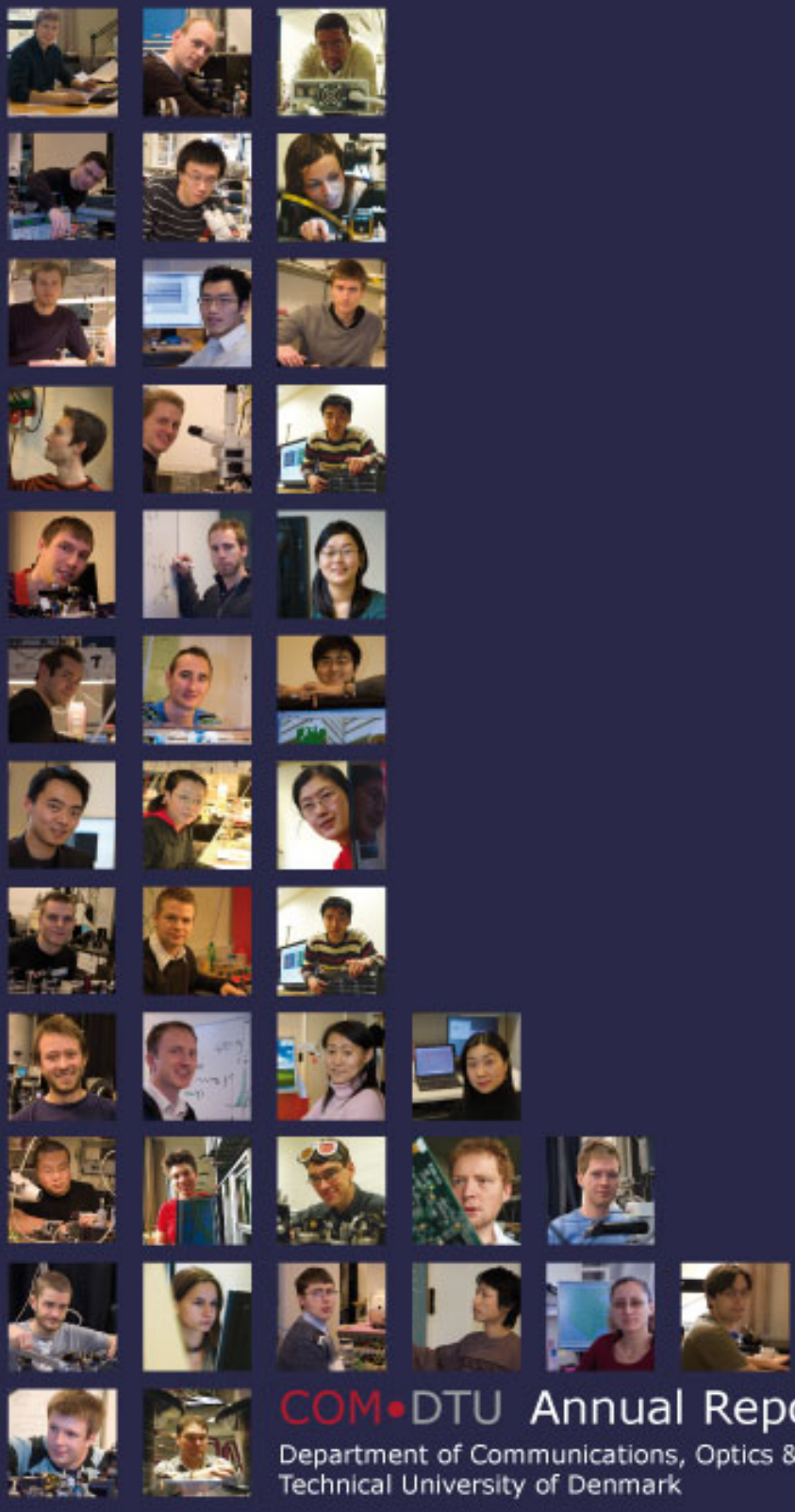


COM•DTU Annual Report 2007

Department of Communications, Optics & Materials
Technical University of Denmark

Table of Contents

Anders Overgaard Bjarklev
Director

Lars-Ulrik Aaen Andersen
Deputy Director

Introduction

We are very pleased to present you with this annual report describing highlights of the activities at COM•DTU - Department of Communications, Optics & Materials, Technical University of Denmark during the year 2007.

For this annual report we have chosen to put special focus on our young talented researchers, who are in the process of shaping the first part of their career. The Ph.D.-student projects form the core of the research done here at COM•DTU and the students' energy, innovative thoughts and ambitions together with those of their supervisors are an important part of the dynamics and development of our department.

Once again we have had a very productive research year, as can be seen from our publication lists. We are happy to note that our citation index is steadily growing as compared to the previous year. Our researchers have also been able to attract a large amount of external funding and many of our young scientists have received prizes for their scientific achievements.

COM•DTU has, during 2007, received a number of donations from our industrial partners. We would like to take this opportunity to express our gratitude and thanks – our research and education activities all benefit tremendously from these donations.

To attract more students, COM•DTU took a new initiative towards the Danish Secondary Schools. Over the course of three months, a new text book on optics and telecommunications technology was written, balanced, and sent out in 32 copies to each Secondary School. As a result of this initiative, we have had a large number of visits from high-school classes and many members of the scientific staff have given presentations.

We would also like to draw your attention to our other educational activities. These are of course reflected in our many Ph.D. projects but also in the list of completed B.Sc. and M.Sc. projects and the extensive work done by our highly motivated students and their supervisors. Degree projects will always be a cornerstone in the activities of a university department, and we note with pride that the quality of the work that is done here, is reflected in the exciting jobs that our graduates take after graduation.

This year COM•DTU successfully hosted two international summer schools: one on telecommunication and one on modelling and simulation of next generation internet. In total, more than 50 students from all over the world participated, encouraging us to repeat the success. It is important for our department to have this type of close contact with students for future recruitment of researchers.

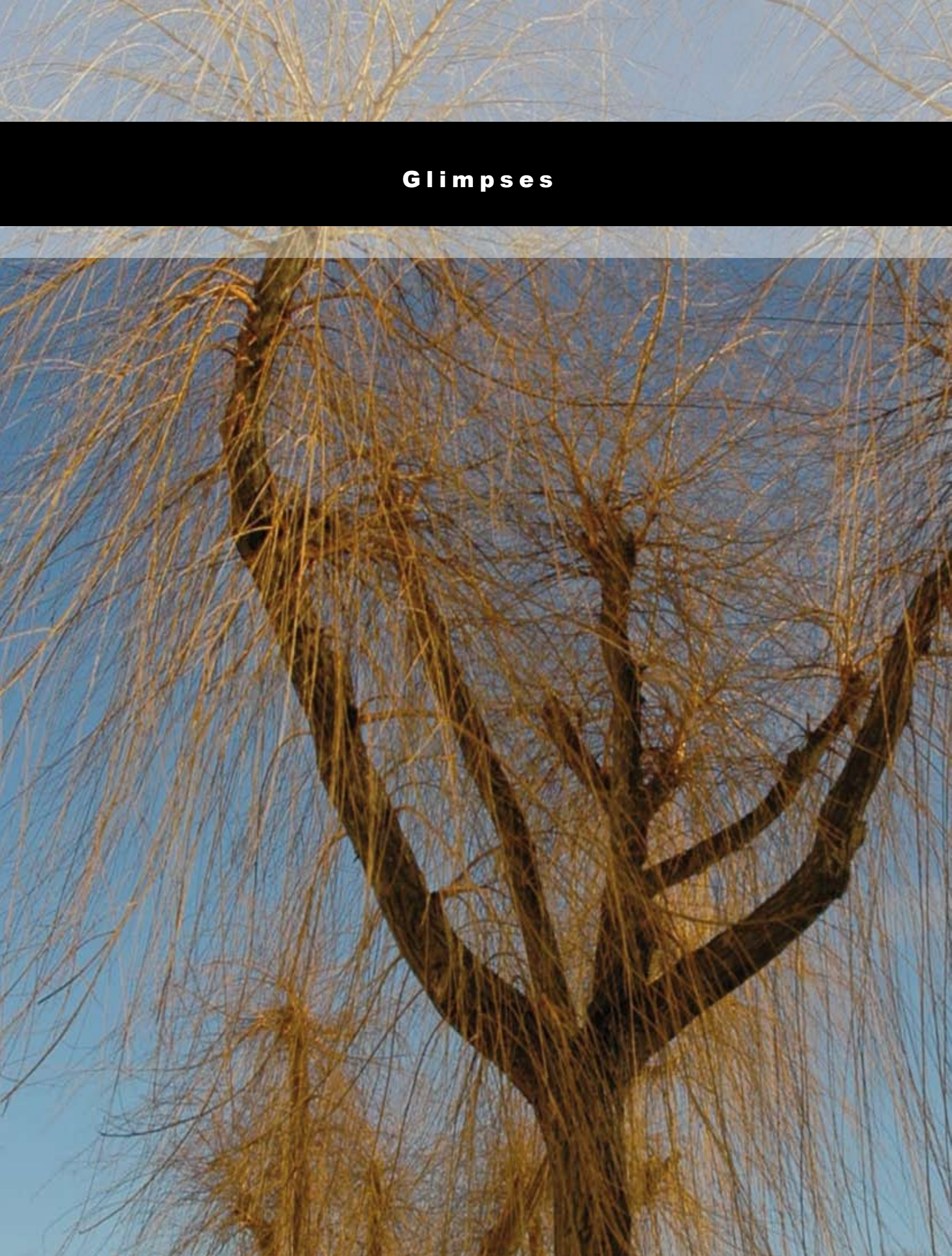
The Technical University of Denmark initiated at the beginning of 2007 a large university merger, which nearly doubled the number of employees. At the end of 2007 COM•DTU was joined with related activities at Risø-DTU, forming a new and much stronger department covering a broad range of advanced photonics and related research and education programs. The new department was inaugurated in January 2008 under the name "DTU Fotonik – Department of Photonics Engineering". We look forward to presenting the first results of our new department in next year's annual report.

In the meantime, we hope you will enjoy this year's annual report.

Anders Bjarklev

Lars-Ulrik Aaen Andersen

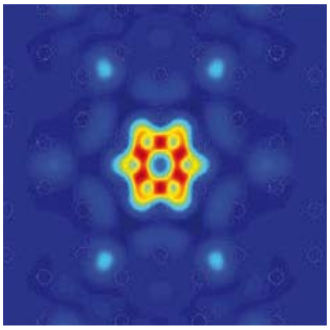
Glimpses



New Add-drop Switch

Elite Scientists

European Conference on Integrated Optics (ECIO)



BIOP

January

Donation of Tellabs Router for the Networks Group at COM•DTU

The Networks Group at COM•DTU received a new high-performance router from Tellabs. The router is to be used for teaching purposes. The new Tellabs 8830 is incorporated into the massive experimental network to which all students get access. Networks has acquired a new heart.

Lecture

Overview of Research in Optoelectronics at Chalmers

Anders Larsen, Photonics Laboratory, Dept. of Micro technology and Nanoscience, Chalmers University of Technology, Sweden.

Among the 5 Best Danish Research Breakthroughs

Each year the Danish newspaper "Ingeniøren", Denmark's largest provider of industry specific information, selects the Top 5 Scientific breakthroughs of the year. COM•DTU, Nano•DTU and iNANO were nominated among the five best for the work on strained silicon.

New Add-drop Switch - World Record

Hans Christian Hansen Mulvad and a few of his colleagues at COM•DTU, invented an add-drop switch, which makes it possible to add-drop channels in a data signal. For the first time in the world, this was done flawlessly at 320Gbit/s, which is double the speed of previous attempts.

"What happens inside the fiber is that the qualities of the fiber are changed by the intense light that is passed through it" explains Hans Christian Hansen Mulvad.

Ingeniøren, Thursday, January 11th, 2007

Elite Scientists

on January 25th Hans Christian Hansen Mulvad, PhD Student, was given an Elite-Scientist Travel Stipend and Thomas Tanggaard Alkeskjold, PostDoc, was given a Young Scientist Prize. Both prizes are given out by the National Science Foundation.

March

Lecture

Moving from VECSELs to MIXSELs – a New Class of Ultra Fast Semiconductor Lasers.

By Ursula Keller, Department of Physics, Institute of Quantum Electronics, ETH, Switzerland.

Lecture

Research Activities in the Optical and Quantum Communications Group. Applications of microwave photonics: Microwave Photonic Filters and Phased-Arrayed Antennas.

Salvador Sales, Optical and Quantum Communications Group (OQGC) of the Universidad Politécnica de Valencia, Spain.

Seminar

Measurement and Control of Spin and Charge Interactions in a Single Quantum Dot Molecule.

Jonathan J. Finley, Walter Schottky Institut, Technical University of Munich, Germany.

April

European Conference on Integrated Optics (ECIO)

COM•DTU hosted, in collaboration with Danchip, the conference European Conference on Integrated Optics (ECIO) 2007 with more than 200 delegates.

BIOP.dk, COM•DTU, and Risø

When COM•DTU embarked on a collaboration with Risø in 1999, they paved the way for skin cancer diagnosis using optics and lasers instead of the surgical knife. The BIOP Center was founded to create a synergy between the very different research approaches of Risø and COM•DTU.

Today the BIOP Center is an internationally renowned research center in the area of medical applications of optics. COM•DTU and Risø have benefited in terms of research as well as in terms of the quality of education. Everybody has benefited from this collaboration, not least patients, who no longer need an invasive biopsy performed to establish whether or not they have skin cancer.

DTU Avisen, vol.. 5, 27th April, 2007.

DTU Gold Medal

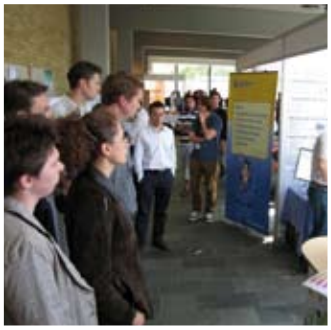
COM•DTU's Advisory Borad member and former Board Chairman, Kaj Juul Pedersen, was given the DTU Gold Medal at the cermonies preceeding the Annual Ball in April.

The Medal is given to an honorable effort in relation to research and education within the scientific areas of DTU.

May

Associate Editor of New Journal

Ole Bang was appointed Associate Editor of the new Internet based journal "Advances in Non Linear Optics".



Elektroprisen 2007

For his invention and research, Peter Uhd Jepsen was selected by the Danish Engineer Association's Elektrofond to be this year's recipient of the annual Elektropris. He received the prize on May 16th at the Engineers House in Copenhagen. The prize included a check for DKK 30.000 and a large bouquet of flowers.

Peter Uhd Jepsen and his team have developed a method by which it is possible to reveal and identify chemicals, for instance explosives or drugs, which are hidden in closed containers or packages. The safety of air travel will increase, and the time spent in safety checks at the airport will be reduced.

The story about Peter Uhd Jepsen, the Elektro-prize and the Terahertz Technology research received a lot of media attention: several large Danish Newspapers carried the story. DR aired it in their radio news program on May 16th, and TV2 had a story about it on the late news-show *22-Nyhederne* on May 16th.

TERENA Conference

Bandwidths are getting broader and broader, but how do we utilize it fully, most safely, and for the specific benefit of students and scientists? This question was the focal point of a networking conference held at DTU on May 21st – 24th.

The Trans-European Research and Education Networking Association (TERENA) offers a forum to collaborate, innovate and share knowledge in order to foster the development of Internet technology, infrastructure and services to be used by the research and education community.

The program featured international speakers and sessions about concrete experiences with using, structuring, and developing services for high speed internet. One notable presentation was given by Henrik Wessing of the COM•DTU Networks Group on the subject of the EU project MUPBED.

The conference was arranged by TERENA, Forskningsnettet, and UNI•C.

Optical Horizons - Text Book for Secondary School Physics

In late May and early June, 8000 books lined the hallway in Building 343. It was *Optical Horizons*, the textbook that COM•DTU published as one of several efforts to strengthen our relationship with the Danish secondary schools. The book received a lot of positive attention and gets great reviews.

Written by scientists, the book is intended to be used in secondary school physics classes. During the month of June all Danish secondary schools received a free set of 32 books. And many orders have subsequently been placed. In December another edition was printed.

Seminar for Secondary School Teachers

Simultaneously with the publication of Optical Horizons, COM•DTU invited physics teachers to a seminar.

Part of the purpose of the seminar was to launch the book, another part was to launch a collaboration with physics teachers in order to strengthen their teaching, increase our student numbers in the future and to generally improve the image of the natural sciences. It turned out that the secondary school physics teachers were in dire need of up-to-date information in their field and were very grateful for COM•DTU's efforts to provide it.

The seminar consisted of a whole day of lectures, group projects, laboratory tours and lots of good food.

June

Lecture

Properties and Applications of Solid Core Photonic Bandgap Fibers

Dr. Paul Steinvurzel, CUDOS, University of Sydney, Australia.

Lecture

Femtosecond Second-harmonic Generation in Random Nonlinear Media

Wieslaw Krolikowski, Guest professor at COM•DTU

Lecture

Quantum Dynamics of Polarisation Squeezing in Optical Fibres

Dr. Joel F. Corney, University of Queensland, Australia.

July

Lecture

Inverse Designed Photonic Devices or Scattering Optical Elements

Dr. Andreas Håkansson, International Center for Young Scientists, National Institute for Material Science, Japan.

Summer School in Telecommunications

It was COM•DTU's first summer school of this kind and it was a success.

Best Paper Award

NorWiP Workshop

EuroFGI Summer School

Rasmus Kjær

Lars Staalhagen and Jorge Seoane from COM•DTU, Allen Dyhr Hammershøj and Jens Peter Jensen from CICT and the 21 students were all very happy with the proceedings. The participants came from all over the world, including Mexico, Malta, and Poland. Their impression of COM•DTU as a place to study was positive and two of them signed up to start a bachelors program in the fall.

Nano Camp 2007

Nano Camp is a summer school that is arranged by UNF (The Danish Youth Association of Science) as part of their efforts to heighten the popularity of the natural sciences and technology. COM•DTU supported the Camp by inviting the participants to demonstrations in the laboratories on two of the four days.

Lectures Booked at Secondary Schools

Thomas Tanggaard Alkeskjold was asked to participate in the Danish Natural Sciences Festival in September as a lecturer. Via the "Book a Scientist" program on our web site, he was booked for three lectures on September 24th and 25th. Thomas Tanggaard Alkeskjold spoke about wave guides, the internet and fiber lasers.

Best Paper Award to Leif Katsuo Oxenløwe

Leif Oxenløwe received the Best Paper Award at the annual OECC/IOOC 2007 Conference. The paper was the result of a collaboration between Optoelectronics Research Center at University of Southampton and COM•DTU. At ORC they produced a special fiber grating filter which was brought to COM•DTU by Francisca Pamigiani of ORC. "Together with the honor and pleasure of receiving this award, came 50.000 Yen, which will be put to use for a nice coffee machine in the Opto Lab." Leif Oxenløwe explains.

The paper is entitled: " *160 Gb/s Re-timing Using Rectangular Pulses Generated Using a Super Structured Fibre Bragg grating".*

August

NorWiP Workshop

At their 3rd Workshop, the Nordic Network of Women in Physics (NorWiP) presented a number of internationally renowned women scientists such as Meg Urry and Naomi Halas, respectively of Yale and Rice Universities, speaking on subjects ranging from black holes to nanoshells, as well as on gender related topics.

NorWiP aims to make sure that women emerge in the Nordic public eye as scientists, too.

The Workshop was arranged by: Karin N. Andersen, MIC; Cathrine Fox Maule, DMI; Alexandra Boltasseva, COM•DTU; Inge Rasmussen, Risø; Johannes Andersen, Niels Bohr Institutet: Ramona Mateiu, SCF Technologies.

EuroFGI summer School

The EuroFGI summer school took place on August 20th to 24th.

The title of the summer school was *"Simulation for Modelling Future Generation Internet*". Its purpose was to introduce the participants to application oriented aspects and problems of digital computer simulation modelling:

The summer school covered both core networks and access networks applications.

ChinaCom Grant

A paper by Sarah Ruepp, Jakob Buron, and Henrik Wessing of the COM•DTU Networks Group were awarded with travel grant at ChinaCom 2007. ChinaCom is being positioned as a premier international conference in the field of communication, networks and internet applications.

Lecture

Discrete Nonlinear Optics in Liquid-filled Photonic Crystal Fibers

Christian Romer Rosberg, CUDOS, Australian National University, Australia.

Donation of an Agilent Router Tester to the Networks Group at COM•DTU

Agilent Danmark donated two router testers to the Networks Area at COM•DTU. The router testers facilitate and expand the students' ability to perform advanced testing of network equipment in a controlled laboratory environment.

Rasmus Kjær Receives Idella Travel Stipend

Rasmus Kjær received the Idella Foundation's travel stipend of DKK 30000. The money was meant to cover expenses for participation on the Asian-Pacific Optical Communications conference (APOC) in Wuhan, China. The Conference took place in the beginning of November. Rasmus Kjær was invited to talk about applications of dispersion compensating Raman amplifiers (DCRA).



September

Children of Galileo

Fifth and sixth graders built their own working telescope almost exactly like the one Galileo Galilei built almost 400 years ago. The project was a tribute to that historical event.

Mikael Svalgaard, formerly of COM•DTU, initiated, planned, and completed the project. in 2009 it is to be one of Denmark's contributions to the International Year of Astronomy. In 2009 it will be 400 years since Galileo built his first star telescope – the first the world had ever seen.

The Children of Galileo project was officially launched on September 11th, at the Bellahøj School. Present were: the Minister of Science, Helge Sander, Rektor Lars Pallesen, COM•DTU's Deputy Director, Lars-Ulrik Aaen Andersen, the Copenhagen Major, Bo Rasmus Kjeldgaard, and many others from the Danish scientific, industrial, political, and academic fields. More on: www.bornafgalileo.dk

Knud Jørgen Larsen - 25 years at DTU

Docent Knud J. Larsens 25th jubilee was celebrated with a lecture by professor James L. Massey on the topic of: "*Zero Error with Feedback*", followed by a reception.

Lecture

High Birefringence Liquid Crystals for Photonic and Display Applications.

Sebastian Gauza, CREOL, University of Central Florida, USA

Lecture

Our Circuits-and-materials Research Activities for use in OTDM Network Systems that will Start From 160 Gb/s

Yoshiyasu Ueno, Associate Professor, Graduate School of Electronic Engineering, National University of Electro-Communications, Tokyo, Japan

Lecture

Photonic-crystal Couplers for Slow Light

Andrey Sukhorukov, Nonlinear Physics Centre, Research School of Physical, Sciences and Engineering, the Australian National University, Australia

Lecture

High-Power, Wide Tuning Range External Cavity Lasers with Integrated Functional Section

Shinya Sudo and Mads Lønstrup Nielsen, NEC System Devices Research Laboratories, Japan.

October

Lecture

Quantum State Preparation and Environment Characterization via Landau-Zener Sweeps of a Qubit

Dr. Martijn Wubs, Niels Bohr Institute.

Knud Larsen in Istanbul

On October 11th, Knud Jørgen Larsen presented our Master"s Degree Programs to students at Bosperus University in Istanbul. Bosperus is one of DTU's collaborating universities. It was founded as an American-British university, so it is an English speaking institution.

This visit is the first of – hopefully – many similar visits in our continuing efforts to recruit more students.

Direktør Gorm-Petersens memorial Grant

Lars Hagedorn Frandsen received Direktør Gorm-Petersens Minde-legat (Memorial Grant) this year!

This grant is given to "Polytechnic Master's or Master's in the Science of Applied Engineering, in recognition of the practical technical development or within the advancement of the technical sciences". DTU Dean of Research, Kristian Stubkjær bestowed the grant at the PhD Graduation ceremony in late October.

November

Physics Teacher Day 2007

On Thursday the 15th of November, Ole Trinhammer and Robert Jensen from the Department of Physics hosted a workshop for secondary school teachers. The teachers were invited to get some input on some of the activities which can be offered to the secondary school students at DTU and how these activities can assist the actual teaching in the secondary schools.

At the workshop people from Department of Physics, Department of Micro and Nanotechnology and COM•DTU represented by Anders Clausen, were invited. Anders Clausen gave a talk - seconded by Mike van der Poel, Thomas Tanggaard Alkeskjold and Leif Oxenløwe about some of the lectures and exercises that COM•DTU offers in an effort to facilitate their teaching about lasers.

Optical Horizons - the Film

The 2007 Broad Band Day

Lectures at IDA

Terahertz on DR1 TV-Avisen

The Secondary School Connection

During the autumn of 2007 COM•DTU was involved in more than 11 class presentations for almost 253 students. Furthermore, 3 high-school students have made the required experiments for their special 3rd year secondary school project at COM•DTU.

Lecture

Three-dimensional Photonic Crystals

Prof. Martin Wegener, Institut für Angewandte Physik, Universität Karlsruhe and Institut für Nanotechnologie Forchungszentrum Karlsruhe GmbH, Germany.

Optical Horizons – the Film

The Post- & Tele museum hired filmmaker Steen Herdel to produce a film about what COM•DTU does. He used the secondary school book as a guide, since it includes all of COM•DTU's areas of expertise.

The film is about 8 minutes long and takes the viewer back and forth between the present and the future of optical communications in order to illustrate what the future may hold.

The film was finished on February 6th, 2008 and was presented at a reception held by the Post- & Tele Museum in connection with the opening of their "Dream Tracks" Exhibit.

The 2007 Broad Band Day

More than 750 people took part in the Broad Band Day 2007 event in the Bella Center. COM•DTU was present with a booth giving exposure to COM•DTU as a research, education and industry-academic cooperation partner. The booth was manned by Idelfonso Tafur Monroy, Kamau Prince, and Palle Jeppesen. Anders Bjarklev gave a talk at the symposium.

The Minister of Science spoke about the digital future of Denmark, explaining how, by 2010, all households in Denmark will have access to broad band.

Visit from Australia

Chris Walsh of CUDOS in Australia, visited COM•DTU this year. Several people from the Nanophotonics group and one from the FNO group gave our guest a tour of their work and facilities.

Chris Walsh is Chief Operations Officer at CUDOS. He is also chairman of AIP Bragg Medal and AIP Walsh Medal (2002), Councillor, Australian Optical Society. in previous years, and President of Australian Optical Society and Chair, NSW branch of Australian Institute of Physics

Lectures at IDA

Both Peter Uhd Jepsen and Anders Fosgerau gave lectures at the Danish Association of Engineers (IDA).

Anders Fosgerau gave a lecture at a workshop at IDA on Monday, October 1st. The workshop was on P2P technology and Anders Fosgerau spoke on what it can be used for.

Peter Uhd Jepsen gave a lecture entitled *THz - the Unknown in a New Light*.

Terahertz on DR1 TV-Avisen

Peter Uhd Jepsen and his THz group were filmed and interviewed for the Danish Radio television news program.

CENDIT Agreement

On November 15th COM•DTU and CENDIT, the Centro Nacional de Desarrollo e Investigación en Telecomunicaciones (The Venezuelan National Institute of Research and Development in Telecommunications) signed an "intention of scientific and academic cooperation". The general objective of this agreement is the development of collaborative research projects and PhD research projects. Moreover, the two institutes will strive for the organization of joint academic and scientific activities, such as courses, conferences, seminars, symposia or lectures. More specifically, the initial area of cooperation will be related to photonic technologies for broad band access networks. The expectation is to start the first three joint PhD projects by September 2008.

The agreement was signed by the Director of CENDIT, professor Freddy Brito and DTU Vice Rector Dr. Knut Conradsen. The signing of the agreement was witnessed by the Ambassador of the Bolivarian Republic of Venezuela to Denmark, Dr Vicente Vallenilla, Lars-Ulrik Aaen Andersen, Ejner Nicolaisen, and Anders Bjarklev.

Third Place at LEOS-Newport Annual Student Paper Awards

Hans Christian Hansen Mulvad achieved third place in the 2006 LEOS-Newport/Spectra-Physics Research Annual Student Paper Award.

Most Important Research Results of 2007

COM•DTU's research on fiber-optical bio-sensors was selected by the Optical Society of America

CENDIT Agreement

Palle Jeppesen - 40 years at DTU

Super Lens

HELLO

DTU Fotonik
Department of Photonics Engineering

(OSA) to be among the most important results in 2007. As such, they will appear in the special December issue of Optics and Photonics News on the worlds most important research results in 2007 [G. Emiliyanov, J.B. Jensen, O. Bang, P.E. Hoiby, L.H. Pedersen, E. Kjaer, and L. Lindvold, Localized biosensing with Topas microstructured polymer optical fiber, Optics and Photonics News, Special December issue "Optics in 2007", Volume 12, Issue 12.]

DOPS Annual Prize went to Lars Hagedorn Frandsen

The prize is given to "a young scientist, development engineer, or other person, who has made an extraordinary effort in the optical field". The prize consists of a diploma and a check for DKK 6.000. Both were bestowed at the Annual DOPS meeting on November 22nd at Risø. The prize is also meant to encourage further work in the optical field. A person is nominated for the prize by others.

Specifically, Lars Hagedorn Frandsen was given the prize for his extraordinary effort within design, production, and characterization of optical semiconductor components based on photonic crystals.

December

Palle Jeppesen - 40 years at DTU

Palle Jeppesen has made many significant and important contributions to his area of research, Optical Communications.

Palle Jeppesen not only deserves a great deal of the credit for the fact that Denmark is in the international forefront of optical communications research, he also brought the field to DTU as an independent field of research. Optical Communications is one of COM•DTU's main areas of expertise, and thus COM•DTU's research has been given status as one of DTU's world class research fields.

COM•DTU celebrated and thanked Palle Jeppesen with a reception in his honor.

Lecture

Terahertz Spectroscopy in the Near Field

Daniel Mittleman, Electrical and Computer Engineering Department, Rice University, Texas

NewTon in Physorg.com

The COM•DTU project NewTon received mention in physorg.com: 3-D photonic crystals will revolutionize telecommunications

Smaller, faster, more efficient: BASF research scientists helped to revolutionize the future world of telecommunications – with the aid of three-dimensional photonic crystals.

In the long term, transmitting information through electrical signals will restrict speed and transmission capacity in telecommunications. The long-term goal is therefore to develop a communications technology based entirely on transmitting information by light waves. The research activities of the "NewTon" project are laying the foundations for this scenario.

Add-drop World Record Doubled – 640 Gbit/s

Late in the year, the UltraNet project achieved an even better world record. They doubled the speed achieved earlier in the year by demonstrating that it was possible to handle 640 Gbit/s at one time.

Nature Photonics - a COM•DTU article by Michael Frosz and Peter E. Andersen

Solitons in optical fibers are important in the generation of super continuum light. An understanding of the diverse physics that is involved when intense optical pulses propagate along nonlinear fibers will enable the engineering of broad-wavelength sources for a wide range of applications.

Super Lens Can Reduce the Need for Medical Experiments

Alexandra Boltasseva was been interviewed for Ingeniøren in connection with her project NanoMIUS.

The Oticon Grant

Per Kær Nielsen, who is a project student with Jesper Mørk, was selected to receive Oticon's large special grant of DKK 100.000.

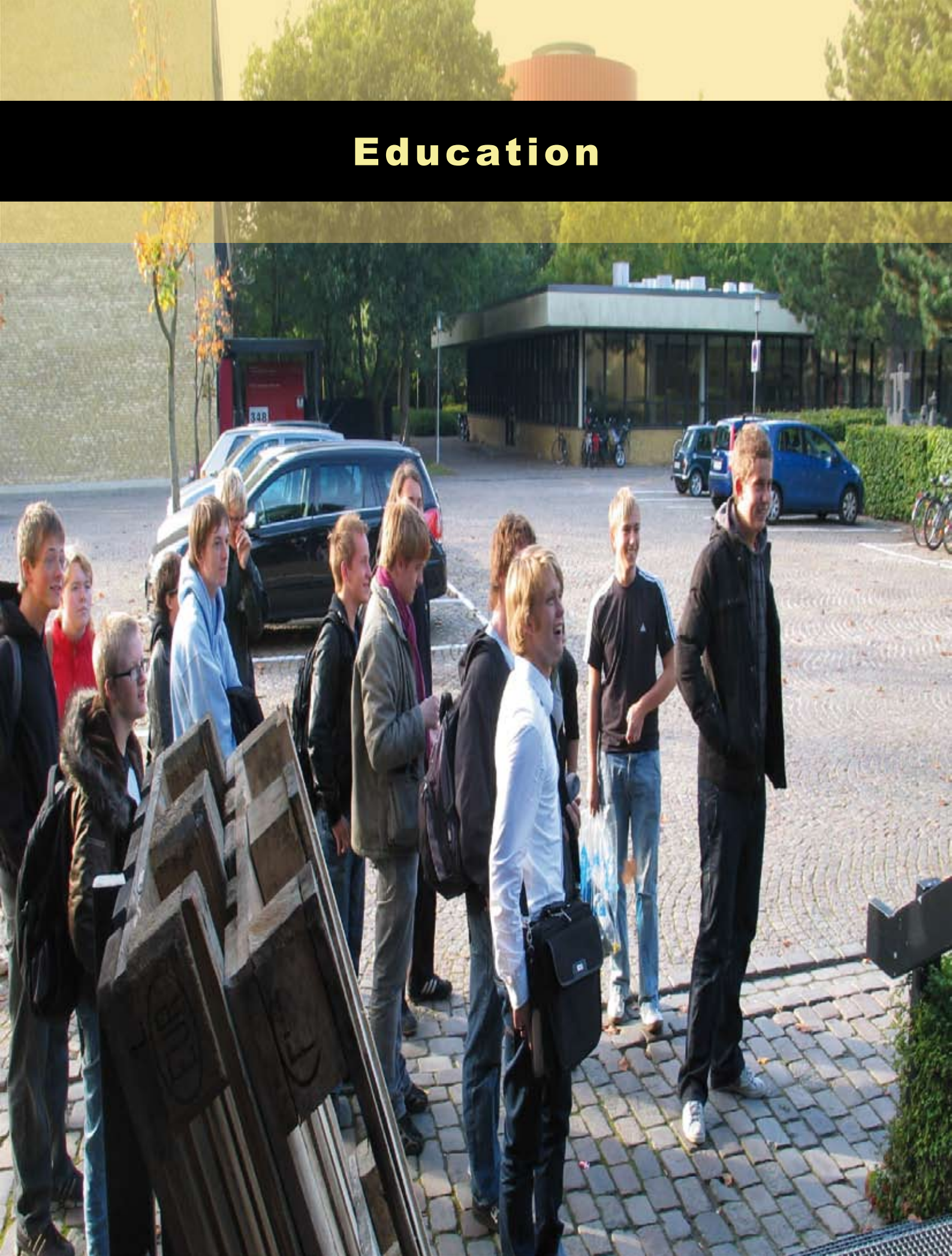
20.000 of that is to be spent on consumables in connection with his project, but 80.000 are his own.

Farewell to COM•DTU Hello to DTU Fotonik

All the DTU departments are undergoing changes this winter: mergers, reorganizations and name changes.

On January 1st, 2008 we are no longer working at COM•DTU, but at DTU Fotonik, Department of Photonics Engineering.

Education



January

Ali Farek Mohamad
Powerline Communication. The Access Technology for reasizing AMM and Broadband Service
15-01-2007
Lars Dittmann,
Knud Ole Helgesen
Pedersen, Ørsted

Yun Xu
Transformation of the Chinese Telecom Sector
15-01-2007
Morten Falch

Yaohui Chen
Nano-scale Semiconductor materials for Multi-Wavelength Optical Regeneration
16-01-2007
Filip Öhman
Jesper Mørk

Zheng He
Quality of Service for Hand-over Traffic
19-01-2007
Villy Bæk Iversen

Jiankai Yin
Evaluation of Multi-service Overflow Systems
24-01-2007
Villy Bæk Iversen
Torgny Holmberg

Lars Fledelius
Analysis, Design and Implementation of P2P-based File Sharing System
25-01-2007
José Soler

Danny Noordegraaf
Long period Gratings in Liquid Crystal Photonic Bandgab Fibres
30-01-2007
Thomas Tanggaard Alkeskjold
Jesper Lægsgaard
Lars Rindorf

Rui Du
Implementation of Strategies for Network Testing
30-01-2007
Michael Berger

February

Barfi-Adomako Owusu
Network Infrastructure to Support Research and Education Network in Ghana
05-02-2007
Reza Tadayoni
Jakob Buron

Yu Xu
Investigations of directly modulated Lasers for Metropolitan Area Networks Applications up to 10 Gbit/s
06-02-2007
Christophe Peucheret
Jorge Seoane

Xi Guo
Planning IMT2000 Networks
08-02-2007
Villy Bæk Iversen

Bjarni Olafsson Corfitzen (dipl.)
Ethernet Link Layer Test Equipment
19-02-2007
Reza Tadayoni
Niels Koefoed

Jakob Westh Olsen (dipl)
System Implementation in a Distributed Company
22-02-2007
Morten Falch

March

Mikael K. Mieritz
Mobility Impact on End-to End QoS in UMTS Networks
09-03-2007
Henrik Christiansen
Lars Dittmann

Nestor Avramov
Modelling of TETRA Enhanced Data Services
14-03-2007
Villy Bæk Iversen
Lars Staalhagen

Daming Zou
Performance Evaluation of Balanced Fairness
23-03-2007
Villy Bæk Iversen
Torgny Holmberg

April

Hui Diao
Video Coding for Packet based Communication
19-04-2007
Søren Forchhammer

Björn Grétar Stefánsson
Compression of Maps and Images for Mobile Services
09-04-2007
Søren Forchhammer

Jannik Østergaard
An Analysis of triple play and Requirement Specification Design and Implementation of a Triple Play Measurement Probe in the Back Bone Network
25-04-2007
Reza Tadayoni
Niels Koefoed

June

Nicholas Hansen
Specification of Requirements for an IP-PBX Solution
01-06-2007
Jørgen Bansler

Li Zhang
Video Quality Measurement
01-06-2007
Søren Forchhammer

Carlos Oliver
Improving the Performance Bidirectional Long Reach PON Links by using Code Modulation Techniques
26-06-2007
Idelfonso Tafur Monroy

Mallikarjuna R. Burujukati
UMTS Mobility
29-06-2007
Henrik Christiansen
Lars Dittmann

Jonas Due Buron (Bachelor)
Quantum Noise of Surface Plasmon Polaritons
29-06-2007
Peter Lodahl

Kristian Høeg Madsen (Bachelor)
Quantum Noise of Surface Plasmon Polaritons
29-06-2007
Peter Lodahl

July

Simon Ejsing (bachelor)
Computational Physics: Optical Switching using Microcavities
06-07-2007
Jesper Mørk

John Sivertsen (bachelor)
Network Firewall
27-07-2007
Lars Staalhagen

August

Georgios Kardaras
Resorce Allocation in Next Generation Internet
07-08-2007
Villy Bæk Iversen

Evangelos Iliakis
Resorce Allocation in Next Generation Internet
07-08-2007
Villy Bæk Iversen

Alejandro Pelorosso
Modelling of a Pre Congestion Notification Enabled Network
08-08-2007
Michael Berger
Lars Ellegaard, Tellabs

Philip Raz Haargaard
Electric Field Sensing Using Liquid Crystal Photonic Bandgap Fibres
17-08-2007
Thomas T. Alkeskjold
Lara Scolari

Mansoor Ahmed Qureshi
Modelling Long Term Evolution of 3G Mobile Networks
24-08-2007
Villy Bæk Iversen
Henrik Christiansen

Muhammad Hussain
Modelling Long Term Evolution of 3G Mobile Networks
24-08-2007
Villy Bæk Iversen
Henrik Christiansen

Anders Tegtmeier Pedersen
Evaluation of Urbach associated Components of the Loss Spectrum in Germanium doped Silica Optical Fibres
28-08-2007
Karsten Rottwitt

Jaume Puiggros
Implementation and Characterization of a full 160 Gbit/s Optical Communication Systems
29-08-2007
Leif Oxenløwe
Anders Clausen
Michael Galili

Xu Guo
OBSAI based Embedded System
31-08-2007
Michael Berger
Christian Lanzani

September

Athanasios Panousis-Vongelis
Dynamic Load Control in WiMAX Networks
04-09-2007
Villy Bæk Iversen
Henrik Dam, Danske Telecom

Suresh Donaputi Upandra
Design of Wireless Sensor Networks with Video and Mobility
10-09-2007
Søren Forchhammer
Jan Madsen

Kenni Lars Lund, (bachelor)
Bidirectional Network Communication with Model Plane
11-09-2007
Brian Bach Mortensen

Nicolaj Koch, bachelor
Bidirectional Network Communication with Model Plane
11-09-2007
Brian Bach Mortensen
Björn Arnarsson
Mobile/IP Convergence
14-09-2007
Lars Staalhagen

Ýmir Sigurdason
Mobile/IP Convergenc
14-09-2007
Lars Staalhagen

Òsk Òlafsdóttir
MyPAL: Mobile Personalized Activity Locator
21-09-2007
Henning Olesen

Stefan de Crescenzo
Performance Simulation for a Quantum Key Distribution Network
21-09-2007
Lars Dittmann

October

Kristian Nielsen
Fabrication and Characterization of Nonlinear Microstructured Polymer Optical Fibres
10-10-2007
Ole Bang
Theis Hansen,
Peter Moselund

Zhiguang Deng
Benefit for All: A Techno-Economic Study on Mobile TV Value Chain and Business Mode
11-10-2007
Knud Erik Skouby
Steffen Ring, Motorola
Yi An
Regeneration of Optical DPSK Signals Using Nonlinear Processes in Optical Fibres and semiconductor components
15-10-2007
Christophe Peucheret

Jinhua Qiu
Radio Ressource Allocation in WCDMA Networks
24-10-2007
Villy Bæk Iversen

Siaka Traore
Image sequence coding for the ASIM space mission
29-10-2007
Søren Forchhammer

Na Qiau
Reliable IPTV Services in Metro Ethernet Networks
30-10-2007
Michael Berger

Yanmeng Wang
Constraint Based Routing in Multi-Service Network
30-10-2007
Michael Berger
Lars Ellegaaard, Tellabs

Rong Fu
Constraint Based Routing in Multi-Service Network
30-10-2007
Michael Berger
Lars Ellegaaard, Tellabs

November

Dan Zhao
C-Based Implementation of An RTP-Stability Testing Tool
05-11-2007
José Soler
Anders Fosgerau

Yupeng Li
C++ Based Implementation of An RTP Stability Testing Tool
05-11-2007
José Soler
Anders Fosgerau

Hao Yu
Simulation of Fault Handling Property in a Protocol for Home Network Environment
06-11-2007
Lars Dittmann
Niels Jensen, Oticon

Aaron Larsen
Application of Orthogonal Frequency Division Multiplexing to High Speed Optical communication systems
12-11-2007
Christophe Peucheret
Knud J. Larsen,

Yu Xu
Signal generation and Transmission for 100 Gbit/s Ethernet
12-11-2007
Christophe Peuchere
Jorge Seoane

Jiang Zhang
OAM Function for Carrier Ether-

net Transport

19-11-2007

Michael Berger

Lars Dittmann

Kamran Virk

MPEG Video Postprocessing for HDTV

26-11-2007

Søren Forchhammer

Wenting Cao

All-Optical Frequency Down-conversion for Wireless Access Points

28-11-2007

Idelfonso T. Monroy

Jorge Seoane

December

Hao Yu

Simulation of Fault Handling Property in a Protocol for Home Network Environmen

06-12-2007

Lars Dittmann

Yuqi Zhang

Evaluation of Network Architectures for IP TV

11-12-2007

Brian Bach Mortensen

Jose Soler

Ravi Kumar Gangam

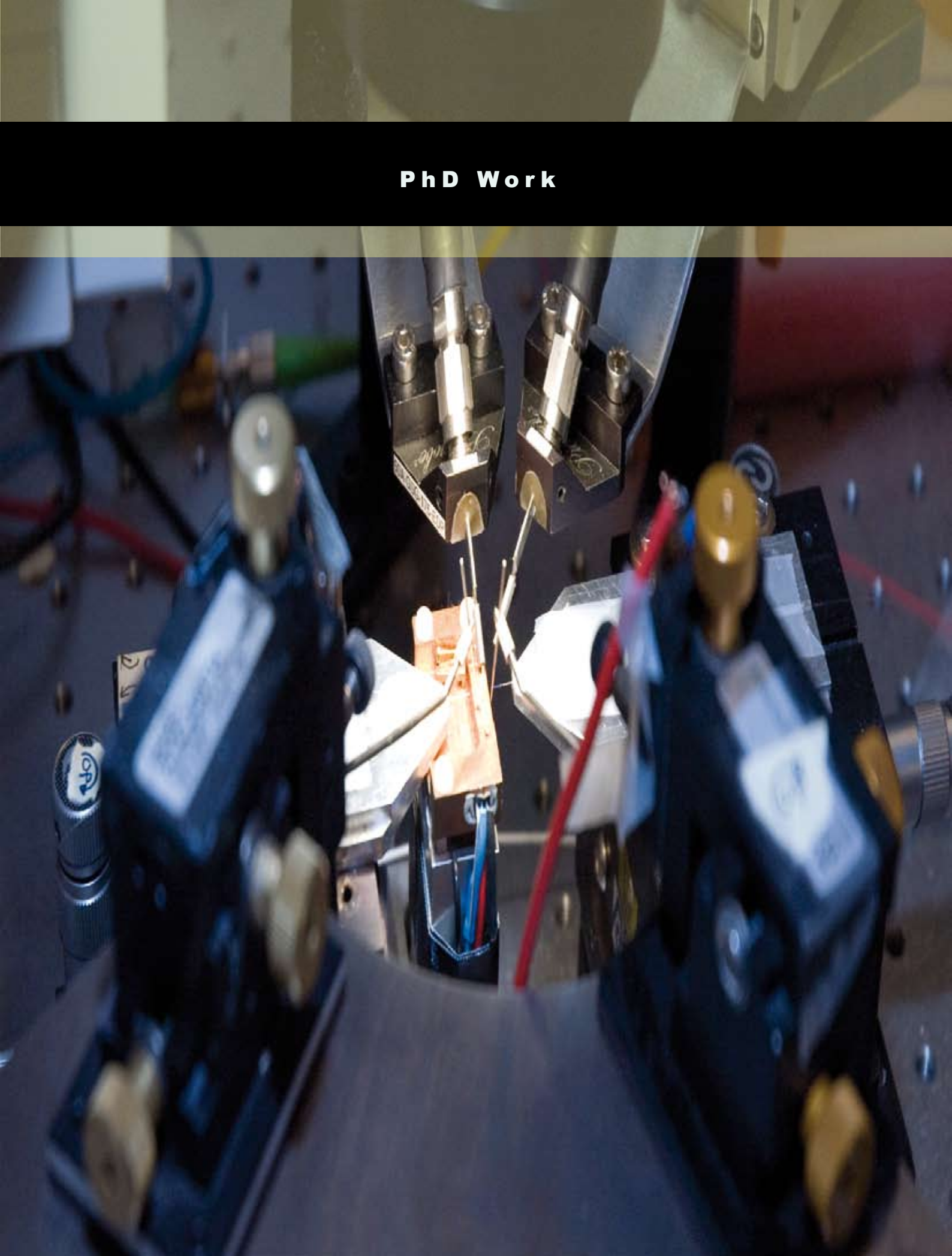
Evaluation of Interworking Between WIMAX/IMS and TETRA

20-12-2007

Lars Dittmann

Jens Jacobsen, Motorola

PhD Work



Huiying Li

What is the best possible result of this project? the dream scenario?

Solutions, that are both fast and efficient, are valuable in the industrial world. That is what I hope for.

What else needs to be done before the dream scenario might be realized?

A more reliable and more intelligent visual quality evaluation method is needed.

Might the dream be realized in the foreseeable future?

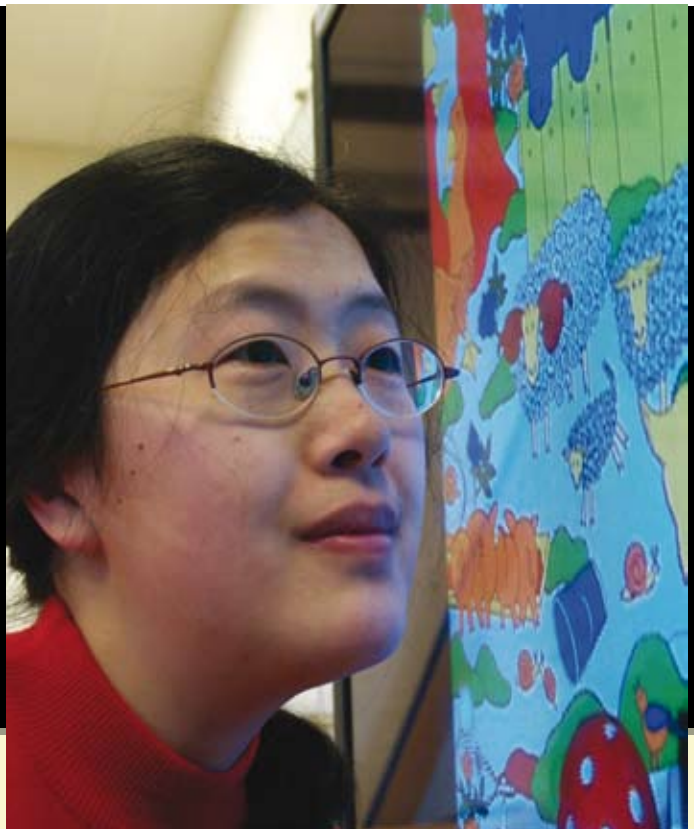
Hopefully.

What keeps you going? Is it the dream or is it the day-to-day work itself?

Both. To realize a dream, a huge amount of day-to-day work must be carried out.

Why COM•DTU?

I don't know. Maybe it is a kind of destiny which decides that my twenties are spent in a technical university from the home of the fairy tale.



Visual Quality in Video Coding Applications

The goal of this PhD project is to optimize the quality of video decoding for the flat panel TV screens (LCD and Plasma).

The project is targeted at encoded MPEG video signals. MPEG2 and MPEG4 are currently the dominant digital video coding standards. The newest MPEG/H.264(AVC) is on the verge of entering the market e.g. for HDTV and IPTV. They reduce the size of the video but often at the expense of generating some artefacts. My PhD project is targeted at developing video processing methods, which can remove and depress the artefacts and optimize the quality of the decoded video frames.

Danmarks Tekniske Universitet, COM•DTU

Main Supervisor: Søren O. Forchhammer

Kamau Prince

What is the best possible result of this project? the dream scenario?

The best possible scenario would be the development of a set of guidelines that inform industry partners as to the most efficient, most sustainable methods for developing and implementing radio over fiber solutions for converged mobile access networks.

What else needs to be done before the dream scenario might be realized?

A more thorough characterization of the operating conditions needs to be undertaken, as well as analyses into the optimal methods for protocol-transparent signal processing and transmission.

Are there other dream scenarios?

Yes, we would like to get industry partners on board, to get a better feel for issues they might have, that we wouldn't otherwise know about. It might make them more comfortable with the finished proposals, as well as give them a more concrete sense, that the final proposals would fit their operations better.

Might the dream be realized in the foreseeable future?

Yes, if work continues as planned, then it will be possible to achieve the dream.

What keeps you going?

of course it's always good to have a set of clear long-term goals, but it's also important to enjoy the everyday tasks that need to be accomplished.

Briefly describe the day-to-day work.

It's basically a caffeine-fuelled challenge to get through the reading, experiment setup (and troubleshooting) and reporting as quickly and efficiently as possible while making sure you don't get in everyone else's way.

Why COM•DTU?

There's a great balance between the work environment and home life, and there's also so much room/opportunity to achieve some really good results and collaborate with persons from such diverse backgrounds.

Fixed and Wireless Unified Signal Transport

We're trying to develop Radio-over-Fiber communications systems for provisioning protocol-transparent interfaces as will be required for successfully interconnection of wireless access and optical core communications networks, especially for in-building and fiber-to-the-home scenarios. For this, we'll also be examining current trends in the development of high-speed wireless access and optical core communication networks in order to ensure that the final solution is relevant to industry's needs, as well as being the most robust, best-cost solution available.

Danmarks Tekniske Universitet, COM•DTU
Main Supervisor: Idelfonso Tafur Monroy
Supervisor: Palle Jeppesen

Finn Eichhorn

What is the best possible result of this project? the dream scenario?

The ultimate result would be to develop a state-of-the-art mobile light-weight terahertz (THz) camera which can be used for airport security, quality control and spectroscopy of chemical and biological materials. Today it is a tough challenge to build a robust and inexpensive THz setup creating THz radiation outside the well controlled lab environment. The dream scenario would be that every person going through security in an airport in foreseeable future will be full-body scanned with a THz scanner.

What else needs to be done before the dream scenario might be realized?

We need inexpensive and robust high power THz sources and optimized sampling equipment. Further, we also have to design the right material in which we generate the THz radiation for these small portable devices.

Are there other dream scenarios?

Basically, there are a couple of these dream scenarios, since the right THz device opens up for an enormous range of interesting applications. We are working on it.

Might the dream be realized in the foreseeable future?

If we keep on working hard and make some essential progress in the area, the dream scenario might then actually not be so far away from being realized. Many researchers and companies all around the world are working on making progress in this area right now.

What keeps you going? Is it the dream or is it the day-to-day work itself?

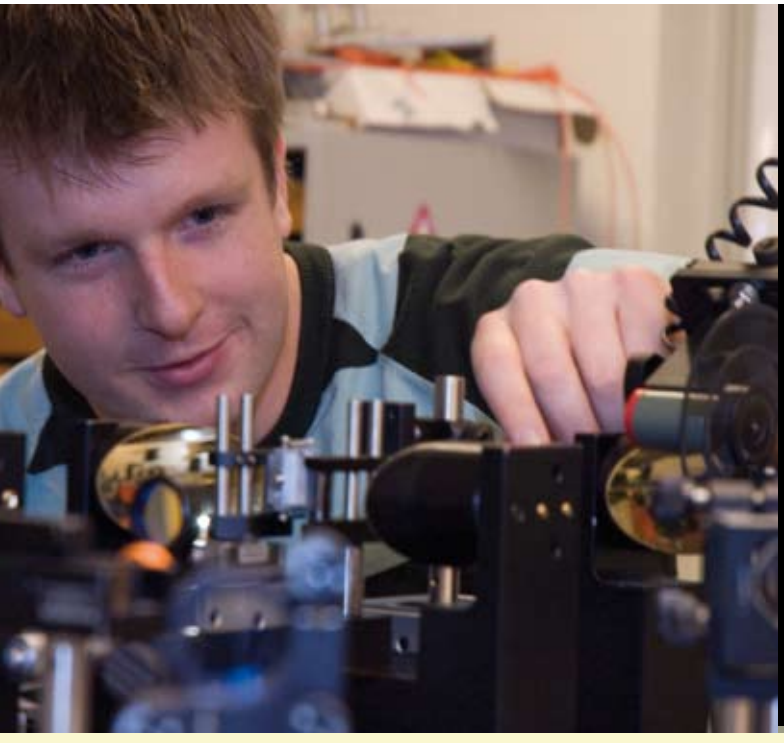
It is clearly a combination of both. The daily work is both exciting and very challenging. An inquisitive person will always stumble over new, interesting ideas that he just needs to know more about and try out in the lab. So, there is always more interesting stuff to explore. But of course you also need a dream to keep you motivated in the day-to-day work. Every research project has some different fases. Sometimes everything works out very smoothly, but there will also be long days where things do not work out as planned and everything seems to be against you. Especially on these days, it is the dream that keeps you running.

Briefly describe the day-to-day work.

The daily work is very diverse. Some days are spent in the lab, on others I read the newest scientific articles in the field and on a third day I might set up computer simulation. Travelling to conferences and summer schools is also a part of the PhD job, but this is of course not the worst part of it.

Why COM•DTU?

I already had some insights into terahertz sciences from my Master's degree studies at Ørsted•DTU. My Supervisor at Ørsted•DTU had a tight collaboration with associate professor Peter Uhd Jepsen from COM•DTU. Peter was also co-supervising my thesis work. So I talked to Peter about this exciting PhD Project he was offering and so I was hooked and stayed at COM•DTU.



Fibre Laser Based Broadband THz Imaging Systems

The terahertz, or THz, frequency range represents a gap in technology - as well as knowledge - in the electromagnetic spectrum. The THz range is loosely defined as frequencies between 100 GHz and 5 THz. The region is sandwiched between the laser world and the transistor world. The aim of the project is to construct an active THz imaging system based on coherent radiation in the THz range. We are designing a THz camera which will be able to take THz pictures, which can be used in various sorts of different applications ranging from airport security to spectroscopy and quality control.

Danmarks Tekniske Universitet, COM•DTU

Main Supervisor: Peter Uhd Jepsen

Supervisor: Jens Engholm Pedersen,

Stephan Smolka

What is the best possible result of this project? the dream scenario?

I would like to investigate novel correlations in multiple scattering random media. Up to now, quantum optics and multiple scattering are two separate fields of research. In my dream scenario I combine both areas and perform the first experiment, which proves the theoretical predictions, that different states of quantum light behaves differently in multiple scattering random media.

What else needs to be done before the dream scenario might be realized?

There are only some theoretical predictions in the literature which propose novel correlations in multiple scattering media. Therefore, additional theories need to be developed. This is a challenging task. Furthermore, different non-classical light sources, like squeezed light, thermal light and single photon sources, have to be realized in the experiment and several setups will be established to prove different theories.

Are there other dream scenarios?

Besides solid media dynamic multiple scattering media like fluids are also very interesting. Quantum optics in multiple scattering media is a new field of research and offers a big playground for new experiments.

Might the dream be realized in the foreseeable future?

We work hard to realize non classical light sources and to investigate the behaviour of non-classical light in multiple scattering random media. We have managed to set up a squeezed light source as our first non-classical light source. in the next step we will perform experiments to understand the behaviour of squeezed light in multiple scattering media. This is a milestone in the project because non-classical light in nano-structured media can be investigated now.

What keeps you going? Is it the dream or is it the day-to-day work itself?

For me both are very important. On the one hand it is very fascinating to work in the laboratory and to build up new experiments. Every day is different and one has to deal with unforeseeable challenges. On the other hand the experiments are set up to prove predictions, which have been done in advance. It is very motivating and fascinating to go through the theory and to compare the theory with experiments.

Briefly describe the day-to-day work.

There is no general time schedule. I share the laboratory with other PhD students. I try to be as much as possible in the lab. In between, I analyse the measurements and read a lot of literature. Furthermore I participate in PhD courses. An essential part of my work is to discuss problems and results with other PhD students or my Supervisor.

Why COM•DTU?

After my Master's degree, I decided to see something new and therefore I applied at various places all over Europe. The project and the environmental conditions at COM•DTU suited me best. Here the expertise in optics is very broad. Moreover the institute has a good reputation and is internationally oriented.

Quantum Optics in Nano-structured Materials

The project concerns studies of multiple scattering of quantum correlated light propagating through nano-structured materials. Multiple scattering of light is an extremely active and interdisciplinary research field, which so far has focused mainly on classical optics. When light is scattered many times, the propagation direction is randomized, i.e. the transmitted light becomes uncorrelated. In contrast, different quantum states of light can be used to induce strong correlations between different propagation directions. The aim of the project is to give the first experimental demonstration of this effect.

Danmarks Tekniske Universitet, COM•DTU
Main Supervisor: Peter Lodahl
Supervisor: Ulrik Lund Andersen, DTU Fysik

Minhao Pu

What is the best possible result of this project? the dream scenario?

The best possible result of this project is to get an optical filter with ultra high Q value about 10^8 and free spectral range of 10GHz.

What else needs to be done before the dream scenario might be realized?

How to design the novel photonic crystal structure and how to improve the fabrication technologies are the main concerns.

Are there other dream scenarios?

I hope the filter can have its own commercial applications in future next-generation optical network.

Might the dream be realized in the foreseeable future?

I believe the dream can be realized due to the developing nanotechnology and the growing demand for large capacity communication.

What keeps you going? Is it the dream or is it the day-to-day work itself?

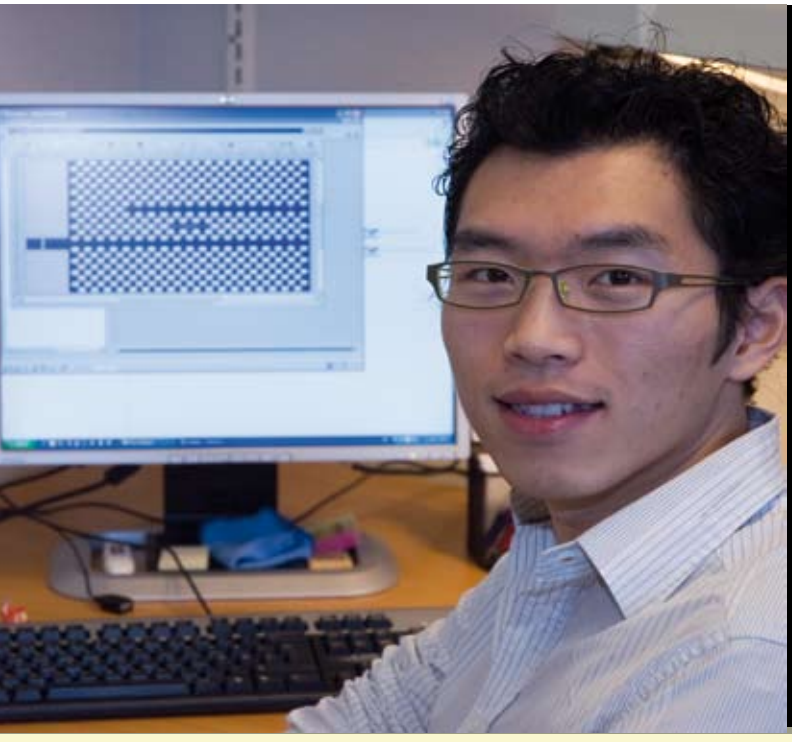
The dream can keep me working with passion and enthusiasm. It also gives me the courage to overcome difficulties.

Briefly describe the day-to-day work.

Computer simulation and fabrication in clean-room constitute my daily work. New ideas and the satisfaction I experience with any improvement also color my work.

Why COM•DTU?

COM•DTU is a world leader in optoelectronics - especially in design and fabrication of nano-photonic structures. In addition, the excellent facilities and staff and the international and harmonious atmosphere are all attractive to all the students in optical field



Nano-structured Filters

The project is about design and fabrication of a novel compact photonic crystal-based optical filter with ultra-high quality factor, which is used for mode-locking in the pulsed fiber laser. We will also use the topology optimization method to design photonic crystal-based sinc-function filter for timing-jitter tolerant switch. The size of the filters will be in the order of several tens micrometers which benefits from nanotechnologies. The final goal is to use the filters to stabilize 160 Gbit/s or higher optical communication systems.

Danmarks Tekniske Universitet, COM•DTU

Main Supervisor: Jørn Märcher Hvam

Supervisor: Lars Hagedorn Frandsen

Hans Christian Hansen Mulvad

What is the best possible result of this project? the dream scenario?

The best possible result of this project would be to demonstrate a fiber-based switch with ultra-high-speed performance, which is both polarisation-independent and inherently stable against environmental perturbations. This would constitute an important step towards practical use of this type of switch for future high-speed signal processing.

What else needs to be done before the dream scenario might be realized?

The project has already resulted in a potential candidate for such a switch. It has been shown that a so-called Sagnac fiber interferometer can be used to perform polarization-independent signal processing at very high bitrates, and that this switch can be protected against external temperature fluctuations. In the remainder of the project, we will attempt to find other candidates with even better performance and stability.

Might the dream be realized in the foreseeable future?

Practical use of fiber-based switches is not expected in the near future, since the existing optical communication networks do not operate at bitrates where the high-speed capability of these switches is required. However, when systems operating Terabit/s speeds become necessary, fiber-based switches could enable their realisation provided the instability problem is solved.

What keeps you going? Is it the dream or is it the day-to-day work itself?

The challenge of achieving the main goal of the project is the most important motivation in the daily work.

Briefly describe the day-to-day work.

Most of the day-to-day work takes place in the laboratory, where new ideas can be tested. Beforehand, the experiments are discussed with Supervisors and colleagues. The existing scientific literature is often consulted to find new inspiration.

Why COM•DTU?

At COM•DTU, there is very good collaboration among colleagues as well as excellent experimental facilities. These conditions enable us to perform research at the highest international level in our field.

Ultra Fast Signal Processing in Optical Fibers

Switches based on optical fiber rely on the nonlinear Kerr effect which has a response time of a few femtoseconds. They are therefore one of the most promising candidates for ultra high-speed signal processing at bitrates beyond 1 Terabit/s. The goal of this project is to overcome the inherent instability problem of these switches, which is due to their sensitivity to environmental conditions and their dependence on the polarisation state of the light signal.

Danmarks Tekniske Universitet, COM•DTU
Main Supervisor: Palle Jeppesen
Supervisor: Leif Oxenløwe
Supervisor: Anders Clausen
Supervisor: Lars Grüner-Nielsen, OFS A/S

Christian Lanzani

What is the best possible result of this project? the dream scenario?
A reasonably acceptable result of the project is to see a match of the discoveries into real field applications and having acceptance from the bodies involved into the specification definitions.

What else needs to be done before the dream scenario might be realized?

Work, work, work, and work. Team cooperation with industry partners and key academic institutions is of vital importance.

Are there other dream scenarios?

The achievement of a goal is part of the satisfaction of a dream scenario.

Might the dream be realized in the foreseeable future?

Yes, of course.

What keeps you going? Is it the dream or is it the day-to-day work itself?

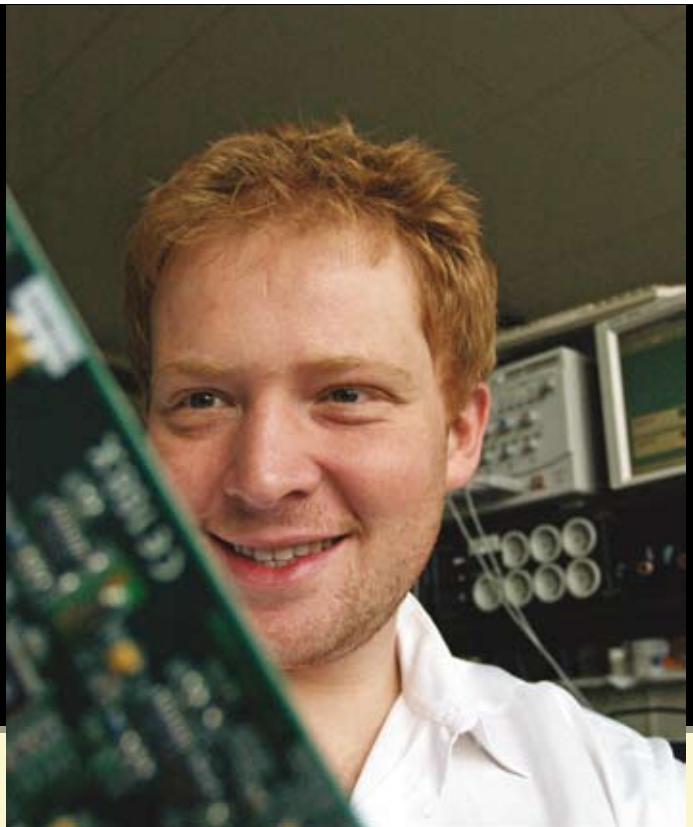
It is both. It is the feeling of desire and of completing something that has been started.

Briefly describe the day-to-day work.

It is mainly carried out at Radiocomp ApS facilities since mine is an industrial PhD project. It varies from scientific readings, to architecture design and verification, product and technology management and roadmap to team work coordination. Teaching consists of bringing out to students the challenges and knowledge required to face this technology.

Why COM•DTU?

COM•DTU is the best environment for mixing networks, wireless and software competence areas with a very skilled background in both optical and wired networks research. Also the laboratory facilities and instruments available are at the cutting edge.



Software Defined Radios for 4G Mobile Networks

The project is focusing on commercial applications for Software Defined Radio, where a trade-off between performances and cost is of great interest when developing solutions. SDR definitions and approaches have a strong impact on both the network architecture and on the radio transceiver internal functions of distributed BTS (Base Transceiver Station) nodes that use either local or remote radio transceivers. Specifically, it investigates the network challenges that emerged after the deployment of the first generation of OBSAI/CPRI interfaces in RRH (Remote Radio Head) networks for most of the new emerging standards like WiMAX and LTE (Long Term Evolution).

Danmarks Tekniske Universitet, COM•DTU
Main Supervisor: Lars Dittmann
Supervisor: Michael Stübert Berger

Christina B. Olausson

What is the best possible result of this project? the dream scenario?

The best possible result of the project would be to gain some new knowledge of the characteristics of active photonic crystal fibers, which would significantly improve the design of the fibers.

What else needs to be done before the dream scenario might be realized?

Several characterization systems need to be developed and many types of large mode area fiber should be tested thoroughly. The fiber designs comprise ultra-high NA fibers, rod-type fibers, HOM fibers.

Are there other dream scenarios?

To design a fiber which ends up in a successful fiber laser or amplifier product would be a dream scenario.

Might the dream be realized in the foreseeable future?

Being an industrial PhD, there is, of course, a commercial interest from the company in supporting a project which is realizable within the near future. During the initial few months of the project, the first active characterization system for photonic crystal fibers has been constructed, and several more systems have to be developed during the next three years.

What keeps you going? Is it the dream or is it the day-to-day work itself?

Being a part of a fiber manufacturing company and feeling the dynamics of company life is a significant motivation, combined with the potential of seeing my work make an impact on a commercial product.

Briefly describe the day-to-day work.

My time is split between COM•DTU and Crystal Fibre. A typical day at Crystal Fibre takes place in the laboratory where I prepare the characterization setups and make measurements on the different fibers, using lenses, mirrors, OSAs and CCD cameras.

Why COM•DTU?

COM•DTU is an obvious choice of institute for an industrial PhD project within fiber technology. COM•DTU comprises a great deal of experience in the field of photonic crystal fibers.

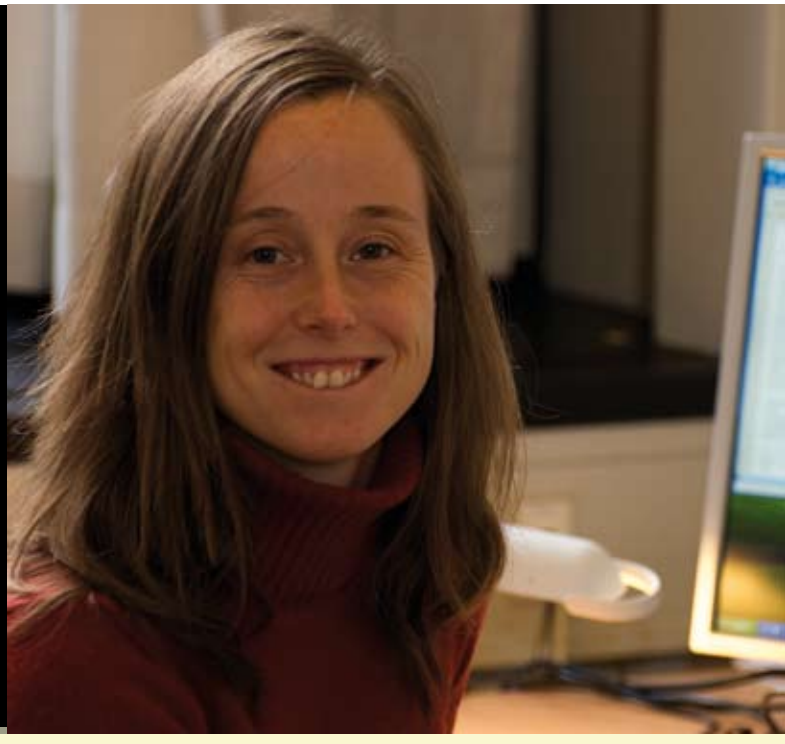
Active Photonic Crystal Fibres for High Power Applications

Within the field of fiber technology there is a great need to understand the possibilities and limitations of the active photonic crystal fibers. The scientific goal of the project is to reach a deeper understanding of the photo darkening phenomenon and the characteristics of active materials, and to broaden the knowledge of active large mode area fibers. The photo darkening phenomenon plays a large role in limiting the lifetime of ytterbium-doped silica fibers and is still to be understood in depth. The trend towards higher power in fiber lasers and amplifiers requires a great amount of knowledge about active large mode area fibers, typically used in this type of application. The project will add to the knowledge and development of these fibers through development of reliable characterization systems and the design of new active high NA, large mode area fibers.

Danmarks Tekniske Universitet, COM•DTU

Main Supervisor: Kim P. Hansen, Crystal Fibre A/S

Supervisor: Anders Bjarklev



Philip Trøst Kristensen

What is the best possible result of this project? the dream scenario?

My project is concerned with calculations of light-matter interaction, so the dream scenario must be a device offering total, coherent control over the interaction of electrons with the electromagnetic field. Such a device will have direct application in future quantum information technology.

What else needs to be done before the dream scenario might be realized?

One will need full control over both electrons and photons. The former may be achieved with quantum dots, which are nano meter sized solid state structures, often referred to as artificial atoms. The latter may be realized with cavities in novel periodic materials known as photonic crystals. Sufficiently advanced models of these structures are needed in order to understand and predict the coupling effects.

Are there other dream scenarios?

My personal goal, which I find possible to realize in one form or the other, is simply to learn more and to better understand the quantum nature of light-matter coupling. Hopefully, this may in time lead to ideas for new devices or experiments exploring these effects.

Might the dream be realized in the foreseeable future?

In my opinion, quantum information processing and communication will become an important part of future information technology. Already quantum cryptography has been demonstrated experimentally and commercial quantum information and communication products are emerging. A coherent light-matter interface is more or less essential for many of the proposed applications, so there is an intense research in this field and I expect that it will be realized in some form or the other.

What keeps you going? Is it the dream or is it the day-to-day work itself?

It is definitely curiosity about what is actually possible to achieve with nano and quantum photonics, that makes me want to learn more about it and hence keeps me going.

In my opinion you should not be in this business only in the hope to one day realize a dream. If you do not enjoy complex math you should leave it to someone who does – and if you don't enjoy solving the equations (or whatever problems your project might contain) standing in the way of you and your dream you probably won't ever reach your dream anyway. This said, I often swear when calculations seem to be impossible, but on the other hand, this also makes it all the sweeter whenever it works out and I actually do solve a given problem.

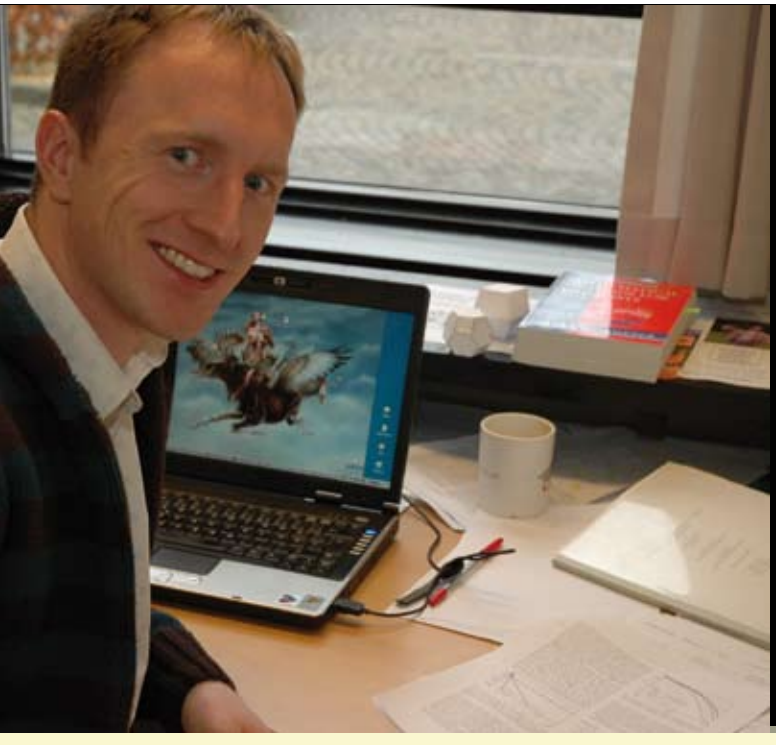
Clearly, there are better paid jobs available, so if one does not like the work and study itself, one should probably look for something else to do.

Briefly describe the day-to-day work.

The most important part of my work is concerned with my project and consists of setting up mathematical models and implementing them in the computer. Results and ideas are discussed with colleagues and compared to published literature. Further, we have a number of weekly meetings, including a journal club where we take turns presenting a relevant, recent paper and I co-supervise a number of student projects.

Why COM•DTU?

I find the interplay between electronics and photonics very interesting as this merging of two different realms of physics inevitably leads to interesting phenomena and possibilities.Futhermore, I like the close collaboration between theory and experiments that we have. I find this to be a strong advantage and I very much enjoy discussing the physics of both theory and experiments with my colleagues.



Light-matter Interaction in Nano-structured Materials

In this project we plan to set up a model of a general planar photonic crystal using the Greens function for the electromagnetic field. With such a model we will be able to predict in principle light propagation phenomena both inside and outside the photonic crystal. Of special interest will be the radiation pattern outside the photonic crystal from quantum dots inside the crystal as well as light-matter coupling in wave guides in the photonic crystal for use as single-photon sources or slow light devices.

Danmarks Tekniske Universitet, COM•DTU

Main Supervisor: Jesper Mørk

Supervisor: Peter Lodahl

Lei Wei

What is the best possible result of this project? the dream scenario?

The best possible result of this project is to obtain some successful packaged devices which are based on photonic crystal fibers filled with liquid crystals. The dream scenario is to patent the valuable designs I have made.

What else needs to be done before the dream scenario might be realized?

I need to strengthen my optical background and also get more experience working in the clean-room.

Are there other dream scenarios?

Be an expert in my research area and live happily with my work.

Might the dream be realized in the foreseeable future?

Definitely yes!

What keeps you going? Is it the dream or is it the day-to-day work itself?

Taking the PhD study at COM•DTU is a necessary way for me to realize my goals, so it gives me more energy to pursue my dream.

Briefly describe the day-to-day work.

Design the microfabrication process, run the process in the clean-room, test the chips and write papers.

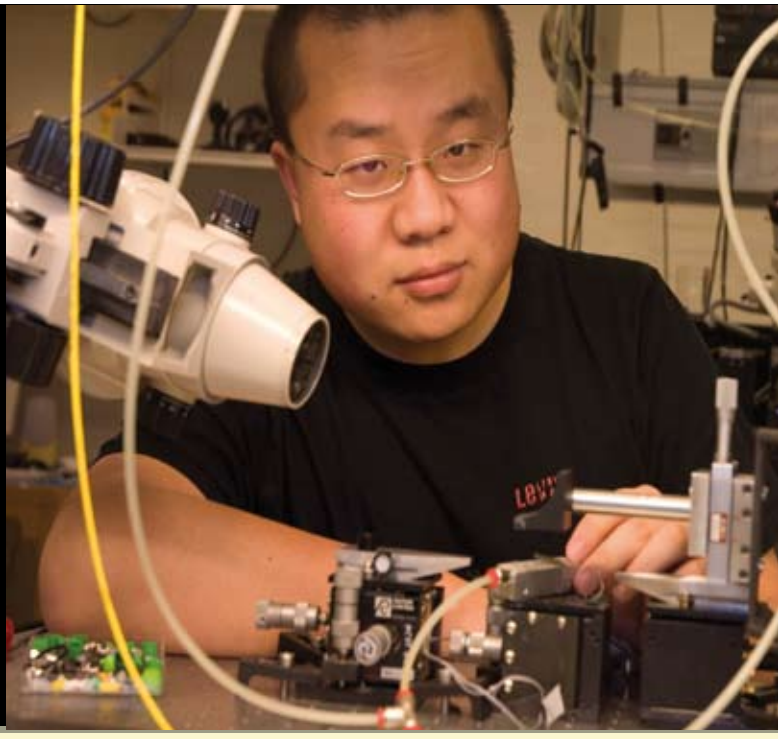
Why COM•DTU?

Optical research at COM•DTU is in the leading position all over the world, so working here is an exciting experience, and can greatly enhance my study and research abilities.

Integration of Liquid Crystal Photonic Bandgap Fiber Devices on Silicon Structures

Photonic Crystal Fibers (PCFs) are microstructured waveguides with a large number of air holes running along the length of the fiber and usually located in the cladding region. An initial index-guiding PCF can be converted to a tunable bandgap-guiding type PCF by infiltrating the air holes with Liquid Crystals (LCs). This project is to develop the Liquid Crystal Photonic BandGap (LCPBG) devices, which allow for thermally, electrically, and all-optically tuning of a range of in-fiber components such as spectral filters, polarizers and polarization controllers.

Danmarks Tekniske Universitet, COM•DTU
Main Supervisor: Anders Bjarklev
Supervisor: Lars Eskildsen
Supervisor: Thomas Tanggaard Alkeskjold, Crystal Fibre A/S



Hu Liang

What is the best possible result of this project? the dream scenario?

Develop a new type self-organized mobile ad-hoc network operating in unlicensed spectrum, where users act both as the network provider and as end users of the network.

What else needs to be done before the dream scenario might be realized?

PHY layer should be sensing a wide range of spectrum and learn and adapt to a new radio environment. MAC/LINK and Network Layer Protocol should be designed such that the PHY layer can hide the dynamic change of PHY layer characteristics, while still maintaining a good QoS to the end users.

Are there other dream scenarios?

Military Communications, Sensor Networks

Might the dream be realized in the foreseeable future?

Large industrial vendors have already invested large amounts of research efforts into this area, e.g. Microsoft, STM, Philips, Motorola. In 5-10 years, it is expected that every person can afford using self-organized mobile ad-hoc network via their PDA or mobile phones.

What keeps you going? Is it the dream or is it the day-to-day work itself?

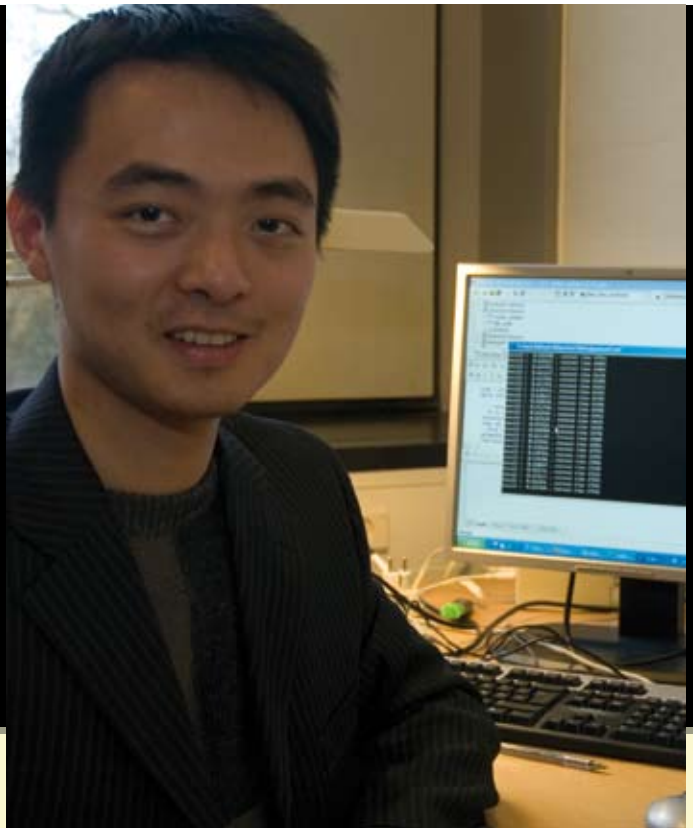
Both the dream and day-to-day work. The first one keeps me always motivated, while the latter is the process I always enjoy.

Briefly describe the day-to-day work.

Reading papers, thinking about research ideas, discussing with colleagues, implementing ideas into software.

Why COM•DTU?

Very international, good research freedom, good research financial support.



Resource Management for Next Generation Multi-Service Mobile Network

In self-organized mobile ad-hoc networks, CR (cognitive radio) aware MAC is investigated to explore efficiently radio resources both from licensed and unlicensed bands. As the capacity of wireless ad-hoc network is often very limited, by using cognitive radio, the communication device at an unlicensed band can opportunistically use the licensed spectrum not being used by a licenced communication device. Thus the capacity of wireless ad-hoc networks can be enhanced and overall spectrum utilization can also be significantly increased. The key problems here are: how to mitigate the mutual interference between devices on license bands and unlicensed bands; how to reliably learn the available licensed spectrum and collaboratively share the spectrum info with other peers. To solve those problems, new MAC and link control protocols will be designed and implemented in a discrete event simulator to evaluate the protocol performance. Finally, an analytical model will be built according to the protocol specification to validate the protocol performance.

Danmarks Tekniske Universitet, COM•DTU

Main Supervisor: Villy Bæk Iversen

Supervisor: Henrik Christiansen, ComWyse ApS

Jesper Bevensee Jensen

What is the best possible result of this project? the dream scenario?

The dream scenario would be the transmission of 40 Gbit/s data in an existing 10 Gbit/s environment.

What else needs to be done before the dream scenario might be realized?

Further development of digital signal processing.

Are there other dream scenarios?

Cheap and easy bit rate upgrade of existing systems.

Might the dream be realized in the foreseeable future?

Yes, capacity upgrade by a factor of two or three through multilevel modulation should be feasible with current commercially available technology.

What keeps you going? Is it the dream or is it the day-to-day work itself?

Mainly the day-to-day work.

Briefly describe the day-to-day work.

A mixture of experiments, computer simulations and paper writing.

Why COM•DTU?

I believe that COM•DTU has a unique combination of laboratory facilities and general working environment.

Multilevel Modulation Formats in Optical Communication Systems

Current optical communication systems use a method of modulating the data on to the light where a logical “1” is represented by a light pulse, and a logical “0” is represented by the omission of a light pulse. This modulation format is known as on-off-keying. A more efficient way of modulating the light is known as multilevel modulation, where more than two symbol states are possible, thus enabling the transmission of more than one bit of data with each pulse. Often the phase of the light is modulated, sometimes even in combination with the amplitude or the polarization. The advantages are higher spectral efficiency, and higher tolerance towards transmission impairments. The aim of my project is the investigation of multilevel modulation for optical communication systems.

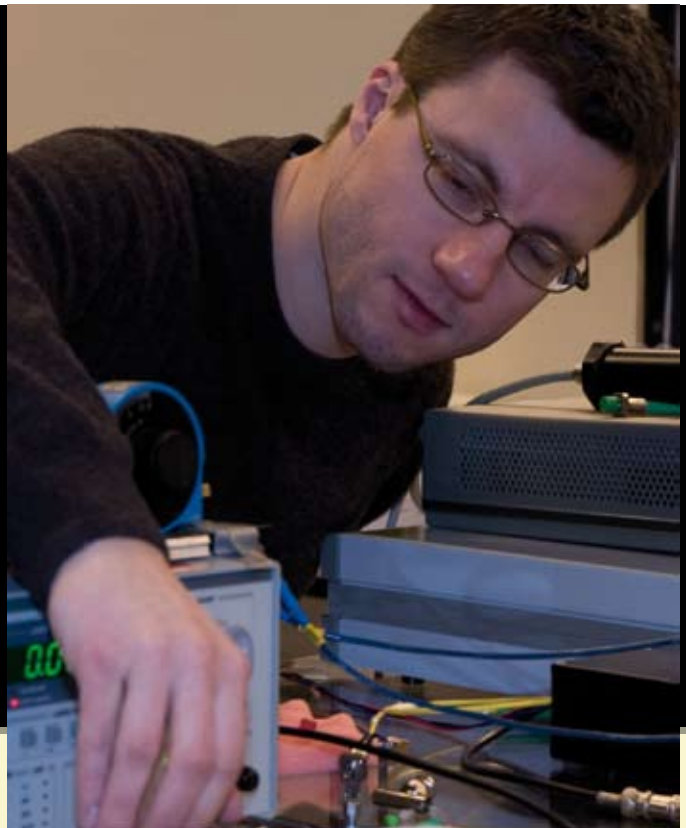
Danmarks Tekniske Universitet, COM•DTU

Main Supervisor: Palle Jeppesen

Supervisor: Christophe Peucheret

Supervisor: Gert Schiellerup, Tellabs, Denmark A/S

Supervisor: Torger Tokle, OFS Fitel Danmark



Rasmus Kjær

What is the best possible result of this project? the dream scenario?

That a method for using Raman amplification in future optical communication systems is invented, or for the first time thoroughly understood. Ideally, this method could help to solve an important problem or even change the way people communicate today.

What else needs to be done before the dream scenario might be realized?

A new brilliant idea should be put forth, or a new generation of optical amplifiers should be proposed which can change the way data traffic is routed and allocated in future networks.

Are there other dream scenarios?

Sure, the noise-free amplifier, the polarization-independent amplifier, the "perfect linear amplifier", "the perfect non-linear amplifier", an amplifier with infinite dynamic range, an amplifier with 100% power efficiency etc… Fortunately, this also leaves us, the engineers, with many technical challenges to be solved…

Might the dream be realized in the foreseeable future?

New applications of optical amplifiers keep emerging and it is not unlikely that the next landmark in the evolution of optical communications could come from the development of a new type of optical amplifier. This was the case when the erbium-doped amplifier spurred on the development of long-distance, high-capacity communications in the early nineties. This development eventually enabled the internet to evolve into the incredible information channel it is today.

What keeps you going? Is it the dream or is it the day-to-day work itself?

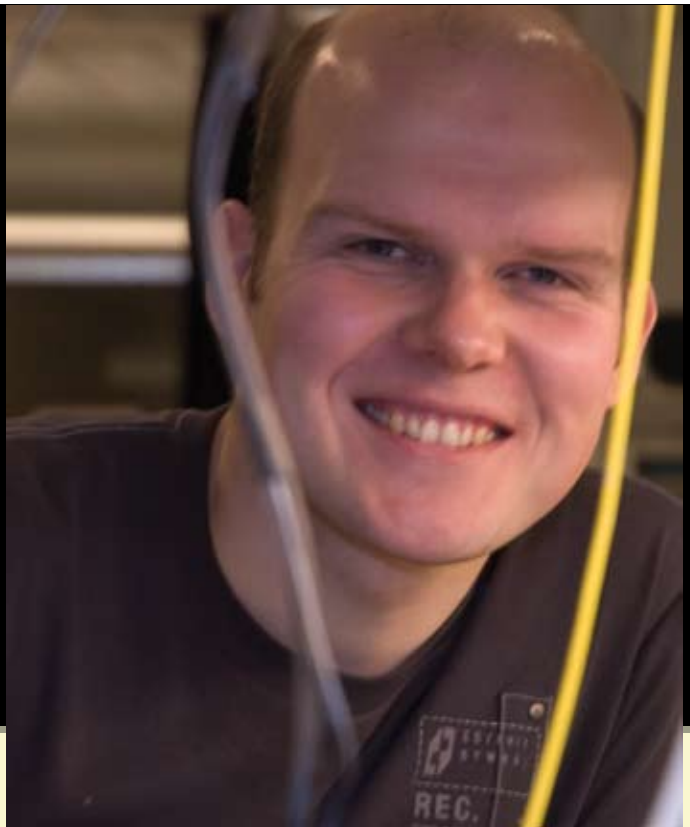
Much of my motivation comes from having dedicated and skilled people working around me on a daily basis. I also find it very motivating when people care to take interest in each other's problems and are willing to take a moment and share their experience in order to help a fellow colleague.

Briefly describe the day-to-day work.

My work day typically starts with checking my mail and calendar for the day. The rest of the day will depend very much on the current topic of investigation. I typically divide my project phases into weekly topics which are dedicated to either experimental work, numerical simulations or writing a paper, for instance.

Why COM•DTU?

Optical amplifiers are an interesting and important topic to work with, since they provide one of the foundations for today's information society. COM•DTU is the best place in Denmark to perform this study. Furthermore, the systems group at COM•DTU has excellent lab facilities, a good working environment, the colleagues are nice and I like my supervisors very much.



Raman Amplification in Optical Communication Systems

The project is about identifying new applications and design rules for using Raman amplification in future optical communication systems. Raman amplifiers has attracted much attention in recent years due to their good noise properties, versatile bandwidth and because the transmission fiber can be used for amplification medium. The design of discrete Raman amplifiers with dispersion compensating abilities is one of the major topics of the project. Another important topic is to understand how interchannel crosstalk can limit the transmission distance of Raman amplified systems and what can be done to remedy this unwanted effect.

Danmarks Tekniske Universitet, COM•DTU
Main Supervisor: Palle Jeppesen
Supervisor: Leif Oxenløwe
Supervisor: Bera Palsdottir, OFS A/S

Rasmus Bundgaard Nielsen

What is the best possible result of this project? the dream scenario?

Making a new kind of microscope, which uses super or hyper lenses to achieve optical images with nanometer resolution.

What else needs to be done before the dream scenario might be realized?

It is necessary to develop the technology for such lenses, as well as integrating them into various systems.

Are there other dream scenarios?

The work here is focused on the interaction between light and thin metal films, which can be used for a lot of things other than lenses, for example faster data transport, or optical components much smaller than what is currently possible.

Might the dream be realized in the foreseeable future?

It is possible, but for now the focus is mainly on making such lenses and integrating them into a few early experimental systems. Much work will need to be done to improve the resolution, and adapting it to real-world applications.

What keeps you going? Is it the dream or is it the day-to-day work itself?

For me it is mainly about the day-to-day work, I like the intellectual challenge of constantly encountering new challenges, and finding the solutions to whatever problems we face. Furthermore I have a lot of great co-workers who I enjoy talking to and being around.

Briefly describe the day-to-day work.

Most of my time is spent either in the clean-room doing nanofabrication and characterization, or outside it trying to figure out what to do next by talking to my colleagues or reading articles on what others around the world have done. Aside from that there is writing articles of my own, or going to various conferences to present it, and get ideas from others.

Why COM•DTU?

Because I am very interested in the work being done here, because we have great state of the art facilities, and because I love the working environment.

Metamaterials for On-chip-nano-manipulation and Imaging

The project centers around the development of super lense technology, with the goal of integrating this technology into lab on a chip devices, thus allowing optical imaging with nanoscale resolution of the molecules present. For now we are focussing on DNA stretching in nanochannels. The work will include a study of plasmonic resonance imaged by the super lense, and the light will be captured by scanning optical microscopy at the surface, though the dream is being able to replace the super lense with a so-called hyperlense that allows farfield microscopy, greatly easing the job, and allowing a much wider range of applications.

Danmarks Tekniske Universitet, COM•DTU
Main Supervisor: Jørn Märcher Hvam
Supervisor: Alexandra Boltasseva
Supervisor: Anders Kristensen, MIC

Michael Galili

What is the best possible result of this project? the dream scenario?

The stated goal of the project is to realize an optical system for processing high speed data signals. In particular a system capable of reducing noise in an optical data signal is the main goal of this project as well as systems for optical wavelength conversion and synchronisation in ultra high speed data transmission.

What else needs to be done before the dream scenario might be realized?

In many ways the dream scenario for this project has been realized. This, however, has just paved the way for more ambitious dreams and goals for possible future work. I think many of the systems I have been working on have potential to be developed and revised to achieve higher speeds and improved functionalities.

Are there other dream scenarios?

A more general dream is of course to see some of the work of my project being carried on, now that the project has ended.

Might the dream be realized in the foreseeable future?

At the end of the project in September 2007 all the project goals had basically been reached. I demonstrated noise reduction in an optical signal in an optical wavelength converted. I also managed to set a world record for the fastest wavelength converter ever demonstrated by optically switching the wavelength of a 640 Gbit/s data signal.

What keeps you going? Is it the dream or is it the day-to-day work itself?

It has definitely been a bit of both. I think the dream has made it possible to stay focused on the project for three years, while the day-to-day work has made it fun to go to work every day.

Briefly describe the day-to-day work.

To me the nice thing about this work is that there is no average day. Some days are spent in the lab doing state-of-the-art research, while other days are spent in the office studying results and preparing publications, and other days, again, are spent teaching and supervising students.

Why COM•DTU?

COM•DTU is involved in world leading research in several scientific areas. This, combined with the friendly and relaxed atmosphere at COM•DTU among both staff and students, made it an easy decision for me to join COM•DTU to finish my engineering degree and subsequently my PhD.

Ultra High-speed Data Rates for Future Generation Internet

To meet future requirements for increased bandwidth for data communication this project is investigating optical communication systems operating at ultra high data bit rates (160 Gbit/s and above) at a single wavelength. The Ultra-Net project addresses the issue of finding optical means of processing a high bit rate optical data signal without having to decompose it to several lower bit rate signals first. We are targeting several signal processing functionalities including wavelength conversion and signal regeneration.

Danmarks Tekniske Universitet, COM•DTU
Main Supervisor: Palle Jeppesen
Supervisor: Leif Oxenløwe
Supervisor: Anders Clausen

Jakob Buron

What is the best possible result of this project? the dream scenario?

The dream scenario is that the protocols and optical components from the project will be used in real telecommunication networks. Or that they are included in a standard, which will shape the future design of networks.

What else needs to be done before the dream scenario might be realized?

Consensus on the best way to design next generation networks must be reached. It's a chicken and egg situation – new ideas are developed based on a lot of assumptions about future network technology. And the technology decisions are not made until a lot of promising new ideas have been developed.

Are there other dream scenarios?

Building an optical computer would be fun. But it is a long way into the future. So far we are struggling with the core of a specialized telephone exchange – imagine building an entire general-purpose computer.

Might the dream be realized in the foreseeable future?

I think so. There are examples of good research ideas influencing protocol design and standards within a short time frame. The optical computer is further out in the future.

What keeps you going? Is it the dream or is it the day-to-day work itself?

A little bit of both, actually. Contributing to the future telecom infrastructure is a rewarding dream, but being able to learn about the newest technology every day is also a major motivation.

Briefly describe the day-to-day work.

A typical day consists of research, collaboration within international research projects, student supervision and sometimes teaching. My research is typically based on computer-simulations. The main effort is spent writing code, analyzing results and writing research papers. Occasionally, I'll go to the lab to see if a new idea works in practice.

Why COM•DTU?

Telecommunication research at DTU is carried out at COM•DTU. A lot of expertise on optical communication is available here as well.

Control and Data Plane Design for Optical Networks

Until recently, networks were primarily designed for fixed telephony carried over copper cables. Today, data traffic and mobile telephony services carried over optical fiber cables are much more important.

My project is about building better networks tailored to the use of optical fibers and new services. Dialling a phone number may be fine for voice conversation, for example. But for setting up worldwide broadband connections in seconds, we need something better. Protocols for establishing connections in optical networks are a major part of my project. Investigating new optical components for designing better telephony exchanges is another. An example is polarization encoding, which makes it possible to separate different data streams without reading the data.

Danmarks Tekniske Universitet, COM•DTU

Supervisor: Lars Dittmann

Johannes Weirich

What is the best possible result of this project? the dream scenario

Since the project is built on pretty new technological grounds it is difficult to predict a concrete outcome. A very good result would certainly be to develop liquid crystals that open up the possibility for new liquid crystal photonic bandgap devices.

In general, I think it is difficult to talk about a dream scenario in our field. We are not about finding a unified theory for elementrary particles but rather about doing step by step work with small project goals, which lead to new questions, and in the end, we will obtain a reasonable result.

What else needs to be done before the dream scenario might be realized?

A lot of hard work, involving simulations and lab work. A fair amount of luck and good cooperation with other institutes will be helpful, too.

What keeps you going? Is it the dream or is it the day-to-day work itself?

It is clearly the every-day work and the love of physics and technology. The beauty lies in the details, the mathematics, and experiments and therefore, it is a really interesting and satisfying work, even without THE big goal.

Briefly describe the day-to-day work.

It contains about ¼ experimental work, ¼ organization, courses, meetings etc. and ½ theory and simulations. The experiments are usually done in periods of one or two weeks, where we meet with two people in the mornings and stay in the lab until the afternoon. Then we discuss the results in the early evenings and plan how to proceed.

The theoretical work contains a lot of reading articles, special literature, internet research and so on. To solve the problems, some manual calculations can be done, but most of the problems are too complex for analytic solutions, therefore we use numerical methods. Here, a lot of programming work has to be done but it is evenly important to understand their mathematical background.

Why COM•DTU?

Because COM•DTU was offering the most interesting PhD project and it is also an internationally competitive research center, offering great lab facilities as well as a broad knowledge in optics.

Liquid Crystal Materials for Advanced Fiber-Optic Components

The project title is Liquid Crystal Materials for Advanced Fiber-Optic Components. We investigate liquid crystals (LCs) which can be infiltrated into the air holes of photonic crystal fibers, and in this way change the wave-guiding properties of the fiber. The optical properties of LCs can be controlled electrically, thermally and optically and an important goal for the project is to find LCs with suitable characteristics for fiber-optic components, which among other things can be used in optical communication systems.

Danmarks Tekniske Universitet, COM•DTU
Main Supervisor: Anders Overgaard Bjarklev
Supervisor: Lars Eskildsen
Supervisor: Thomas Tanggaard Alkeskjold, Crystal Fibre A/S
Supervisor: Jesper Lægsgaard

Yuntian Chen

What is the best possible result of this project? the dream scenario?

It is the single photon laser, based on the quantum dot and plamonics.

What else needs to be done before the dream scenario might be realized?

We need to investigate the coupling between the quantum dot and the surface plasmons to obtain a physical picture of the interaction.

Before this happens, the optical source with a single photon in a transform-limited wavepacket, would be one of the largest challenges for the quantum information technology.

What keeps you going? Is it the dream or is it the day-to-day work itself?

The dream can keep me working with passion and enthusiasm. It also gives me the courage to overcome difficulties. At the same time, doing research gives me a lot of enjoyment.

Briefly describe the day-to-day work.

Reading scientific papers, making calculations and computer simulations, attending lectures and group meetings, drinking coffee and so on.

Why COM•DTU?

Because of the prestige held by COM•DTU. It is a world leader in optoelectronics; especially in design and fabrication of nano-photonic structures. In addition, the excellent facilities and staff and the international research environment are also attractive.

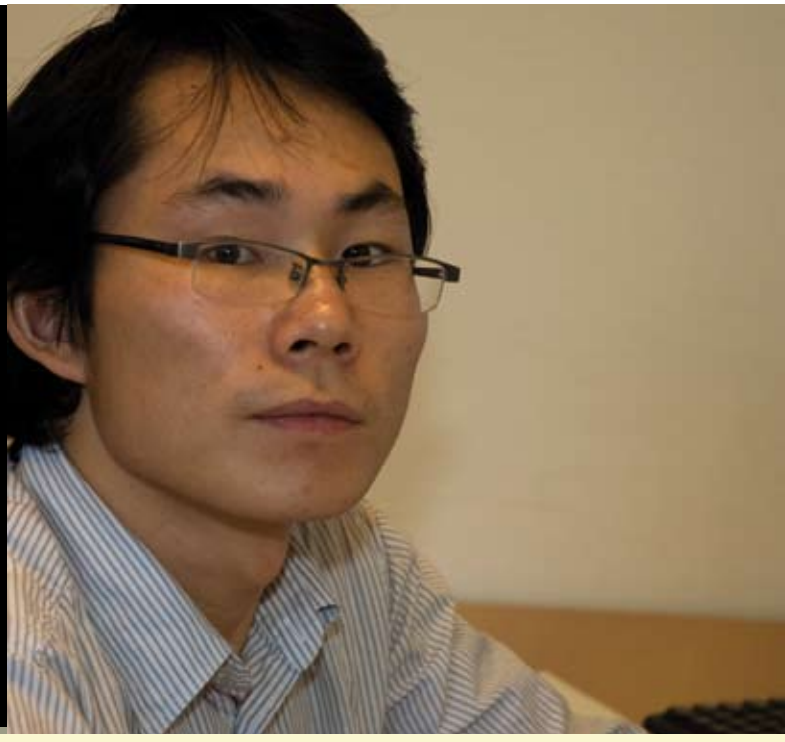
Modelling of Semiconductor Single-photon Sources

The project is the modelling the single photon sources based on the coupling between the quantum dot and the surface plasmons. What we finally want to do is to invent a new kind of semiconductor laser which provides exactly one photon, in a transform-limited wavepacket, precisely when it is required. Due to the tight confinement of the electromagnetic field induced by the plamonics, we want to make use of surface plasmons to couple the quantum dot to create a new efficient single quantum source

Danmarks Tekniske Universitet, COM•DTU

Main Supervisor: Jesper Mørk

Supervisor: Peter Lodahl



Elaine Cristina Saraiva Barretto

What is the best possible result of this project? the dream scenario?

Developing an optical component based on SAW modulation that can be used in real applications.

What else needs to be done before the dream scenario might be realized?

It's necessary to learn in detail how these devices work, to fabricate and to test them, and, based on the results obtained, try to improve their characteristics by changing some of the parameters.

Are there other dream scenarios?

Improving some aspects of the fabrication process would be a very good achievement.

Might the dream be realized in the foreseeable future?

Hopefully at the end of my PhD studies, these goals will be reached!

What keeps you going? Is it the dream or is it the day-to-day work itself?

Working with research and also following the work of my colleagues always make me motivated.

Briefly describe the day-to-day work.

The work has a lot of different facets, like theoretical studies, numerical simulations, clean-room processing and, of course, attending courses.

Why COM•DTU?

Because it combines the facilities that I need to do a good research, like labs, professors and so on, with a motivating environment, where people always seem to be enjoying their work.

Surface Acoustic Modulation of Planar Photonic Circuits

In this project, we are studying the use of acousto-optical effects in MZIs, by means of surface acoustic wave (SAW) modulation of the waveguides. The SAW field is excited by applying an electrical RF field to an interdigital transducer (IDT) on a piezoelectric material (like GaAs or ZnO). The SAW strain field results in an optical phase change between the arms of the MZI.

Advanced mechanisms to enhance the interaction between the SAW field and the waveguides – and then increase the modulation depth – will also be studied, for instance using photonic crystals in the arms of the MZI.

Among the types of components to be explored in this project are intensity modulators, frequency and phase shifters.

Danmarks Tekniske Universitet, COM•DTU

Main Supervisor: Mike van der Poel

Supervisor: Lars Hagedorn Frandsen

Vita Levitan

What is the best possible result of this project? the dream scenario?

The best possible result of my project is the fabrication of a Semiconductor Saturable Absorber Mirror (SESAM) based on my own design. The main thing is that these SESAMs will demonstrate perfect properties and reliability for work as a modelocker in femtosecond laser, which is being built in our lab.

What else needs to be done before the dream scenario might be realized?

I am writing a code for the design structures, with all the properties we need to fulfilll the requirements of fabrication. After that, we can fabricate it. Then the structure will be checked on its real properties, which should match with a predictable one. If not, we should revise code and change design and fabricate again. In the end we hope to get a working semiconductor saturable absorber mirror for the femtosecond laser.

Might the dream be realized in the foreseeable future?

I hope I will able to realize it in my PhD study.

What keeps you going? Is it the dream or is it the day-to-day work itself?

It is the day-to-day work now. I think it changes all the time. It depends on the present result and activity

Briefly describe the day-to-day work.

As a PhD student I have some courses to read and prepare for. I also do calculations for my project. If I need to, I have a talk with my supervisor to help me.

Why COM•DTU?

COM•DTU has a good facilities for my project and a good environment.

Design and Characterization of Advanced Quantum Well Based Components for Fiber Lasers

The project includes designing, calculation and fabrication of advanced quantum well based components for fiber lasers. To be more concrete the main subject is semiconductor saturable absorption mirror (SESAM) which is used in passive modelocking technique to generate short pulses in lasers. These SESAMs are meant to be integrated into the fiber-based femtosecond lasers (1 fs = 10^{-15} seconds). Such a system will be the object of this project.

Danmarks Tekniske Universitet, COM•DTU
Main Supervisor: Peter Uhd Jepsen
Supervisor: David Gregory Cooke
Supervisor: Dmitry Turchinovich

Yaohui Chen

What is the best possible result of this project? the dream scenario?

The best possible result is novel applications of semiconductor quantum dot devices in the field of optical communication or microwave photonics. The dream scenario is to develop and promote photonic devices based on semiconductor quantum dot materials as well as the role of transistor in modern electronics.

What else needs to be done before the dream scenario might be realized?

99% hard work plus 0.9% genius work etc. are always required to explore something new. The understanding of fundamental electrical and optical properties of semiconductor quantum dot materials are still far from sufficient.

Are there other dream scenarios?

Well, we always make a lot of dreams. Which one?

Might the dream be realized in the foreseeable future?

It's difficult to promise, but easy to make progress.

What keeps you going? Is it the dream or is it the day-to-day work itself?

I think I need both of them. A bit of ambition and enthusiasm as well as the summer time are all necessary.

Briefly describe the day-to-day work.

During the busy time, I usually need four cups of coffee or tea every day plus a pencil and notebook.

Why COM•DTU?

It's an open environment for researchers. It's also a place keeping its own legend.

Semiconductor Quantum Dot Devices for Optical Signal Processing

The purpose is to theoretically investigate the fundamental properties of quantum dot devices, with particular focus on optical signal processing applications. The work is of particular importance to obtain a better device level model that bridges the gap between the novel understanding at the physics level of semiconductor quantum dots material and the requirements at the system level of optical communication and microwave photonics. This project is closely correlated with ongoing theoretical and experimental efforts at COM•DTU as well as the cooperation between partners within the Danish Research council project "QUEST" and the European network of excellence ePIXnet.

Danmarks Tekniske Universitet, COM•DTU
Main Supervisor: Jesper Mørk
Supervisor: Filip Öhman
Supervisor: Mike van der Poel

Uffe Møller

What is the best possible result of this project? the dream scenario?

The aim of the project is to develop a compact, state-of-the-art terahertz-spectrometer and investigate its applications within food analysis. The dream would be that this method turns out to be superior to existing methods and thereby form a market in the industry for such a spectrometer.

What else needs to be done before the dream scenario might be realized?

A lot of research. Some aspects of the project are yet unexplored while other aspects in principle are possible to handle. But still, there are a lot of hurdles to overcome before we can go from principle to practice.

Are there other dream scenarios?

It could be that this research opens the door to other areas than food industry, e.g. the medical industry or the safety and security industry.

Might the dream be realized in the foreseeable future?

It is definitely realistic that this method can be used in some areas of food analysis. But it will still take a lot of effort and development to take it from the lab into a finished industry product.

What keeps you going? Is it the dream or is it the day-to-day work itself?

I like what I am doing and it is exciting to be on the edge of the research field I am in.

Briefly describe the day-to-day work.

My day-to-day work takes place in the laboratory measuring on different samples as well as in my office reading, analyzing my measurements, or once in a while preparing a conference contribution.

Why COM•DTU?

I was interested in continuing as a PhD student after receiving my Master's degree at another Danish university. I saw an interesting and available PhD position at COM•DTU, applied for it and got it.

THz Spectroscopy and its Application in Food Analysis

In line with the rising demands on increasing food quality there is a need of new and fast measuring methods for rapid and objective determination of the state and quality of the food product on its way from the producer to the consumer.

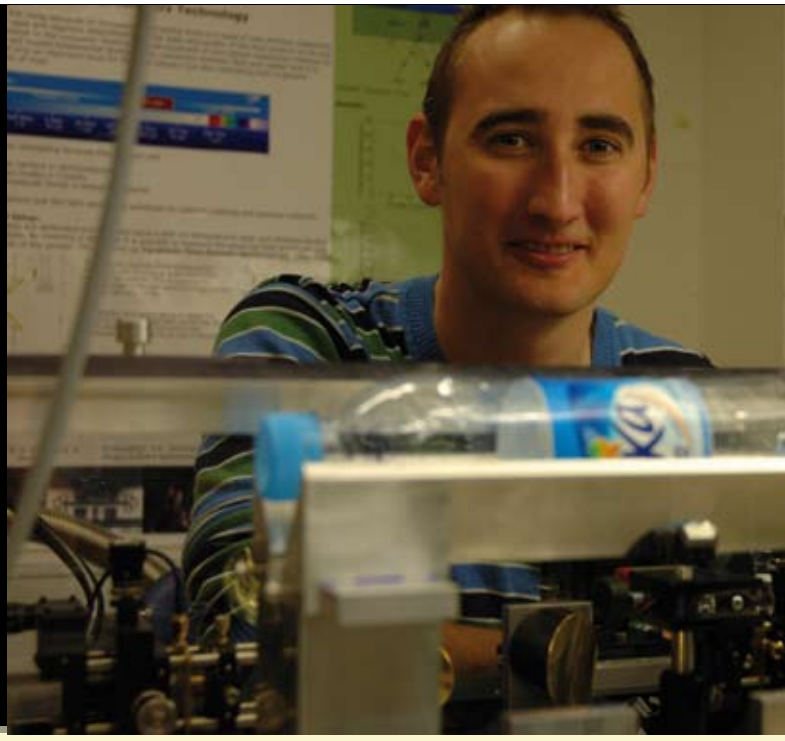
One of the candidates to a new measuring method relies on terahertz (THz) spectroscopy which covers the frequency range between radio waves and infrared light. Since its breakthrough about 20 years ago, THz spectroscopy has found many scientific applications. But in spite of the promising and exiting potential of THz spectroscopy this method has so far not been applied to products from the food industry.

This project is a collaboration with Photonics Academy Denmark, FOSS Analytical A/S and COM•DTU.

Danmarks Tekniske Universitet, COM•DTU

Main Supervisor: Peter Uhd Jepsen

Supervisor: Jacob Riis Folkenberg, Foss A/S



Mo Wu

What is the best possible result of this project? the dream scenario?

The video coding algorithms will be applied in digital video and TV, digital cinema, mobile communication, telemedicine and image or video communication in space.

What else needs to be done before the dream scenario might be realized?

The coding efficiency needs to be improved for limited network bandwidth and storage. The computation load is also important for the real-time application. Good modelling of the video coding process is the key point for the adaptive control scheme.

Might the dream be realized in the foreseeable future?

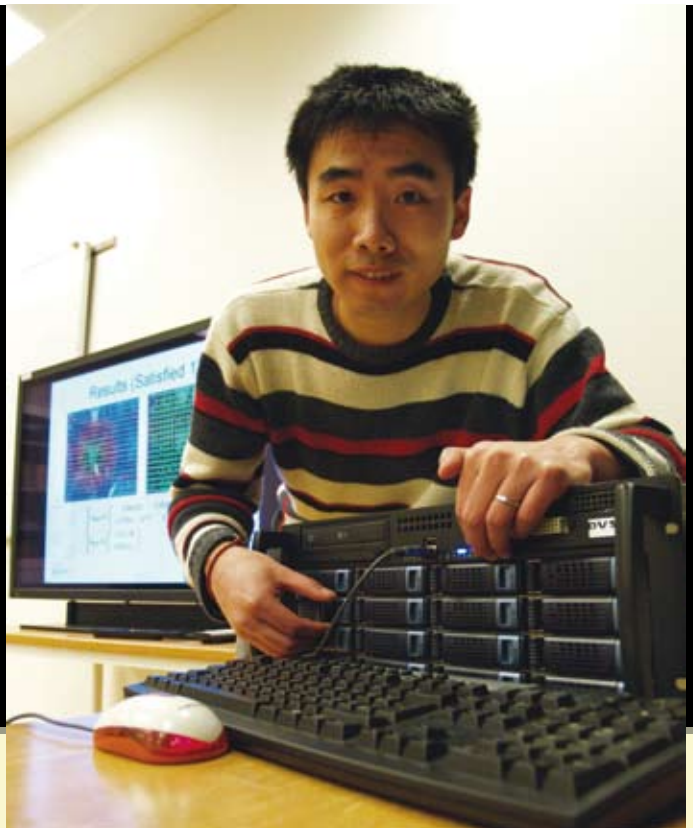
The newest H.264 video codec and other standards have been accepted in the industry, and it goes into people's lives in different ways. People may use it.

What keeps you going? Is it the dream or is it the day-to-day work itself?

Video coding, compression and signal processing are where my interests are located.

Why COM•DTU?

Because I was a Master's degree student at COM•DTU and I like what I learned in the Coding group. Coding group is the only group in Denmark that works with video and image compression and information theory.



Advanced Video Coding

H.264/MPEG-4 part 10 advanced video coding (AVC) standard. The gain in coding efficiency comes at the price of a significant increase in encoding complexity. A computational complexity control is proposed for aiming at maintaining the the distribution of the transformed motion compensation residuals. Some methods are introduced for deciding the distribution parameters in the estimation. I also use 3D (and 4D) wavelets to do lossless compression for fMRI data and obtain good results.

Danmarks Tekniske Universitet, COM•DTU

Main Supervisor: Søren Otto Forchhammer

Xin Huang

What is the best possible result of this project? the dream scenario?

Establish a new video coding paradigm with a very low complexity video encoder and possible complexity decoder, which have comparable video coding performance with the conventional video coding paradigm H.264/MPEG AVC.

What else needs to be done before the dream scenario might be realized?

Until now, there still are some performance gaps between Distributed Video Coding (DVC) and conventional video coding like H.264/MPEG AVC. Improving the side information generation, modifying noise modelling, further exploiting spatial correlations etc, would be helpful for reducing the existing gaps.

Are there other dream scenarios?

Since source statistics are only exploited partly or wholly on the decoder side, DVC does not explore temporal correlations on the encoder side, therefore error propagation is naturally avoided, given the channel code nature. DVC is an error robustness video coding paradigm for transmission over wireless link or internet.

Might the dream be realized in the foreseeable future?

Based on Slepian-Wolf and Wyner-Ziv theorems, it is possible to compress two statistically dependent signals in a distributed way, i.e., separated encoding and jointly decoding, using a rate similar to that used in a system where signals are encoded and decoded together. Although, there are still some performance gaps compared with conventional video coding paradigm, it is promising to reduce the gaps in foreseeable future.

What keeps you going? Is it the dream or is it the day-to-day work itself?

My interest in video coding and the promising wide applications in the future encourage me to explore this new video coding paradigm.

Briefly describe the day-to-day work.

Exploring the possible solutions both from theory and practical, reading literature and communicating with my Supervisor and colleagues inspire me and bring me new ideas.

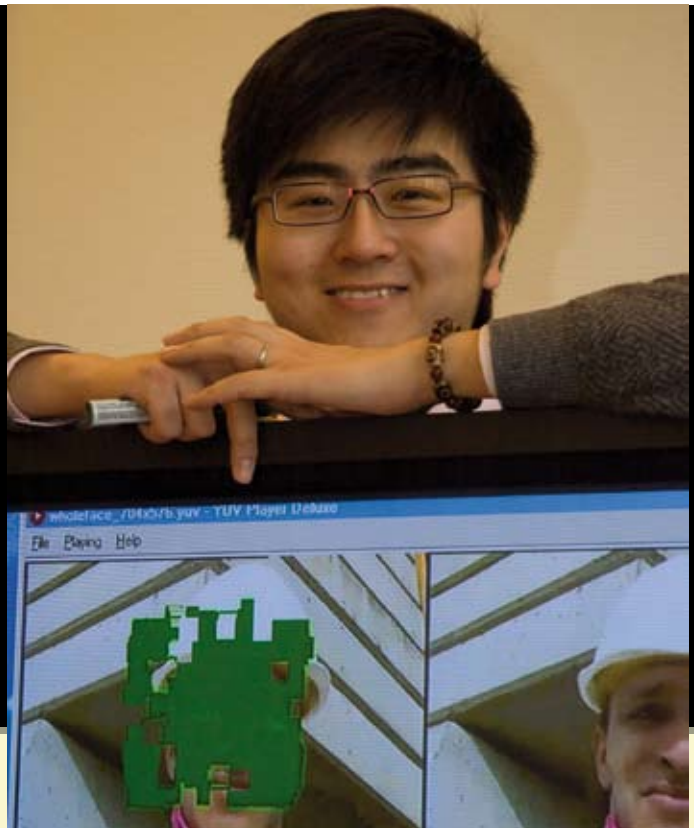
Why COM•DTU?

At COM•DTU there are: an international research environment, world class professors and researchers as well as strong collaboration with industry.

Video Encoding for Resource Critical Applications

Compared with conventional video coding paradigm like MPEG2 and H.264/AVC, Distributed Video Coding adopts a different paradigm by giving the decoder the task to exploit the source statistics to achieve efficient compression. This change of paradigm moves the encoder-decoder complexity balance, allowing the provision of efficient compression solutions with simple encoders where encoding resources are critical and complex decoders. Important future applications include space application, low power surveillance and wireless mobile video etc. One the other hand, this coding paradigm has natural error robustness. Practical applications include video transmission over wireless link or internet. The goal of this project is to investigate the new coding paradigm matching the available resources at encoder and robust video coding solution for error-prone transmission channel.

Danmarks Tekniske Universitet, COM•DTU
Main Supervisor: Søren Otto Forchhammer



Jeppe Johansen

What is the best possible result of this project? the dream scenario?

A detailed understanding of the decay dynamics of solid-state quantum dots and the physics governing the dynamics. Such a detailed knowledge is crucial to understanding the potential and limits of quantum dots as light sources in quantum optics.

What else needs to be done before the dream scenario might be realized?

There are still lots of exciting experiments which could be performed such as measurements on single quantum dots or measurements on quantum dots in either a static electric or magnetic field.

Are there other dream scenarios?

The development of a highly efficient single-photon source. These can be used to achieve 100% secure communication channels using quantum cryptography, or as the light sources in future computers based on quantum optics.

Might the dream be realized in the foreseeable future?

I believe so, as the decay dynamics of quantum dots are attracting more and more attention due to their use as nanophotonic light sources in experiments on quantum electro dynamics.

What keeps you going? Is it the dream or is it the day-to-day work itself?

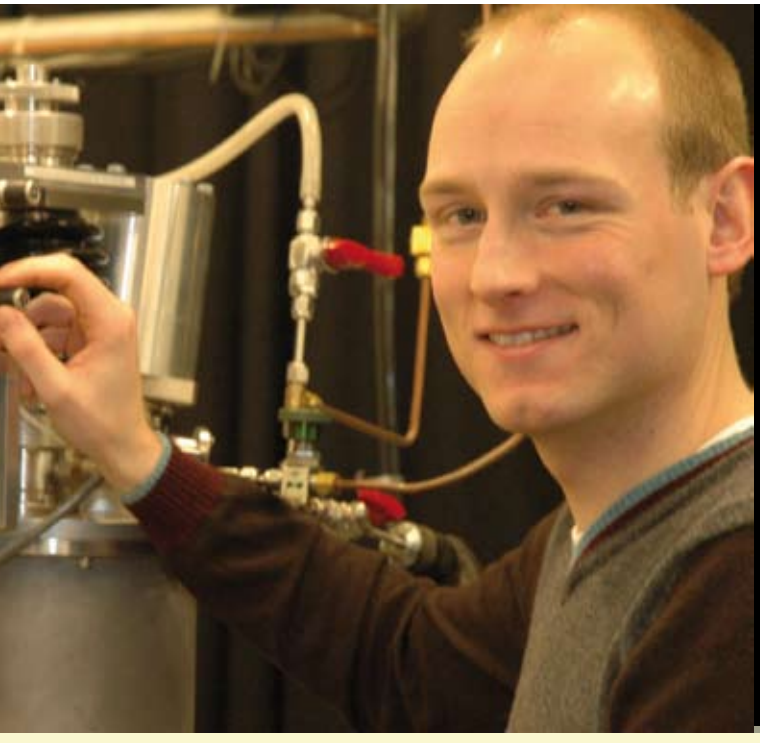
For me it is definitely the day-to-day work. It is the opportunity to dig deep into solid-state physics and try to understand what is really going on. I also like the idea that one day my research might help other researchers to solve an even bigger puzzle.

Briefly describe the day-to-day work.

As my PhD-project is based on experimental work, I spend a lot of time in the lab setting up and performing experiments. But a major part of the work is also done at the computer, where the data is analysed and calculations based on theoretical models are performed.

Why COM•DTU?

During my Master's degree work I discovered the great possibility of combining a strong interest for solid-state physics and semiconductor optoelectronics with the interesting field of quantum optics, which is possible here in the Nanophotonics group at COM•DTU.



Electronic and Photonic Semiconductor Nanostructures

The project is about studying the decay dynamics of the spontaneous emission from solid-state quantum dots. By placing the quantum dots in nano-structered media such as e.g. photonic-crystal membranes we can alter the decay dynamics and hereby obtain new detailed knowledge. This could for instance be knowledge of whether the decay is radiative or non-radiative, how the quantum-dot wave function depends on the size of the quantum dot, or knowledge of the internal dynamics among the fine-structure levels of the quantum dot.

Danmarks Tekniske Universitet, COM•DTU
Main Supervisor: Peter Lodahl

Darko Zibar

What is the best possible result of this project? the dream scenario?

I started my PhD in 2004, so at the time I am writing this document I have completed my PhD project and I am therefore slightly more realistic about the so-called dream scenario. I remember that when I started my PhD I thought that big things were going to happen, but as the time proceeds you get more realistic and I think that this is common for a lot of people starting their PhD. Generally, one of the best possible scenarios would be to publish some high quality papers. In my opinion, I think I have succeeded in this.

However, the best possible result of my project would simply be that there would be a commercial outcome of my PhD project. During my PhD project I was a visiting researcher at the University of California, Santa Barbara, where I worked on one specific project together with Northrop Grumman Space Technologies (NGST). The project had strong industry relevance and if the project succeeds, I think that the device the group was working on, may actually be taken for the next NGST missions. I think that would be my dream scenario.

What keeps you going?

Simply, I like what I am doing and really enjoy it. One thing that really keeps me going is that you can really try your ideas out and if it works it is great! and if it does not work you keep on working until it gets working!

Briefly describe the day-to-day work.

Currently, my project is on digital receivers for next generation wireline and wireless communication systems. This is a new field for me and there seems to be a lot of interest from the industry which I really like. Typically, I build the receivers in MATLAB and then perform experiments in order to test them.

Why COM•DTU?

The great thing about COM•DTU is the lab facilities. There is so much equipment here and you can build all kinds of experiments you have in mind and combine them with the theory. I think that if you want to have very strong research record you really need a strong combination of theory and experiments and this is possible here at COM•DTU.

Low Power Adaptive Beamforming : High-speed Clock Recovery and Demodulation using Short Pulse Sources and Phase-locked Loop Techniques

The general work is on receivers for high speed optical communication systems and especially on phase-lock techniques for signal demodulation and clock recovery. One of the issues when dealing with demodulation and clock recovery is phase noise. In this PhD project, development of advanced mathematical tools used to predict the performance of the clock recovery circuits was carried out and compared successfully to the experimental observations. Moreover, models and phase noise tolerant algoritms for analogue coherent receivers for military communication systems have been developed using techniques borrowed from Digital Signal Processing to recover and demodulate signals.

Danmarks Tekniske Universitet, COM•DTU
Main Supervisor: Palle Jeppesen
Supervisor: Leif Oxenløwe
Supervisor: Jesper Mørk
Supervisor: Anders Clausen

Lara Scolari

What is the best possible result of this project? the dream scenario?

The realization of all-in-fiber devices based on photonic crystal fibers filled with liquid crystal to be used in optical communication systems and/or in sensing application.

What else needs to be done before the dream scenario might be realized?

The fabricated devices need to be reproducible. This is sometimes difficult to achieve because of small uniformities in the cross section and along the z-axis of the fibers used.

Are there other dream scenarios?

Many interesting things can come out from this project. These devices can be used as filters, for example for spectral shaping of light sources, for gain equalization or as mode converters. One of the most interesting properties of these devices is that they can be tunable, and therefore can be used in dynamic networks or dynamic systems, where tunability is required and sometimes difficult to find it in commercial products.

Might the dream be realized in the foreseeable future?

Yes, I think so. Many steps concerning the understanding of the physics behind those components have been achieved in the last few years, also with the help of simulations. Moreover, the possibility of integrating these components in silicon can give more control of the fabrication process.

What keeps you going? Is it the dream or is it the day-to-day work itself?

Since every day is different from each other, sometimes it is the dream, sometimes the day-to-day work itself.

Briefly describe the day-to-day work.

Typically 8-9 hours of work a day. Typically half day in the lab and half in the office. But it changes from period to period.

Why COM•DTU?

Because COM•DTU is an excellent research centre, where unique laboratory facilities are present and where there is a solid knowledge of optics.

Intra-Cellular Optical Fiber Nanosensors and Probes

The project is centred on the fabrication of novel components based on photonic crystal fibers filled with liquid crystals. Liquid crystals exhibit very high electro-optic and thermo-optic effects and therefore, they are particularly promising for the achievement of tunable devices. The project is mostly experimental, even though part of it will be dedicated to the investigation and development of novel liquid crystals. Devices such as optical filters, polarization controllers, gain equalizers are developed and can be tested in optical networks in COM•DTU.

Danmarks Tekniske Universitet, COM•DTU

Main Supervisor: Anders Overgaard Bjarklev

Supervisor: Lars Eskildsen

Supervisor: Thomas Tanggaard Alkeskjold, Crystal Fibre A/S

Mads Lykke Andersen

What is the best possible result of this project? the dream scenario?

The construction of a single-photon source based on coupling to surface plasmons is an international competitive field, in my dream scenario we would be the first to make it work.

What else needs to be done before the dream scenario might be realized?

Right now we are still working on fully understanding the coupling to surface plasmon in much simpler structures than what is needed for a single-photon source. When we have this understanding we need to move on to waveguide structures and eventually solve the problem of out-coupling the single photons.

Are there other dream scenarios?

Plasmonics is a new and dynamic field which find application many places and will continue to do so in the future, there is no saying what technological advances could come from this project.

Might the dream be realized in the foreseeable future?

With luck and hard work it will hopefully be realized within my project period i.e. within the next two years.

What keeps you going? Is it the dream or is it the day-to-day work itself?

Both. It is fascinating to work towards a grand goal, but on day-to-day basis I try to solve smaller tasks, each of which poses plenty of challenges. Hopefully the combined knowledge from all the smaller task will prove sufficient in the end to accomplish the grand goal.

Briefly describe the day-to-day work.

A PhD has a very versatile day, I both have to take course and supervise younger students, I also spend time in the lab and time in front of a computer analysing the results and setting up models for the underlying physics.

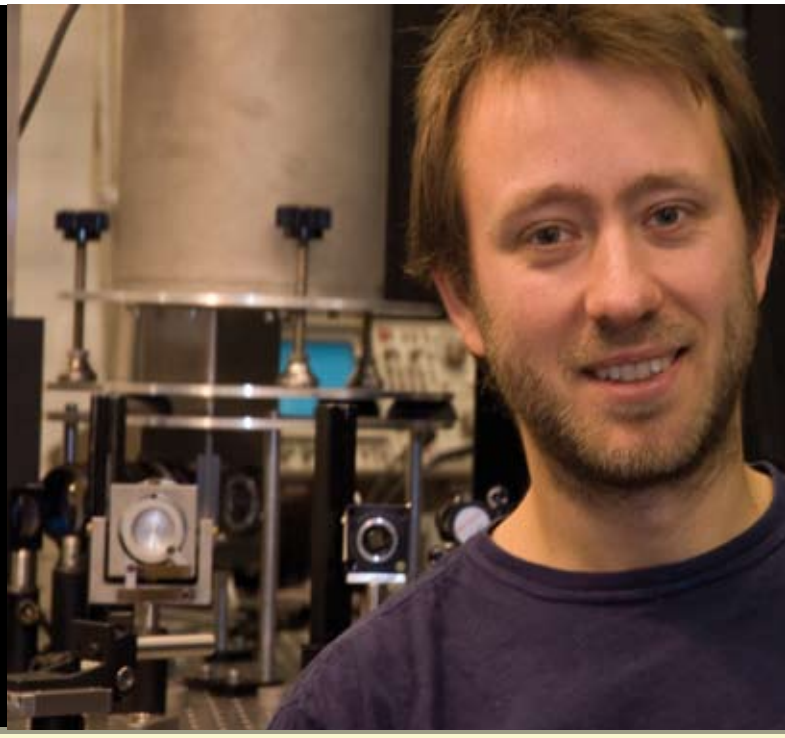
Why COM•DTU?

When I finished my Master's degree in physics I wanted to use the knowledge I had collected on quantum optics in applied sciences. I found that COM•DTU did exactly that.

Semiconductor Devices for Quantum Information Processing

The project aims at fabricating a single-photon source based on coupling to surface plasmons. Nano-sized metallic wires support plasmon modes that couple strongly to dipole emitters, this can be utilized to harvest the excitation from a dipole emitter producing a single plasmon propagating along a metallic waveguide. The propagating plasmon can be evanescently transferred into a single-photon. The coupling over plasmons is broadband which yields a substantial advantage over cavity-QED approaches to single-photon sources.

Danmarks Tekniske Universitet, COM•DTU
Main Supervisor: Peter Lodahl
Supervisor: Jesper Mørk
Supervisor: Andrei Lavrinenko



Alexey Vladimirovich Osadchiy

What is the best possible result of this project? the dream scenario?

The implementation of modern packet-switched access networks. Packet switching is used in optical networks to route data to different destinations without changing the configuration of the network (as opposed to circuit switching).

What else needs to be done before the dream scenario might be realized?

Coming up with the idea of an economically feasible and reasonably complex way to implement packet switching in MANs/access networks.

What keeps you going? Is it the dream or is it the day-to-day work itself?

Series of impulse-like ideas... Sometimes moving in opposite directons, but you never know which one is best, until you try.

Briefly describe the day-to-day work.

News with a glass of tea, some articles on related subjects, then it's either shaping the ideas from the previous day, or getting a new idea...

Optical Label-controlled Transparent Metro-access Network Interface

The project is focused on interfacing the metropolitan area networks with the access networks in order to distribute the traffic between the access networks' users. The most obvious ways are to use packet switching, wavelength routing and fixed time slots for packet casting, however, problems may arise which need to be looked into.

Danmarks Tekniske Universitet, COM•DTU

Main Supervisor: Idelfonso Tafur Monroy

Supervisor: Palle Jeppesen

Ying Yan

What is the best possible result of this project? the dream scenario?

Dream scenario: to obtain an end-to-end provisioned capacity for access and in-building networks by utilizing the latest optical physical layer achievements and adequate networking management and control algorithms.

Are there other dream scenarios?

Other dream scenarios include improvement of QoS provisioning and transport of 2G/3G and Beyond 3G signals.

Might the dream be realized in the foreseeable future?

Yes.

What keeps you going?

3-years studying and researching is the way I have chosen in my life. Obtaining good project results and developing my personal skills is my hope, which keeps me going.

Briefly describe the day-to-day work.

Reading, thinking and programming

Why COM•DTU?

I completed my Master's degree at DTU from 2002 to 2005 and my major is Electrical Engineering. Because I have taken some courses and finished my Master's degree thesis in the telecommunication direction, I continued my study as a PhD student in the Networks group at COM•DTU in 2005.

Strategies for Next Generation Optical Networks

I am working on a European project, in which DTU cooperates with other European research institutes and telecommunication operators and manufactures. My PhD topic is about strategies for next generation optical networks. This project focuses on the application of innovative optical networking solutions to the evolution of the access and in-building networks in Europe. The specification and development of next generation access and in-building network architectures with integrated 3G/Beyond 3G solutions will be important outcomes from this project. The control and management algorithms will also be tailored to adequately address the needs of the integrated network.

Danmarks Tekniske Universitet, COM•DTU

Main Supervisor: Lars Dittmann

Supervisor: Michael Stübert Berger

Weiqi Xue

What is the best possible result of this project? the dream scenario?

The ultimate goal of the project is an integrated phased array optimised for use in antennas or microwave filters.

What else needs to be done before the dream scenario might be realized?

From the application point of view it is important to investigate how the proposed devices meet the specific application demands. This includes the specific demands on the processed signal, for example the magnitude of the phase shift required, modulation depth, power and signal-to-noise ratio. From a device point of view important tasks include experimental and theoretical investigations to find out to what extent integrated or discrete devices can fullfil the application demands, optimisation of the design of phase shifters and integrated phased arrays.

Are there other dream scenarios?

Hopefully the ultimate device can find more applications in microwave photonics areas.

Might the dream be realized in the foreseeable future?

Of course, but it's a long way.

What keeps you going? Is it the dream or is it the day-to-day work itself?

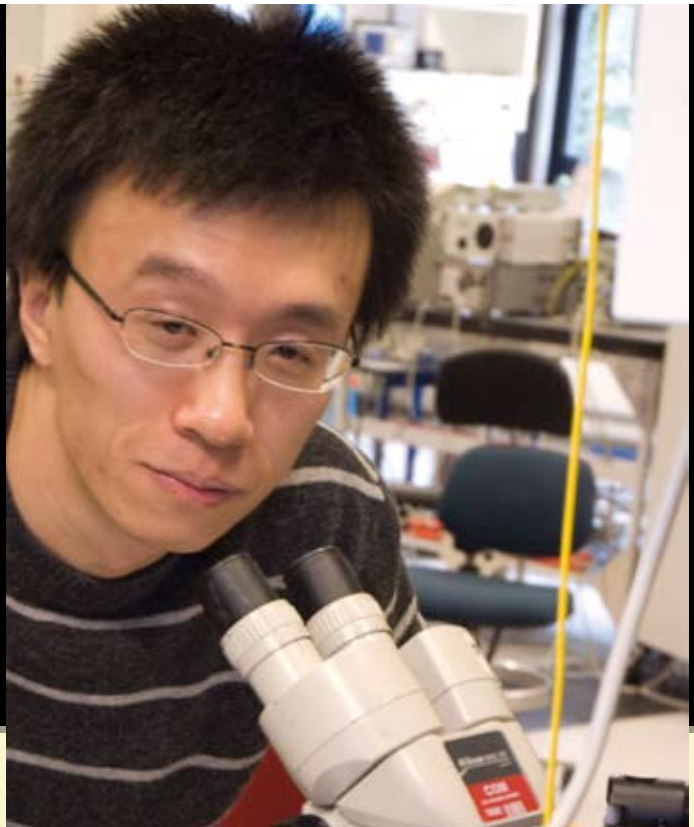
In this attractive research area, you may find many new problems at every workday. Beating them is the motivation.

Briefly describe the day-to-day work.

Ordinary and challenging!

Why COM•DTU?

It is an area of research where COM•DTU already has a strong background and where it is realistic that important new results can be achieved in the future.



Slow and Fast Light for Applications in Microwave Photonics

It's a combination of research and application, of two leading institutes and of two hot topics. As a charming effect, slow and fast light will provide a potential realization of the phase shift in the applications of microwave photonics, which combines two worlds of RF engineering and photonics.

Danmarks Tekniske Universitet, COM•DTU

Main Supervisor: Jesper Mørk

Supervisor: Filip Öhman

Hua Ji

What is the best possible result of this project? the dream scenario?

An excellent performance nanotechnology-based fiber laser will be realized for ultra-high speed optical communications. The lasers will provide long term stable, high speed, ultra-short pulse trains for future ultra-high speed optical communication systems.

What else needs to be done before the dream scenario might be realized?

The basic idea of this project has proved to be solid. However, before the dreams can come true, many problems need be solved, such as how to increase the repetition rate, how to make the output pulse shorter, how to provide the lasers with long term stabilities and so on.

Are there other dream scenarios?

The laser can be also applied in biology and other fields.

Might the dream be realized in the foreseeable future?

Yes! the idea of the project has been experimentally demonstrated effectively. After solving many engineering problems, the dream will be realized in the foreseeable future.

What keeps you going? Is it the dream or is it the day-to-day work itself?

The amazing fiber lasers keep me going.

Briefly describe the day-to-day work.

The day-to-day work is mainly in the lab to do experiments with colleagues, discuss problems in the project and find out better ways to realize the dream step by step.

Why COM•DTU?

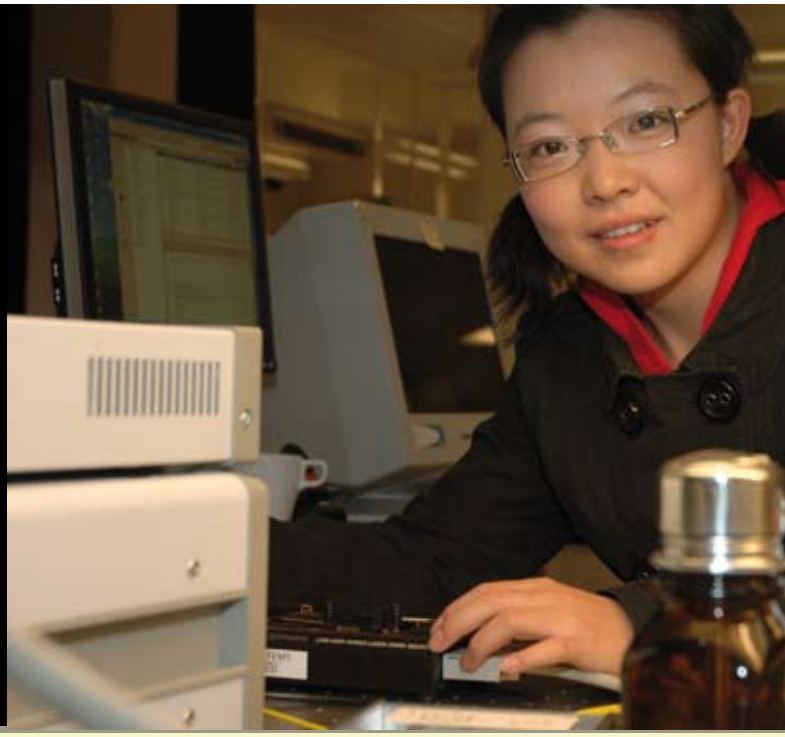
COM•DTU has strong research background and has very good research environment. It is a wonderful place to realize dream.

Nanotechnology-based Solutions for Ultra High-speed Optical Signal Processing-pulsed Fibre Lasers

High repetition rate ultra-short mode-locker pulse lasers are necessary in ultra-high speed optical communications. Erbium fiber and carbon nanotubes are the best candidates for gain medium and mode-locker, respectively, for their special optical properties. The project will realize an excellent laser based on erbium fiber and carbon nanotubes.

Danmarks Tekniske Universitet, COM•DTU

Supervisor: Palle Jeppesen



Toke Lund-Hansen

What is the best possible result of this project? the dream scenario?

Realising a semiconductor single-photon source capable of generating pure single-photons on demand.

What else needs to be done before the dream scenario might be realized?

Some breakthroughs are needed in the fabrication of quantum dots, efficient light collection strategies, and excitation of the emitters.

Are there other dream scenarios?

Creating other quantum mechanical semiconductor light sources such as entangled or squeezed photon sources.

Might the dream be realized in the foreseeable future?

Possibly within the next 10 years but there are still some fundamental issues to be solved.

What keeps you going? Is it the dream or is it the day-to-day work itself?

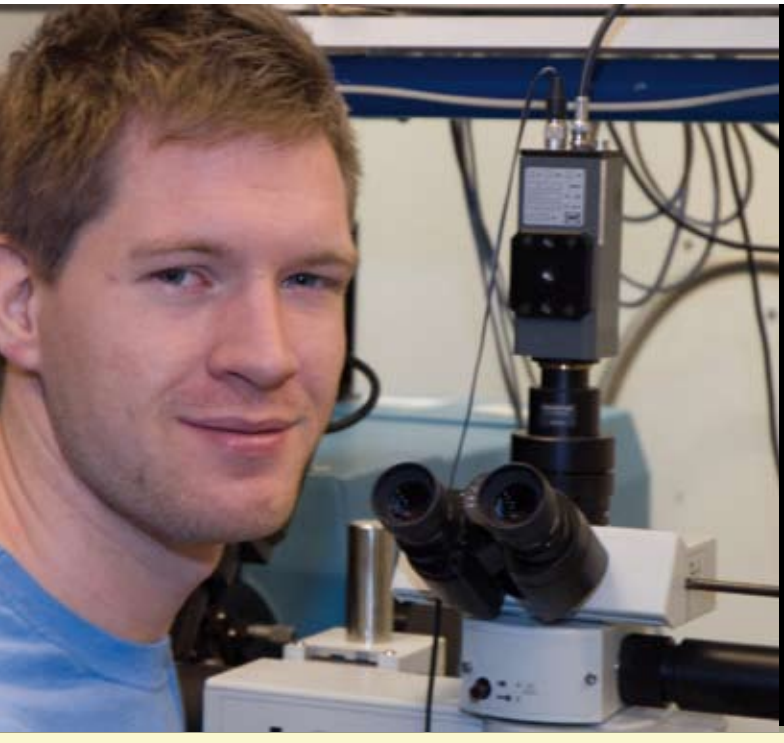
Acquiring new basic knowledge of quantum mechanical systems and exploiting these for new technologies.

Briefly describe the day-to-day work.

The daily work is mainly focussed on doing measurements in the laboratory, designing experiments and solving practical problems.

Why COM•DTU?

It is a place with many possibilities and resources for doing experimental physics.



Quantum Control with Optical Nano-Cavities

The project focuses on single quantum dots as single-photon emitters and the optical properties of quantum dots from local sources and international collaborators are investigated. To control the single-photon emission photonic crystals are used. These are optical nanostructures that can be designed such that the propagation and emission of light is controlled. An important part of the project is to build new optical characterisation setups for characterising the single-photon sources.

Danmarks Tekniske Universitet, COM•DTU

Main Supervisor: Peter Lodahl

Supervisor: Jørn Märcher Hvam

Sarah Renée Ruepp

What is the best possible result of this project? the dream scenario?

The dream scenario is an entirely self-healing telecommunications network - a network which can automatically and without human intervention reroute traffic to recover from failures. The best possible result of this project is to develop a method that is applied by telecommunication operators worldwide to protect their clients from service disruptions when failures occur in the network infrastructure.

What else needs to be done before the dream scenario might be realized?

Some of the recovery methods require that the network may take actions by itself without human supervision, but many network operators are not comfortable with this lack of control. Hence, a trade-off must be found between recovery methods that are technically possible and what network operators feel comfortable with letting their networks do autonomously.

Are there other dream scenarios?

In addition to applying the mentioned recovery concepts to telecommunication networks, they could be applied to other types of networks, for example power networks, whose survivability are also very important to our society.

Might the dream be realized in the foreseeable future?

Network operators gradually allow for dynamic connection setup in their networks, which also opens the door for more advanced network survivability schemes.

What keeps you going? Is it the dream or is it the day-to-day work itself?

The area of network survivability is a research area where different fields must be combined to achieve good results. The combination of network operation, design, optimization and industrial applicability provides many inputs to the field and makes it very exciting to work with.

Briefly describe the day-to-day work.

To propose a new method to achieve better network survivability, I model network failures and recovery in a computer. The first step is to simplify a complex network scenario into a comprehensible model. The model should only include the essential features governing the failure and recovery behaviour. Then, the model is implemented, which involves software design and programming. Finally, the results are analyzed and areas of improvement are identified, which leads to the development of better performing network survivability schemes. In addition to working on my own project, I also supervise students who are doing a project within the field of network survivability, and share my knowledge through lectures.

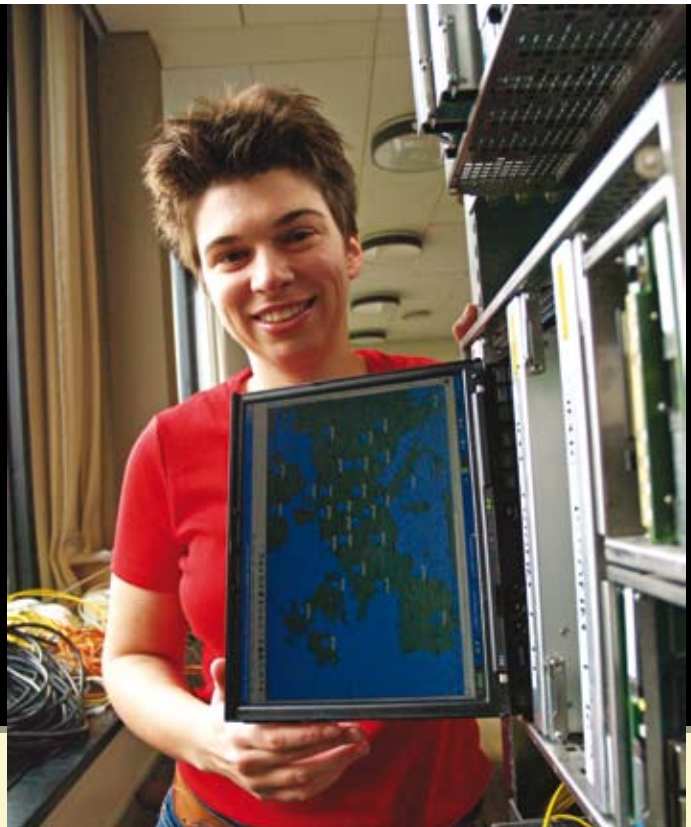
Why COM•DTU?

The research environment at COM•DTU is very inspiring. I like the freedom to pursue the research field of my interest and working together with highly motivated colleagues. Furthermore, I enjoy sharing the field of network survivability with students in projects and courses.

Dynamic Protection of Optical Networks

Nowadays, a functional communication system is of paramount importance for our society to function properly. With a large variety of both natural and man-made disasters that can affect the telecommunication infrastructure, it is important to make communication networks fault-resilient, so they can recover from failures without the user noticing the fault. In this PhD project, I develop methods that permit fast and stable recovery in optical networks, and evaluate their efficiency by simulation.

Danmarks Tekniske Universitet, COM•DTU
Main Supervisor: Lars Dittmann
Supervisor: Henrik Christiansen
Supervisor: Lars Ellegård, Tellabs A/S



Rasmus Kjelsmark Olsson

What is the best possible result of this project? the dream scenario?

To generate ultrashort pulses of light with a fiber laser. The pulses of light should be at least ten times shorter than what is possible today with a fiber laser.

What else needs to be done before the dream scenario might be realized?

We need a very good control of dispersion and nonlinearity in the fibers and in the fiber based components.

Are there other dream scenarios?

We hope to use the fiber lasers for an efficient conversion of light into THz radiation.

Might the dream be realized in the foreseeable future?

Yes

What keeps you going? Is it the dream or is it the day-to-day work itself?

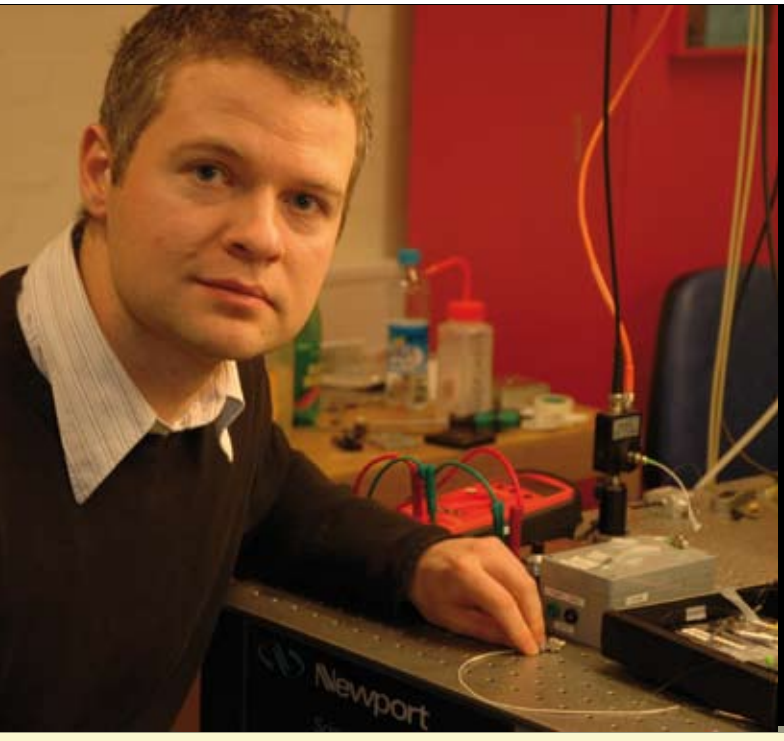
It is both. I enjoy the lab work as well as the many discussions and strategy meetings with the other researchers.

Briefly describe the day-to-day work.

Some days I spend time in the lab setting up optics, splicing fibers, characterizing pulses etcetera. Other days I spend reading articles and books.

Why COM•DTU?

Because of the many interesting optics research projects at COM•DTU.



Fiber Laser Based Short and Long Wavelength Sources

The aim is to develop a fiber laser based, pulsed, broadband THz source. In the project we focus on two issues 1) generating ultrashort, broadband pulses with a fiber laser and 2) converting these optical pulses to THz pulses in a suitable nonlinear crystal. The THz source is going to be used for spectroscopy, e.g. Fourier-transform spectroscopy, and for further research in solid state physics.

Danmarks Tekniske Universitet, COM•DTU
Main Supervisor: Peter Uhd Jepsen
Supervisor: Dmitry Turchinovich
Supervisor: Thomas Vestergaard Andersen, NKT Holding A/S

Per Lunnemann Hansen

What is the best possible result of this project? the dream scenario?

The ability to significantly slow down the speed of light by use of quantum dots (QDs) by means of electro magnetically induced transparency (EIT). Experiments on EIT using atoms, have shown truly beautiful and amazing results. Demonstrating these amazing effects in a specifically designed material would be exiting from a fundamental science point of view, but would also open doors for a number of optical applications.

What else needs to be done before the dream scenario might be realized?

Inhomogeneous broadening (size fluctuations) of the quantum dots is detrimental for achieving slow down using EIT. New techniques for growing quantum dots with negligible size fluctuations would need to be developed, or optical means of reducing the inhomogeneous broadening need explored.

Are there other dream scenarios?

Exploring EIT in photonic crystal cavities. This could potentially lead to nonlinearities several orders of magnitude larger than in normal semiconductor material.

Might the dream be realized in the foreseeable future?

In the near future, realizing EIT in quantum dots at cryogenic temperatures would be possible as a proof of principle. However, for use in applications, several fundamental issues need to be resolved before that would be possible.

What keeps you going? Is it the dream or is it the day-to-day work itself?

Seeking to describe physical observations made in the laboratory feeds my curiosity. Sometimes it can be a long walk in the desert, but when you succeed, it feels very rewarding.

Briefly describe the day-to-day work.

Working as a PhD student gives a diverse work day. One gets to: Explore things no one has done before, learning new stuff through courses and teach others what you know.

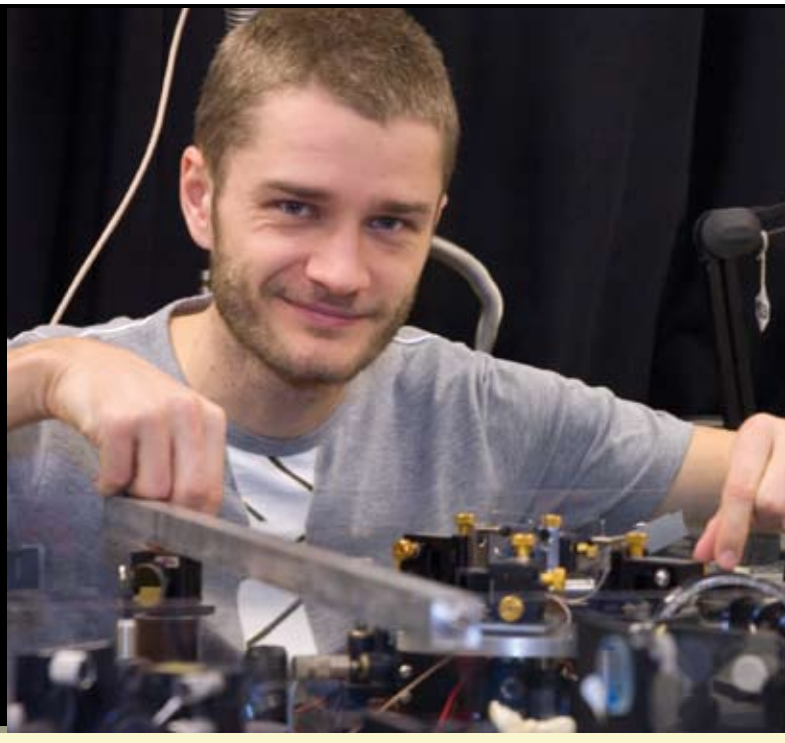
Why COM•DTU?

My research interests are focused on quantum optics, optics, and photonics which fits quite naturally with some of COM•DTU research activities.

Processing and Characterization of Quantum Dot Devices

The scope is to experimentally investigate the effect of slowing down light in a controlled fashion by utilizing QDs as the active medium. Two techniques for achieving a slow-down are pursued. The first technique is based on a phenomenon known as Coherent population oscillations (CPO). In order to gain insight of the dynamics behind the effect, an investigation of CPO using ultra short pulses is pursued. The other technique relies on (EIT). Laser light coherently prepare quantum states in the QDs that leads to quantum interference resulting in a slow-down of the light. To ensure a strong interaction between the light and the QDs, the laser beam is confined by a ridge waveguide on top of the QDs.

Danmarks Tekniske Universitet, COM•DTU
Main Supervisor: Jesper Mørk
Supervisor: Antti-Pekka Jauho, MIC
Supervisor: Kresten Yvind
Supervisor: Mike van der Poel



Hua Wang

What is the best possible result of this project? the dream scenario?

The ultimate goal of this project, which is radio resource management (RRM) for next generation mobile and wireless communication systems, is to design new algorithms that can utilize the scarce radio resources more efficiently while maintaining diverse quality of service (QoS) requirements.

What else needs to be done before the dream scenario might be realized?

There are many open issues waiting to be settled in this area, such as efficient scheduling algorithms that can meet diverse QoS requirements and effective call admission control policy that prevent the system capacity from being overused.

Might the dream be realized in the foreseeable future?

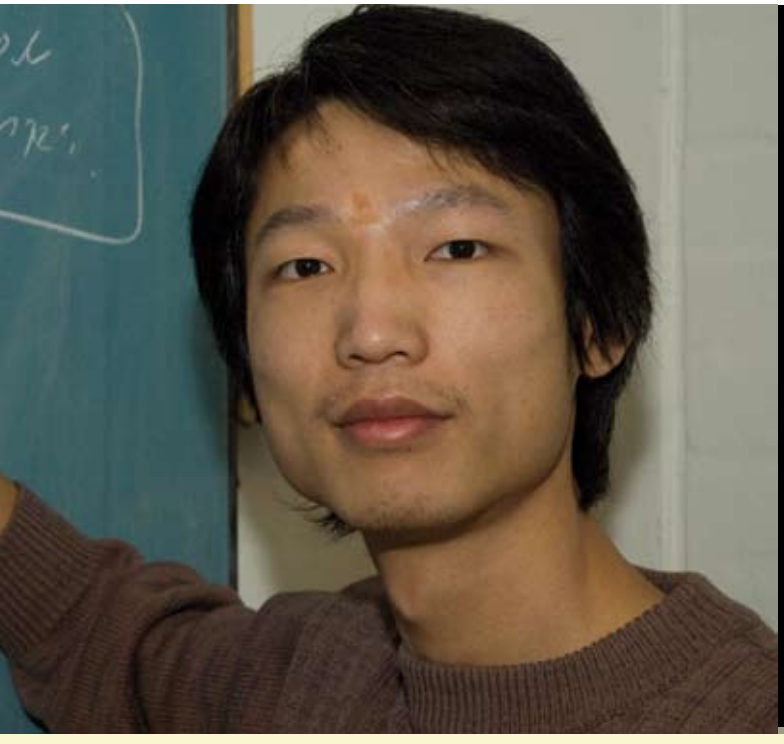
Recently, resource management for future mobile communication systems has attracted enormous research interests. Thousands of papers based on work in this area are published every year. So it is believed that effective RRM algorithms will be realized in the near future.

What keeps you going? Is it the dream or is it the day-to-day work itself?

It is simple. The curiosity and passion to explore, to discover keep pushing me toward the goal of wireless communications - connecting people anywhere, anytime.

Why COM•DTU?

According to the most recent statistic from the Times Higher Education Supplement, DTU ranked second highest in Europe in science and technology. Most importantly, I love the working environment here. People are so nice and easy going.



Mobile and Wireless Systems Beyond 3G

Throughout the world, the demand for broadband wireless access has increased exponentially in the last few years. As 3G wireless systems are deployed worldwide, significant efforts have ben underway in the research community for 4G wireless networks. Future mobile communication systems are designed towards a high-date-rate, low-latency and packet-optimised radio access technology. Some of the promising broadband wireless access solutions are 802.16 (WiMAX), 3GPP Long Term Evolution (LTE), long-range/multi-hop 802.11 (Wi-Fi) and 802.20 (mobile broadband). The key feature of future mobile communication systems is the ability to deliver a variety of multimedia services as well as the traditional voice service. The broad range of services can be divided into different Quality-of-Service (QoS) classes. However, the provision of such mobile multimedia services under QoS guarantees will not be possible without an efficient utilization of radio resources. Thus enhanced or completely new Radio Resource Management (RRM) algorithms have to be designed to guarantee the target QoS, to maintain the planned coverage area, and to offer a high system capacity.

Danmarks Tekniske Universitet, COM•DTU

Main Supervisor: Lars Dittmann

Supervisor: Lars Staalhagen

Supervisor: Villy Bæk Iversen

Qi Zhang

What is the best possible result of this project? the dream scenario?

The advocated Cellular Controlled Peer to Peer (CCP2P) Network architecture becomes a future wireless network architecture.

What else needs to be done before the dream scenario might be realized?

We need to investigate many different application scenarios to show the advantages of CCP2P network architecture. Furthermore, an efficient short-range communication should be developed to support CCP2P networking.

Might the dream be realized in the foreseeable future?

It is promising to realize the proposed network architecture in the near future. Some simple prototypes have been developed on mobile phones.

What keeps you going? Is it the dream or is it the day-to-day work itself?

The goal of the project and the planned schedule keeps me working.

Briefly describe the day-to-day work.

Reading, Thinking, Discussion, Programming, Writing, Presenting.

Why COM•DTU?

I like the way of doing research here. We are not pushed to do research but are self-motivated. Research is an enjoyable thing at COM•DTU. Furthermore, my supervisor is a respected and easy-going person.

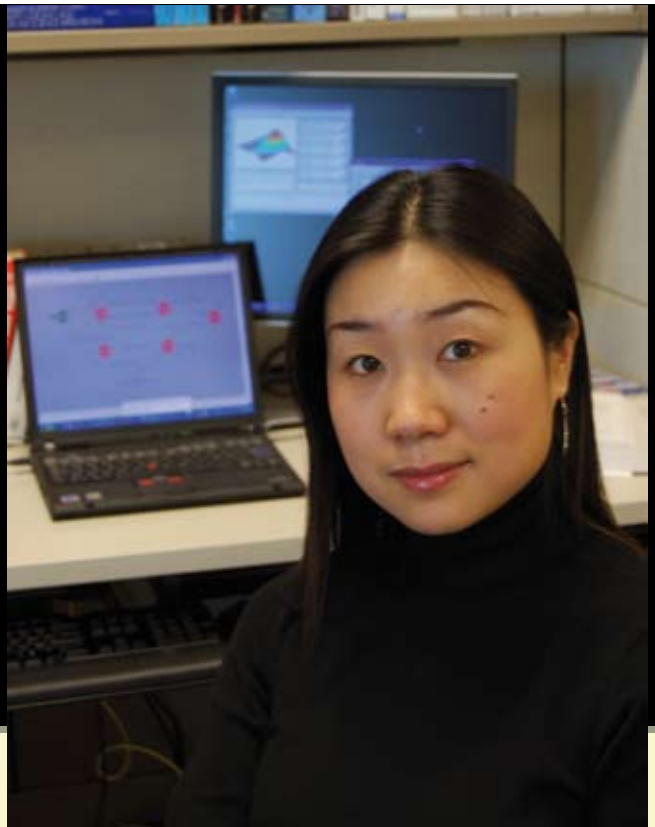
Performance Analysis and Design of Ubiquitous Wireless Networks

The traditional cellular network has key limitations such as limited achievable data rates over limited available spectrum, ever increasing power consumption of the mobile device, and so on. We advocate a dynamic approach to bridge cellular and peer-to-peer network architecture, referred to as cellular controlled peer-to-peer networks. Exploiting the advantages of the short-range between mobile devices, the proposed network architecture brings a new featured network dimension into the picture. We will prove that it can be a good feasible future wireless network architecture.

Danmarks Tekniske Universitet, COM•DTU

Main Supervisor: Villy Bæk Iversen

Supervisor: Anders Fosgerau



Søren Stobbe

What is the best possible result of this project? the dream scenario?

I would really like to obtain a better understanding of light-matter interaction for large quantum emitters. This is what I am working on right now. I hope that this could become an important contribution to the science of nanophotonic structures.

What else needs to be done before the dream scenario might be realized?

I need to do a lot of theoretical calculations to support my experiments.

Are there other dream scenarios?

I think that there could be some very interesting applications of this research and starting up a company would be great. Not least if it was to be based on new concepts from fundamental science.

Might the dream be realized in the foreseeable future?

At the moment everything depends on the outcome of my computer simulations. If they turn out to fit my experimental results and at the same time support my preliminary understanding of the physical mechanisms in play, I think that the future looks bright. It is too early to tell, but I am optimistic.

What keeps you going? Is it the dream or is it the day-to-day work itself?

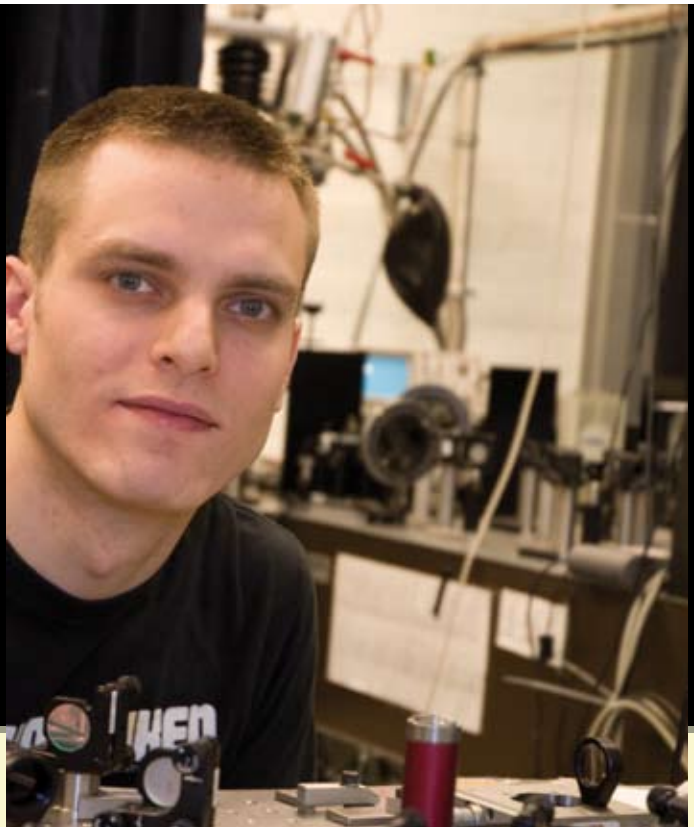
Both. It is great to get into so many new areas of physics and technology and I am learning new things every day and I am basically just interested in fundamental science.

Briefly describe the day-to-day work.

My working days vary a lot. During the first year of my project I spent a lot of time doing process development in the clean-room. Since then I have been spending a lot of time in the optical laboratory and presently I am mostly in front of my computer doing theoretical work and writing papers.

Why COM•DTU?

I think that many great experiments are done at technical universities because they typically have a more advanced technical infrastructure. For my project, I really need the state-of-the-art nanofabrication equipment at Danchip clean-room to make my structures, but it takes a lot of physics to understand the results. I think that COM•DTU has a nice combination of both technology and fundamental physics. Also, we are not doing one-man projects but rather collaborative projects where several PhD students work together and I think that is the only meaningful way to science when experiments are becoming increasingly complicated.



Threshold-less Photonic Crystal Laser

My project concerns the fabrication, measurement and modelling of light-matter interaction between quantum dot emitters and inhomogeneous media such as photonic crystals. Recently I have started investigations of large quantum dots which turned out to have completely new optical properties and therefore the theoretical modelling of these structures has become a significant part of my project. At some point I will also spend some months at the Technishe Universität München where I will work on an electrically tuned quantum dot photonic crystal single-photon source.

Danmarks Tekniske Universitet, COM•DTU

Main Supervisor: Peter Lodahl

Supervisor: Jørn Märcher Hvam

Peter Morten Moselund

What is the best possible result of this project? the dream scenario?

To develop a better light source, which can go into a wide range of medical and technical equipment. This would increase the capacity of the equipment leading to an increase our knowledge of how e.g. cells work. This could in turn lead to better cancer treatment or help solve other biological puzzles.

What else needs to be done before the dream scenario might be realized?

Products using the technology are already on the market. We just want to improve them and then they need to be utilized by equipment manufacturers. In part, this means that we have to reduce the complexity and price.

Are there other dream scenarios?

The spectrally broad supercontinuum light sources are currently mainly being utilized in optical analysis equipment, but they could also be used in optical communications to produce better multichannel (WDM) systems and increase data transport capabilities.

Might the dream be realized in the foreseeable future?

My PhD is in close cooperation with a commercial manufacturer of supercontinuum light sources so any improvements developed can be implemented in a product and be on the market within very few years.

What keeps you going? Is it the dream or is it the day-to-day work itself?

Most of the time it is the day-to-day work, but every time one realizes new results one get a glimpse of the dream.

Briefly describe the day-to-day work.

The work is a mix of working in laboratory with optical fibers and fiberlasers and analysing the results and relating this to the newest literature in the area.

Why COM•DTU?

COM•DTU cooperates with the world's leading producer of this type of light sources, so good cooperation with a company was ensured. In addition this ensured that any important knowledge gained in the PhD would actually be used and not just forgotten after I finished.

Long-pulse Super Continuum Light Sources

The project centres on investigating Super continuum generation. Supercontinuum is a spectrally broad light which can be produced using high intensity lasers and special nonlinear fibers. The broad spectrum can be used in many applications where one uses light to investigate matter based on its response to different colours of light.

The object of the project is to gain a better understanding of the mechanics of the supercontinuum generation process and how this process can be controlled in order to control which combination of colours are produced in the supercontinuum.

Danmarks Tekniske Universitet, COM•DTU

Main Supervisor: Ole Bang

Supervisor: Carsten L. Thomsen, Koheras A/S

Per Dalgaard Rasmussen

What is the best possible result of this project? the dream scenario?

The project I am working on is mainly concerned with modelling of infiltrated photonic crystal fibers. Currently I am working on demonstrating theoretically how an infiltrated bandgap fiber can be used for the generation of a broad spectrum near the blue edge of the visible spectrum. If such a light source is realized it will have applications for different kinds of spectroscopy and imaging techniques.

What else needs to be done before the dream scenario might be realized?

The photonic crystal fibers we have today are of very high quality compared to the first fibers that were produced about 10 years ago, but in the bandgap fibers I am studying, variations in the structure of less than 1% along the fiber axis can have a detrimental effect on the things we want to observe. Therefore fibers of a higher quality than those we have today, will be necessary for realizing the dream.

Are there other dream scenarios?

In my PhD project I have also shown theoretically how a photonic crystal fiber without a core defect could be used for making so-called light-bullets, which are pulses confined in time and space due to nonlinearities of the medium they are propagating in.

Might the dream be realized in the foreseeable future?

During its relative short lifetime the photonic crystal fiber has revolutionized the field of nonlinear fiber optics, along with this development, the quality of the fibers has also improved significantly. It is therefore realistic to expect that devices based on the theory I am working on currently, can be realized in the coming years.

What keeps you going? Is it the dream or is it the day-to-day work itself?

To me, the most appealing thing about the job as a PhD student is the opportunity to gain new insight on a daily basis. But also the freedom in the work, the possibility of studying abroad and going to conferences to present my work, is a highly motivating factor.

Briefly describe the day-to-day work.

As a theorist a lot of the time is spent using either pen and paper, or running numerical simulations on the computer to test the theoretical predictions. The progress is sometimes slow but the drive and direction are always present.

Why COM•DTU?

Before I started my PhD project I had done both my Master's degree project and several special courses at COM•DTU. From these courses my impression was that the researchers at COM•DTU are highly skilled, and are working in close collaboration with the photonics industry and universities abroad, which are all things I find very attractive.

Liquid Crystal Filled Microstructured Polymer Optival Fibres

My PhD project is focused on investigating properties of photonic crystal fibers infiltrated with different liquids. A very fascinating feature of photonic crystal fibers is that an index guiding fiber becomes a bandgap guiding fiber when the material in the holes instead of air is a liquid with an index of refraction higher than the fiber material. The dispersive properties of such a fiber are surprisingly different from their air-hole counterparts. Also the presence of the liquid inside the fiber opens the possibility of tuning the properties of the fiber by varying the temperature, or in some cases applying an electric field. It is the main purpose of this project to investigate these properties theoretically.

Danmarks Tekniske Universitet, COM•DTU

Main Supervisor: Ole Bang

Supervisor: Jesper Lægsgaard

Anna Vasileva Manolova

What is the best possible result of this project? the dream scenario?

Creating a comprehensive framework for inter-domain / inter-layer communication, which will provide for the seamless interconnection between different technologies and different networks with the main goal being the dynamic provisioning of connections with Quality of Service guarantees.

What else needs to be done before the dream scenario might be realized?

Extensive work is needed in order to identify all possible requirements posed by both network operators and network equipment vendors. A common agreement among the participating parties also needs to be established in order to create a framework that will be universally applicable.

Are there other dream scenarios?

Any advance in the area of inter-domain and inter-provider automatic provisioning would be great. One of the first steps would be the horizontal and vertical integration of the control planes of the networks.

Might the dream be realized in the foreseeable future?

With a lot of hard work and the joint efforts of everybody involved in the area such framework can be established in the next 3-5 years.

What keeps you going? Is it the dream or is it the day-to-day work itself?

The project involves work in an area where different proposals compete constantly to be the chosen one for standardization. This on-going competition yields very interesting proposals and implementations which give rise to new issues to be solved. There is a lot of dynamics in the area. This keeps my interest high all the time.

Briefly describe the day-to-day work.

My day-to-day work depends on which phase of the project I am in. Currently I am involved in the practical implementation of a new protocol for inter-domain routing in optical networks. I am also constantly reviewing the most up-to-date work in the area and actively discuss different solutions with colleagues from different universities and research centers.

Why COM•DTU?

COM•DTU has an excellent research environment. My colleagues are highly motivated and very helpful, which makes the research job very pleasant. Moreover, the degree of freedom and support in the research project gives me the chance to choose the direction which suites my interests the best, which is very motivating in itself.

Optical Network Control Plane for Multivendor Interoperability

My project aims at contributing in the field of Optical network control by investigating the options for horizontal and vertical integration of the control planes of different networks, which use different technologies and/or different equipment vendors. The proprietary implementation of different protocols makes the process of seamless interconnection between networks a challenging task. Different networks employ various implementations of schemes for QoS support, provisioning, and other aspects of the network operation. Only under a standardized and unified framework can these entities communicate efficiently and in an automatic manner which provides end-to-end QoS guarantees.

Danmarks Tekniske Universitet, COM•DTU
Main Supervisor: Lars Dittmann
Supervisor: Lars Ellegård, Tellabs A/S

Grigoriy Andreev Emiliyanov

What is the best possible result of this project? the dream scenario?

The best scenario is to create a microstructured Polymer Optical Fibers (mPOFs) based sensors for label-free detection of biomolecules.

What else needs to be done before the dream scenario might be realized?

mPOFs with better guiding properties need to be drawn and inscribed with long period gratings (LPGs).

Are there other dream scenarios?

Yes. To integrate such a biosensor into a chip.

Might the dream be realized in the foreseeable future?

Probably "yes", but it depends a lot on the COM•DTU strategy in the area of mPOF based biosensors.

What keeps you going? Is it the dream or is it the day-to-day work itself?

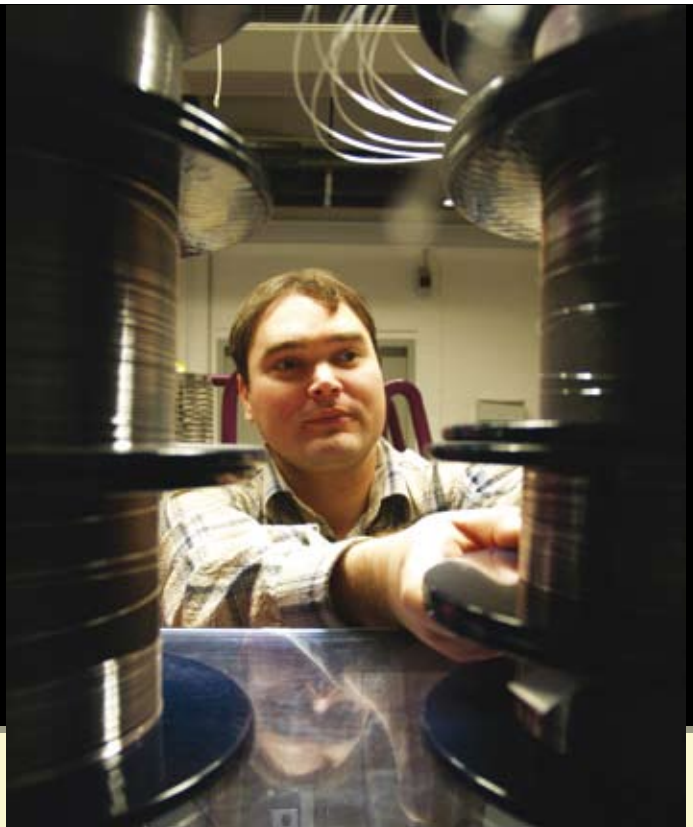
The day-to-day work keeps me going - and also the approaching deadline of my PhD thesis submission, which concludes the project.

Briefly describe the day-to-day work.

As the project is mostly experimental the day-to-day work is concentrated on work in the lab, meetings and discussion about solving practical problems.

Why COM•DTU?

Because COM•DTU is a research center of world-class excellence within the fields of telecommunications and optical technologies.



Photonic Crystal Fiber based Sensors for Label-Free Detection of Biomolecules

The project aims at the development of Microstructured Polymer Optical Fibers (mPOFs) based sensors for label-free detection of biomolecules. Such fibers are characterized by having a pattern of micrometer-sized air holes along the entire length of the fiber. The optical field penetrates into the air holes by evanescent wave and can hence probe aqueous solutions of biomolecules positioned in the air holes or biomolecules captured at the polymer-air interface.

Danmarks Tekniske Universitet, COM•DTU

Main Supervisor: Ole Bang

Supervisor: Lars Hagsholm Pedersen, Bioneer A/S

Lirong Yang

What is the best possible result of this project? the dream scenario?

The best possible result of this project is to have a general algorithm that assists the design of nanophotonic devices so that they can have customized performances. The devices can be photonic crystal wave guides, filters, wave splitters etc. The specific performances to be satisfied can be for an example higher transmission at certain frequencies or a special wave form at the output end.

What else needs to be done before the dream scenario might be realized?

Several test cases need to be tried out to realize the full potential of topology optimization on nanophotonic devices. In the mean time, a computation efficient code needs to be generated to optimize bigger structures in reasonable time.

Might the dream be realized in the foreseeable future?

I would like to think so.

What keeps you going? Is it the dream or is it the day-to-day work itself?

I think both the promising prospects as well as the challenging day-to-day work drive me to go on.

Briefly describe the day-to-day work.

I am mainly working with computer simulation and optimization, so the major work evolves around numerical analysis, as well as optimizing algorithm and the code. It is also exciting to have lively discussions with my Supervisors and colleagues.

Why COM•DTU?

COM•DTU provides a very free and encouraging research environment for its PhDs. There are in house experts in FDTD and topology optimization which are the two main fields I am working in.

Silicon-based Nanophotonic Structures for Controlling Light

The goal of this project is to optimize nanophotonic devices, by using topology optimization method based on transient analysis. Compared to finite element analysis, the transient analysis can work around the multiple calculations at different excitation frequencies, thus improving the optimization efficiency. The majority of the work lies in device modelling and numerical implementation of topology optimization. The end results could be various novel layout designs for filters, wave splitters, cavities, and etc..

Danmarks Tekniske Universitet, COM•DTU
Main Supervisor: Jørn Märcher Hvam
Supervisor: Andrei Lavrinenko
Supervisor: Ole Sigmund, MEK

Martin Schubert

What is the best possible outcome of this project?

To design and fabricate an electrically pumped Coupled phOtonic crystal Resonator Array Laser (CORAL) at room temperature which can be used for commercial applications like telecommunication systems.

What needs to be done before this outcome might be reached?

Fabrication techniques need to be developed in order to manufacture photonic crystal membranes of a sufficient quality to achieve lasing. A suitable design needs to be found which will enable a good profile of the laser beam. A general improvement in the performance of the CORALs and/or new techniques needs to be found to enable room temperature lasing. Last but not least, the electrical contacting of the membrane itself and/or the integration into a VECSEL structure are a challenge.

Are there other possible outcomes?

A better understanding of the interaction of several cavities in a photonic crystal might be gained or there could be an even better understanding of the coupling of microcavities in general. Also the realization of a new technique to electrically contact a membrane and new ways of passivating the surfaces of III-V materials could be found.

Might the objective be realized in the foreseeable future?

We haven't realized lasing at cryogenic temperatures yet therefore the project still has a long way to go before it can fulfilll its objectives. But we already made considerable advances in the fabrication process and are optimistic, that we will be able to achieve lasing in the near future.

What keeps you going? Is it the objective or is it the day-to-day work itself?

Since the objectives of the project are very optimistic it is hard to use them as a motivation. I rather like to work as a PhD student and enjoy the general challenge of scientific work. To answer the question directly it is mostly the day-to-day work that keeps me going.

Briefly describe the day-to-day work.

My daily routine varies greatly depending on whether I have lab work in the clean-room to do or simulations at my computer to run. Working on the simulations is like any other office duty while working in the clean-room is very practical. It also consists of a lot of waiting since most processes are run automatically by machines. A good deal of patience is therefore required in my daily routine.

Why COM•DTU?

I wanted to go abroad and the CORAL project at COM•DTU sounded interesting.

Coupled Photonic Crystal Resonator Array Lasers

The idea of the CORAL project is to develop the scientific tools and fabrication technologies needed for realizing semiconductor lasers in arrays of nano-scale optical resonators. The optical resonators will be realized with the help of photonic crystal slabs. In a photonic crystal slab light is confined vertically by total internal reflection for example in a free-standing membrane that contains an array of sub-micrometer sized holes. The holes can give rise to frequency bands (photonic bandgaps) within which the propagation of light is forbidden in all directions. Removal of a single hole forms a cavity which can act as a resonator. Such structures can be integrated into a Vertical Cavity Surface Emitting Lasers (VCSELs)

Danmarks Tekniske Universitet, COM•DTU
Main Supervisior: Kresten Yvind
Supervisor: Jørn Märcher Hvam
Supervisor: Lars Hagedorn Frandsen

Jens Kristian Lyngsøe

What is the best possible result of this project? the dream scenario?

The perfect waveguide – Guiding high power single polarization light, with low loss and flexible dispersion.

What else needs to be done before the dream scenario might be realized?

First of all we need to understand the mechanisms that give rise to loss in hollow core fibers, which is believed to be mainly scattering of light on the silica/air interface. But also the fiber birefringence that makes single polarization guiding possible, has to be implemented without a significant increase of loss.

Are there other dream scenarios?

Photonic bandgap fibers have a lot of promising applications and most of them rely on these fundamental properties. Ultimately if the loss gets low enough these fibers could replace conventional transmission fibers and transmit light over longer distances. A more realistic application is the fiber optical gyroscope, where implementing hollow core fibers potentially can improve stability and precision.

Might the dream be realized in the foreseeable future?

It depends on the interpretation of the dream, but recent research certainly shows the right trend.

What keeps you going? Is it the dream or is it the day-to-day work itself?

A realistic version of the dream and the day to day work with achieving subtasks on the way to larger goals.

Briefly describe the day-to-day work.

Building optical setups for characterization of new fiber designs. Comparing observed data with models to gain better understanding of fundamental fiber properties. Discussing ideas and results with fellow students and colleagues.

Why COM•DTU?

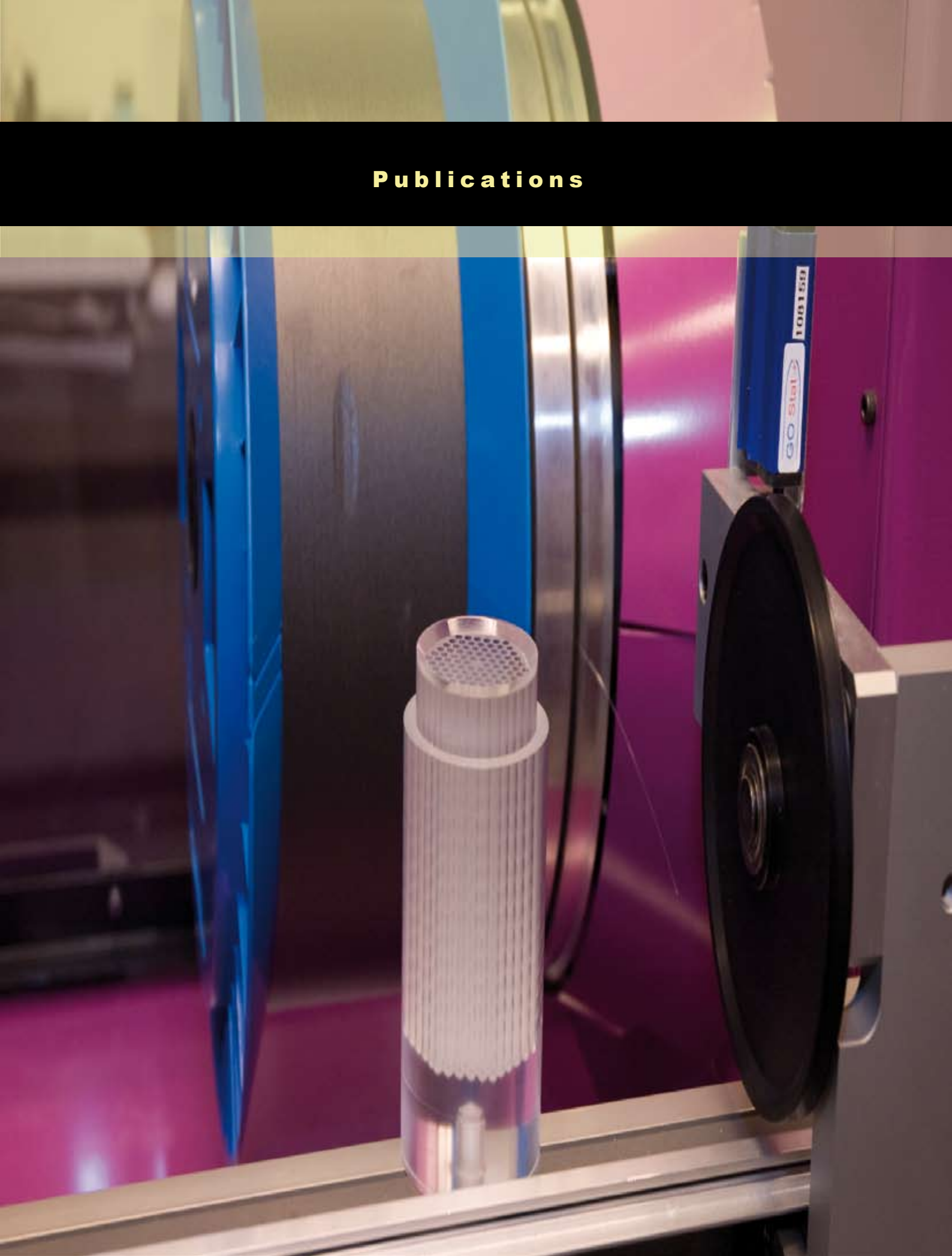
Because COM•DTU has the necessary experience with optics and fiber technology to support the project. Also I find that the close relationship between DTU and the industry is an advantage when working as an industrial PhD.

Refining the Properties of Hollow Core Fibres

To understand and improve fundamental properties of photonic bandgap fibres mainly hollow core fibres, with emphasis on lowering fibre loss and improving polarization maintenance. The main contribution to loss in hollow core fibres is believed to be scattering of light on the silica surfaces inside the fibre. The possibility to lower the surface scattering is examined in this project. Also polarization maintenance by means of fibre birefringence is studied with focus on high birefringence coinciding with low fibre loss.

Danmarks Tekniske Universitet, COM•DTU
Main Supervisor: Anders Overgaard Bjarklev
Supervisor: Harald Simonsen
Supervisor: Brian Joseph Mangan, Crystal Fibre A/S

Publications



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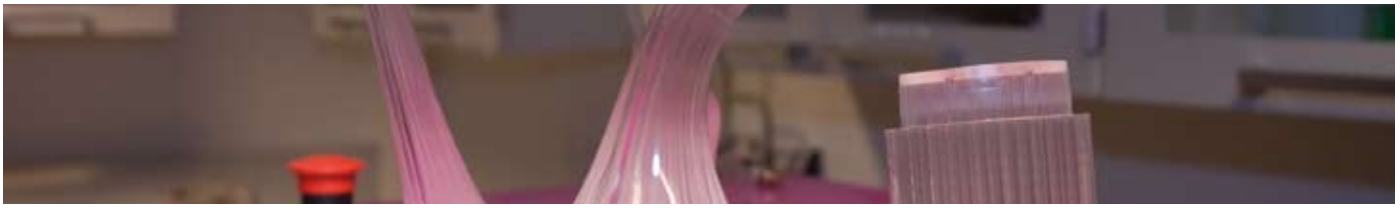

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Presented at: European Conference on Integrated Optics (ECIO), Copenhagen, Denmark, 2007

Jung, H. F.; Tafur Monroy, Idelfonso; Koonen, A.M.J.

Demonstration of An All-optical Data Vortex Switch Node

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Justesen, Jørn; Høholdt, Tom

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Kassar, G.C.; Calabretta, N.; Tafur Monroy, Idelfonso

Simultaneous Optical Carrier and Radio Frequency Re-Modulation in Radio-Over-Fiber Systems Employing Reflective SOA Modulator

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Kjær, Rasmus; Tafur Monroy, Idelfonso; Jensen, Jesper Bevensee; Oxenløwe, Leif Katsuo; Jeppesen, Palle; Palsdottir, B.

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Koucheryavy,Y.; Harju,J.; Iversen, Villy Bæk

Special Issue of Journal of Communications Software and Systems

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Larsson, David; Yvind, Kresten; Hvam, Jørn Märcher

Monolithic Mode-locked Lasers with Surface Etched Bragg Gratins

Presented at: CLEO/QELS, Maryland, USA, 2007

Lavrinenko, Andrei; Leyrer, Reinhold J.; Wohlleben, Wendel; Dissaux, Nolwenn; Heggarty, Kevin; Boyle, Mark; Kiyan, Roman; Neumeister, Andre

Artificial Opals as Nanophotonic Materials for Optical Communications

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Lavrinenko, Andrei; Leyrer, R.J.; Wohlleben, W.; Dissaux, N.; Heggarty, K.; Boyle, M.; Kivan, R.; Neumeister, A.

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Lund-Hansen, Toke; Johansen, Jeppe; Stobbe, Søren; Hvam, Jørn Märcher; Lodahl, Peter

Detailed Investigation of Spontaneous Emission Decay Rates of Self-assembled Inas Quantum Dots

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Tailoring the Dispersion Properties of Photonic Crystal Fibers

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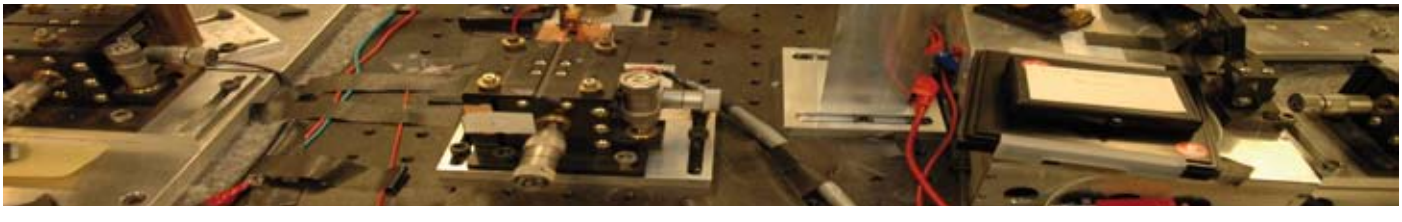
Design and Evaluation of IP Header Compression for Cellular-Controlled P2P Networks



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Manolova, Anna Vasileva; Buron, Jakob Due; Ruepp, Sarah Renée; Dittmann, Lars; Ellegard, Lars

Segmentation-based Path Switching Mecanism for Reduced Data Losses in OBS Networks

Presented at: ONDM: 11th International Conference on Optical Networking Design and Modelling, Athens, Greece, 2007

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Presented at: OPNETWORK 2007, Washington, USA, 2007

Mortensen, Brian Bach

Combining Aggregation and Scheduling using an Iterative maximal Weight Matching Switch Scheduler

Presented at: 11th WSEAS International Multiconference CSCC, 2007 Crete, Greece.2007

Mulvad, Hans Christian Hansen; Oxenløwe, Leif Katsuo; Clausen, Anders; Galili, Michael; Grüner-Nielsen, Lars; Jeppesen, Palle

Error-free 320 Gb/s Simultaneous Add-drop Multiplexing

Presented at: OFC, Anaheim, USA, 2007

Mørk, Jesper

Nanomaterials – quantum dots for optoelectronics

Presented at: European Conference on Integrated Optics (ECIO), Copenhagen, Denmark, 2007

Mørk, Jesper; Öhman, Filip; Poel, Mike van der; Hansen, Per Lunnemann; Nielsen, Torben Roland; Kær Nielsen, Per; Thyrrestrup Nielsen, H.; Yvind, Kresten

Slow Light in Semiconductor Waveguides: Theory and Experiment

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Nielsen, Torben Roland; Gregersen, Niels; Tromborg, Bjarne; Mørk, Jesper

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Noordegraaf, Danny; Scolari, Lara; Lægsgaard, Jesper; Rindorf, Lars Henning; Alkeskjold, Thomas Tanggaard

Electrically Tunable Long-period Gratings in Liquid Crystal Photonic Bandgap Fibers

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Ou, Haiyan; Rottwitt, Karsten; Philipp, Hugh Taylor

Ultra-compact Silica-on-silicon Microresonators by Etching Deep Trenches

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Presented at: Opto-Electronics and Communications Conference, Yokohama, Japan, 2007

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All-optical 160 Gbit/s RZ Data Retiming System Incorporating a Pulse Shaping Fibre Bragg Grating

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Petersen, Martin Nordal

Novel OSNR Monitoring Technique in Dense WDM Systems Using Inherently Generated CW Monitoring Channels

Presented at: OFC, Anaheim, USA, 2007

Poel, Mike van der; de Lima, M.M.; Santos, P.; Hvam, Jørn Märcher

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Silica Bridge Impact on Hollow-core Bragg Fiber Transmission Properties

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Qian, Huang; Ko, Huang; Iversen, Villy Bæk

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Rindorf, Lars Henning; Jensen, Jesper Bo; Dufva, Hans Martin; Pedersen, Lars Hagsholm; Hoiby,Poul E.; Bang, Ole

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Roberts, John

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Sales, Salvador; Öhman, Filip; Capmany, J.; Mørk, Jesper

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Scolari, Lara; Tartarini, G.; Borelli, E.; Alkeskjold, Thomas Tanggaard; Mulvad, Hans Christian Hansen; Bassi, Paolo; Bjarklev, Anders Overgaard

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Soler, José; Gandy, Michael

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Stobbe, Søren; Johansen, Jeppe; Nikolaev, I.S.; Lund-Hansen, Toke; Kristensen, Philip Trøst; Hvam, Jørn Märcher; Vos, Willem L.; Lodahl, Peter

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Publications

Thomas, N.L. Le; Houdré, R.; Frandsen, Lars Hagedorn; Fage-Pedersen, Jacob; Lavrinenko, Andrei; Borel, Peter Ingo

Far-field Investigation of Slow-light Propagating Below The Light Cone In Planar Photonic Structures

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Far-field Investigation of Slow-light Propagating Below the Light Cone in Planar Photonic Structures

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Tokle, Torger; Serbay, M.; Jensen, Jesper Bevensee; Rosenkranz, W.; Jeppesen, Palle

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Vivero, T.; Calabretta, N.; Tafur Monroy, Idelfonso; Kassar, G.C.; Öhman, Filip; Yvind, Kresten; Gonzales-Marco, A.; Mørk, Jesper

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All-Optical Multi-Wavelength Conversion with Negative Power Penalty by a Commercial SOA-MZI for WDM Wavelength Multicast

Presented at: OFC, Anaheim, California, USA, 2007

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Presented at: 1st European Topical Meeting on Nanophotonics and Metamaterials: Nanometa, Seefeld, Austria, 2007

Yuan, H.-K.; Chettiar, U.K.; Cai, W.; Kildishev, A.V.; Boltasseva, Alexandra; Drachev, V.P.; Shalaev,V.M.

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Zhukovsky, Sergei V.; Chigrin, Dmitry N.; Lavrinenko, Andrei; Kroha, Johann

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Conference Contributions (posters, abstracts, etc.)

Alkeskjold, Thomas Tanggaard; Scolari, Lara; Noordegraaf, Danny; Lægsgaard, Jesper; Bjarklev, Anders Overgaard; Tartarini, G.; Castaldini, D.; Bassi,Paolo; Li,J.; Gauza,S.; Wu,S.-T.

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Influence Of Geometry on the Quality Factor of a Micro-pillar
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Hansen, Per Lunnemann; Poel, Mike van der; Yvind, Kresten; Mørk, Jesper
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Presented at: Annual meeting Danish Physical Society; 3, Nyborg, Denmark, 2007

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Slow Light in Semiconductor Quantum Dots
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Houmark-Nielsen, Jakob; Jauho, Antti-Pekka; Nielsen, Torben Roland; Mørk, Jesper

Influence of Coulomb Interactions on Quantum Coherence in Quantum Dots

Presented at: Physics-based mathematical Models of Low-dimensional Semiconductor Nanostructures: Analysis and Computation, Banff, Canada, 2007

Hvam, Jørn Märcher

Recent Advances in Nanophotonics

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Ivinskaya, A.; Lavrinenko, Andrei

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Jepsen, Peter Uhd; Clark, S.J.

Precise Ab-initio Calculation of Terahertz-frequency Vibrational Modes in Molecular Crystals

Presented at: Optical Terahertz Science and Technology Topical Meeting and Tabletop Exhibit, Orlando, Florida, USA, 2007

Jepsen, Peter Uhd

Drugs & Alcohol: Prediction of *Solid-state Vibrational Modes and Analysis of Aqueous Solutions with Thz Spectroscopy*

Presented at: International Bunsen Discussion Meeting on Exploring THz spectroscopy: Technology and applications in the field of dynamics and nanostructures, Bad Honnef, Germany, 2007

Jepsen, Peter Uhd; Clark,S.

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Jepsen, Peter Uhd; Møller, Uffe; Eichhorn, Finn; Merbold, Hannes; Folkenberg, J.R.; Clark, S.J.

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Jepsen, Peter Uhd; Møller, Uffe; Cooke, David; Riis-Folkenberg, Jacob

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Jespersen, Christoffer Felix

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Presented at: 7th Tropical Workshop on Heterostructure Microelectronics, Kisarazu, Chiba, Japan, 2007

Johansen, Jeppe; Stobbe, Søren; Hvam, Jørn Märcher; Lodahl, Peter

Modified Local Density of Optical States as a Diagnostic Tool for Quantum Dot Decay Dynamics

Presented at: International Conference on Optical, Optoelectronic and Photonic Materials and Applications, London, UK, 2007

Kristensen, Philip Trøst; Tromborg, Bjarne; Lodahl, Peter; Mørk, Jesper

Breakdown of Wigner-weisskopf Theory for Spontaneous Emission: A Quantative Analysis

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Lavrinenko, Andrei; Romanov, S.G.

The Finite-difference Time-domain Modeling of Bi-directional Transmission Spectra in Thin 3-dimensional Opal-based Photonic Crystals

Presented at: PECS-VII: International Symposium on Photonic and Electromagnetic Crystal Structures, Monterey, California, 2007

Lavrinenko, Andrei; Wohlleben, W.; Leyrer, R.J.

Effect of Disorder on Transmission Characteristics of Inverse-opal Photonic Crystals

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Leosson, Kristjan; Rosenzveig, T.; Boltasseva, Alexandra

Nanowire Waveguides for Integrated Plasmonic Devices

Presented at: Surface Plasmon Photonics, Dijon, France, 2007

Liu, Z.; Boltasseva, Alexandra; Bakker, R.M.; Gresillon, S.; Yuan, H.-K.; Kildishev, A.V.; Drachev, V.P.; Shalaev, V.M.

Far-field Characterization of Gold Nanoantenna Arrays

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Lund-Hansen, Toke; Johansen, Jeppe; Stobbe, Søren; Hvam, Jørn Märcher; Lodahl, Peter

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Publications

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Presented at: 1st European Topical Meeting on Nanophotonics and Metamaterials, Seefeld, Tirol, Austria, 2007

Manolova, Anna Vasileva; Christiansen, Henrik Lehrmann; Buron, Jakob Due; Ruepp, Sarah Renée

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Presented at: Proceedings of OPNETWORK 2007, Washington, USA, 2007

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Determination of Alcohol Concentration in Aqueous Solutions and Food Analysis using Reflection Terahertz Time-Domain Spectroscopy

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Møller, Uffe; Merbold, Hannes; Folkenberg, J.R.; Jepsen, Peter Uhd

Terahertz Time-domain Spectroscopy: A New Way to Determine Alcohol Concentrations in Aqueous Solutions

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Møller, Uffe; Folkenberg, J.R.; Jepsen, Peter Uhd

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Nielsen, H.; Lund-Hansen, Toke; Julsgaard, Brian; Lodahl, Peter

Investigating Spontaneous Emission from Quantum Dots to a Photonic Crystal Cavity

Presented at: Annual Meeting Danish Physical Society, Nyborg, Denmark, 2007

Nielsen, H.; Lund-Hansen, Toke; Julsgaard, Brian; Lodahl, Peter

Investigating Spontaneous Emission from Quantum Dots Coupled to a Photonic Crystal Cavity

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Presented at: Advanced Laser Technologies Conference, Levi, Finland, 2007

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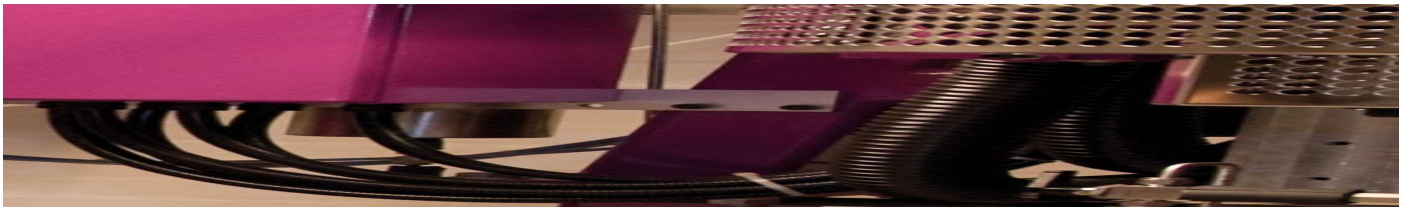

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People

Management Group

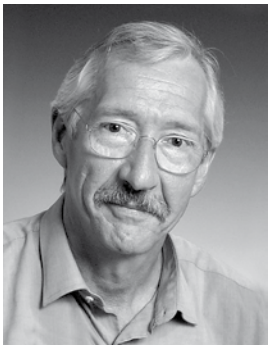
Anders Overgaard Bjarklev
Director

Lars-Ulrik Aaen Andersen
Deputy Director

Ejner Nicolaisen
Coordinator of Contracts

Knud J. Larsen
Head of Coding

Karsten Rottwitt
Head of Fibers & Nonlinear Optics



Jørn Hvam
Head of Nanophotonics

Lars Dittmann
Head of Networks

Palle Jeppesen
Head of Systems

Staff

	Title	start date	end date
Management			
Anders Overgaard Bjarklev	Director		
Lars-Ulrik Aaen Andersen	Deputy Director		
Administration			
Lone Bjørnstjerne	Personnel Officer		
Britt Boding	Group Secretary		
Vivi Brackley	Group Secretary	14-05-2007	
Kirsten Graae	Group Secretary		
Bent Hulsrøj	Electronics Mechanic		
Bodil Kallesøe Kleist	Internal Service		
Aline Møller	Project Coordinator		
Ejner Nicolaisen	Associate Professor, Coordinator of Contracts		
Rune Thode Nielsen	Student Assistant	08-02-2007	07-09-2007
May Rasmussen	Accounting	15-01-2007	
Charlotte Vibeke Smit	Communications and PR		
Anne Louise Susanka	Accounting	01-03-2007	
Brian Michael Sørensen	Electronics Engineer		
Heidi Teglstrup	Head of Accounting		
Heidi Koch Tokle	Communications and PR		31-01-2007
IT Support			
Anders Fosgerau	IT Manager		
Michael Ammekilde	IT Supporter	26-03-2007	
Ole Asmus	IT Supporter		
Erik Winther Eilertsen	IT Supporter		
Martin Riis Lassen	Trainee		
Coding			
Knud J. Larsen	Associate Professor and Head of Area		
Søren Otto Forchhammer	Associate Professor and Deputy Head		
Shankar Manuel Aghito,	Postdoc		14-08-2007
Jakob Dahl Andersen	Research Associate		
Xin Huang	PhD Fellow		
Jørn Justesen	Professor		
Huiying Li	PhD Fellow		
Mo Wu	PhD Fellow		
Fibers & Nonlinear Optics			
Karsten Rottwitt	Associate Professor and Head of Area		
Ole Bang	Associate Professor and Deputy Head		
Thomas Tanggaard Alkeskjold,	Postdoc		30-09-2007
Peter E. Andersen	Adjunct Associate Professor		
Morten Bache	Assistant Professor		
Grigoriy Andreev Emiliyanov	PhD Fellow		
Lars Eskildsen	Associate Professor	01-02-2007	
Michael H. Frosz	Postdoc		31-08-2007

	Title	start date	end date
Theis Peter Hansen	Postdoc		30-09-2007
Wieslaw Krolikowski	Visiting Professor	11-05-2007	30-06-2007
Vita Savelievna Levitan	PhD Fellow	01-02-2007	
Jens Kristian Lyngsøe	Industrial PhD Fellow		
Jesper Lægsgaard	Associate Professor		
Peter Morten Moselund	PhD Fellow		
Carsten Vandel Nielsen	Postdoc	01-03-2007	
Danny Noordegraaf	Research Assistant	01-02-2007	30-11-2007
Christina Bjarnal Thulin Olausson,	Industrial PhD Fellow	01-11-2007	
Haiyan Ou	Associate Professor		
Anders Tegtmeier Pedersen	Research Assistant	29-08-2007	30-11-2007
Per Dalgaard Rasmussen	PhD Fellow		
Lars Rindorf	PhD Fellow		31-10-2007
Peter John Roberts	Professor		
Lara Scolari	PhD Fellow		
Dzmitry Shyroki	PhD Fellow		31-08-2007
Dmitry Turchinovich	Postdoc		
Lei Wei	PhD Fellow	15-08-2007	
Johannes Weirich	PhD Fellow	01-06-2007	
Guests:			
Marina Kasimova	Guest Researcher	01-03-2007	08-03-2007
Line Kessel	Guest Researcher	15-03-2007	
Nanophotonics			
Jørn Hvam	Professor and Head of Area		
Jesper Mørk	Professor and Deputy Head		
Mads Lykke Andersen	PhD Fellow	01-03-2007	
Elaine Cristina Saraiva Barretto,	PhD Fellow	01-09-2007	
Søren Blaaberg	Postdoc		
Alexandra Boltasseva	Assistant Professor		
Yaohui Chen	PhD Fellow	01-05-2007	
Yuntian Chen	PhD Fellow	01-09-2007	
Il-Sug Chung	Postdoc		
David Cooke	Postdoc		
Finn Eichhorn	PhD Fellow		
Lars Hagedorn Frandsen	Postdoc		
Niels Gregersen	Postdoc		
Per Lunnemann Hansen	PhD Fellow		
Aliaksandra Ivinskaya	PhD Fellow		
Peter Uhd Jepsen	Associate Professor		
Jeppe Johansen	PhD Fellow		
Brian Julsgaard	Postdoc		
Jong Min Kim	Postdoc	01-12-2007	
Philip Trøst Kristensen	PhD Fellow		
David Larsson	Postdoc		
Andrei Lavrinenko	Associate Professor		
Peter Lodahl	Associate Professor		

		Title	start date	end date
	Toke Lund-Hansen	PhD Fellow		
	Radu Malureanu	Postdoc	01-03-2007	
	Uffe Møller	PhD Fellow		
	Rasmus Bundgaard Nielsen	PhD Fellow	01-10-2007	
	Torben Roland Nielsen	Postdoc		
	Rasmus Kjelsmark Olsson	PhD Fellow	01-02-2007	
	Mike van der Poel	Associate Professor		
	Minhao Pu	PhD Fellow	01-09-2007	
	Martin Schubert	PhD Fellow	01-04-2007	
	Stephan Smolka	PhD Fellow	01-07-2007	
	Søren Stobbe	PhD Fellow		
	Mikael Svalgaard	Associate Professor		31-07-2007
	Weiqi Xue	PhD Fellow	01-07-2007	
	Lirong Yang	PhD Fellow		
	Aiyun Yao	Postdoc		28-02-2007
	Kresten Yvind	Associate Professor		
	Filip Öhman	Postdoc		
Guests:				
	Gloria Carvalho	Guest PhD Student	22-01-2007	27-04-2007
	Cheng Cheng	Guest PhD Student	01-10-2007	
	Dominic Dorfner	Guest PhD Student	21-05-2007	08-06-2007
	Tiberiu Rosenzveig	Guest PhD Student	07-09-2007	20-12-2007
	Salvador Sales	Visiting Professor	20-02-2007	20-04-2007
	Amelie Tetu	Guest PhD Student		01-12-2007
	Tania Vivero	Guest PhD Student	10-04-2007	19-06-2007
	Enbo Zhou	Guest PhD Student	01-10-2007	
Networks				
	Lars Dittmann	Professor and Head of Area		
	Michael Stübert Berger	Associate Professor and Deputy Head		
	Vilius Benetis	Postdoc		31-01-2007
	Jakob Due Buron	Postdoc		
	Henrik Lehrmann Christiansen	External Associate Professor		
	Andreas Diehl	Research Assistant	01-04-2007	
	Rong Fu	PhD Fellow	01-11-2007	
	Per Flemming Hansen	External Associate Professor	01-09-2007	
	Liang Hu	PhD Fellow		
	Jinxu Huang	Research Assistant	01-04-2007	31-08-2007
	Villy Bæk Iversen	Associate Professor		
	Christoffer Felix Jespersen	Postdoc		
	Mohammed Kadim	Research Assistant		31-05-2007
	Christian Fabio Alessandro Lanzani	Industrial PhD Fellow		
	Anna Vasileva Manolova	PhD Fellow		
	Brian Bach Mortensen	Assistant Professor		30-09-2007
	Martin Nordal Petersen	Postdoc		
	Sarah Renée Ruepp	PhD Fellow		
	Jose Soler Lucas	External Associate Professor		

		Title	start date	end date
	Lars Staalhagen	Associate Professor		
	Hua Wang	PhD Fellow		
	Henrik Wessing	Assistant Professor		
	Ying Yan	PhD Fellow		
	Qi Zhang	PhD Fellow		
Guests:				
	Sergey Stepanov	Visiting Professor	08-01-2007	12-01-2007
Systems				
	Palle Jeppesen	Professor and Head of Area		
	Christophe Peucheret	Associate Professor and Deputy Head		
	Nicola Calabretta	Postdoc	01-05-2007	31-05-2007
	Anders Clausen	Postdoc		
	Michael Galili	Postdoc		
	Yan Geng	PhD Fellow		31-03-2007
	Jesper Bevensee Jensen	PhD Fellow		
	Hua Ji	PhD Fellow	01-08-2007	
	Rasmus Kjær	PhD Fellow		
	Hans Christian Hansen Mulvad,	PhD Fellow		
	Alexey Vladimirovich Osadchiy,	PhD Fellow	15-08-2007	
	Leif Oxenløwe	Associate Professor		
	Kamau Ayodele Webster Prince,	PhD Fellow	01-07-2007	
	Jorge Seoane	Assistant Professor		
	Idelfonso Tafur Monroy,	Associate Professor		
	Torger Tokle	Assistant Professor		30-09-2007
	Xianbin Yu	Postdoc	01-11-2007	
	Darko Zibar	Postdoc		
	Beata Zsigri	Postdoc		
Guests:				
	Victor Company Torres	Guest PhD Student	01-07-2007	30-09-2007
	Jing Xu	Guest PhD Student	01-10-2007	