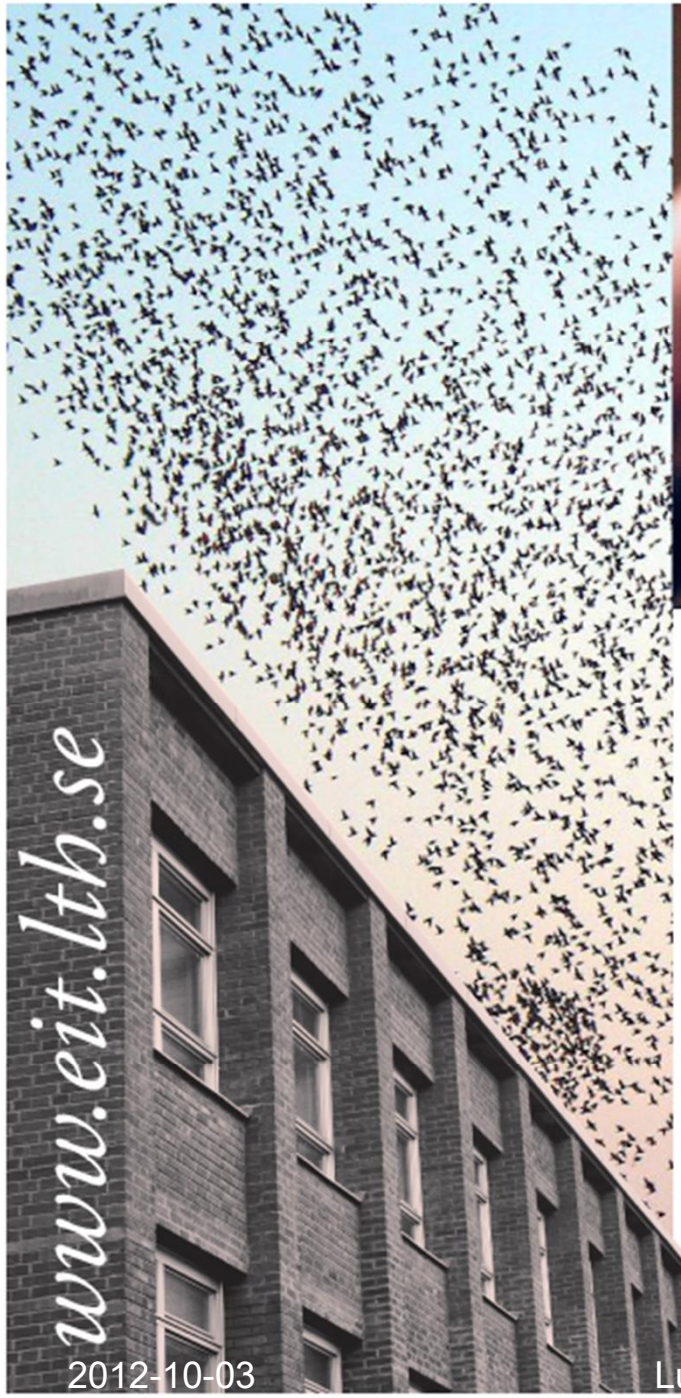
Lund Circuit Design Workshop 2012

LUND

SoS
System Design on Silicon

Professor Jan Rabaey became Honoray Doctor of Lund University in 2012!



The Wireless Revolution Continued: from Mobiles to Swarms

honorary doctor lecture by

Jan M. Rabaey

E-BUILDING LTH | E:A

THURSDAY MAY 24, 13.15

Welcome and Introduction

Viktor Öwall

Dept. of Electrical and Information Technology

Lund University, Sweden

viktor.owall@eit.lth.se

Welcome to two exiting days

A Lund University perspective by senior researchers and PhD students

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A Lund University perspective by senior researchers and PhD students

Welcome to two exiting days

- Invited speakers from academia,
  - Patrick Reynaert, KU Leuven

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- Research Institutes
  - Liesbet Van der Perre, IMEC

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- Invited speakers from academia,
  - Patrick Reynaert, KU Leuven
- Research Institutes
  - Liesbet Van der Perre, IMEC

- and an Industrial Perspective:
  - Frederic Gianesello, ST Microelectronics

  - Pierre-Yves Challier, Cadence
  - Thierry Petit, ST Microelectronics

  - Hannes Medelius, Ericsson AB

Some Logistics!

- Today's program is at Grand Hotel including Lunch.
- Dinner in the Main Building of Lund University.
- Tomorrows programs is at the Faculty of Engineering, Lund University.

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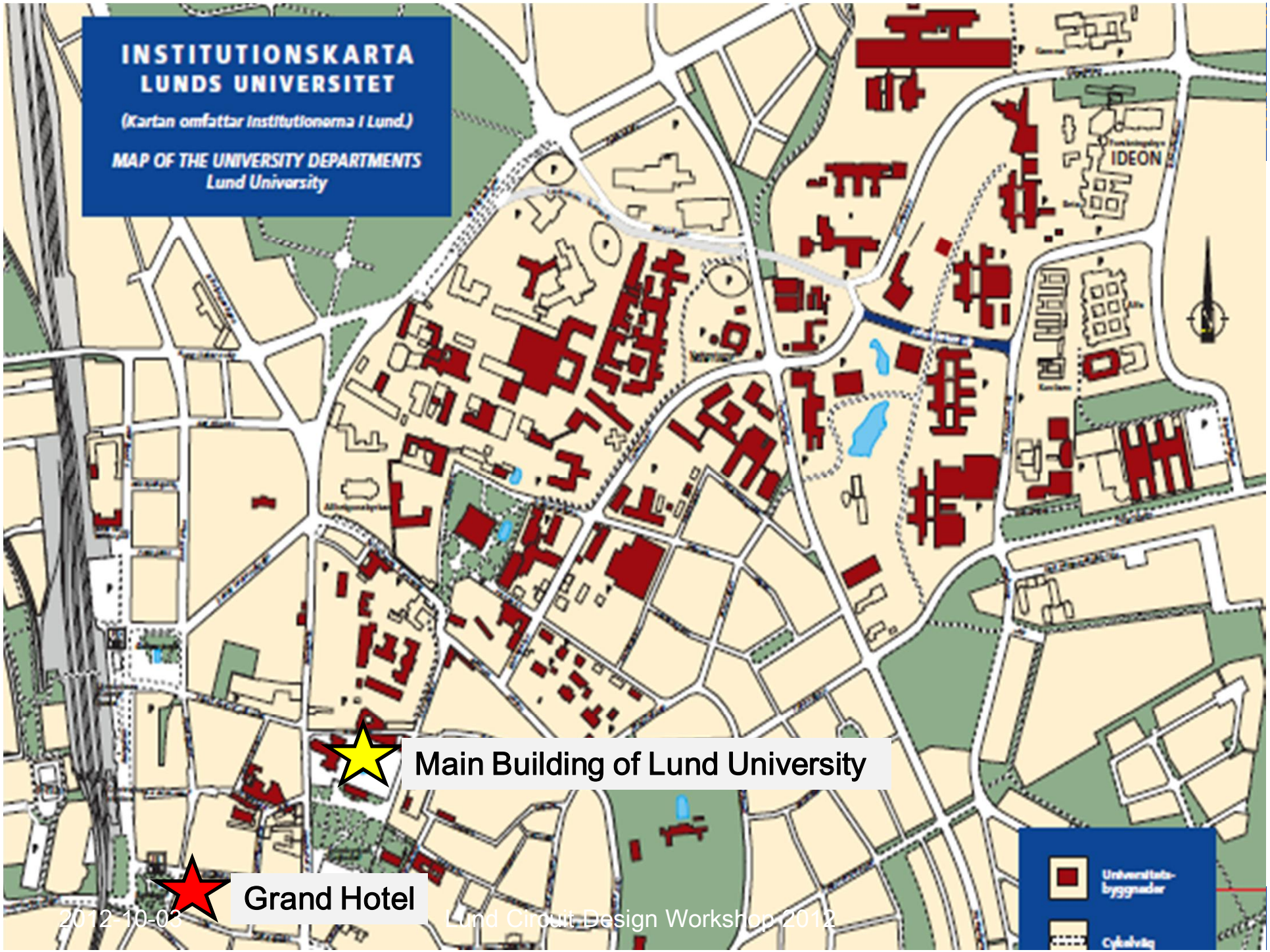
Dinner : Main Building of Lund University


INSTITUTIONSKARTA
LUNDS UNIVERSITET
(Kartan omfattar institutionerna i Lund.)
MAP OF THE UNIVERSITY DEPARTMENTS
Lund University
IDEON
Main Building of Lund University
Grand Hotel

Some Logistics!

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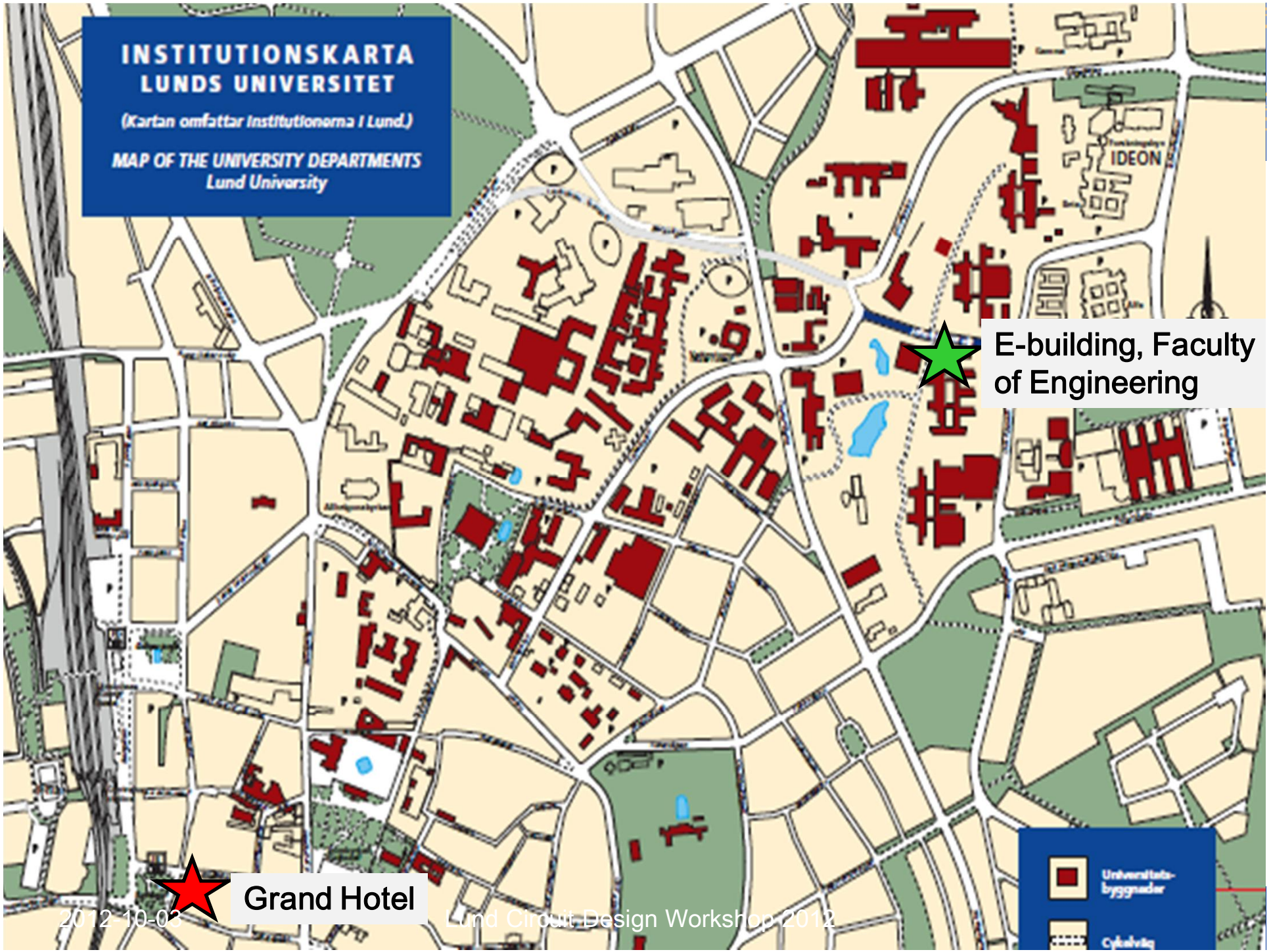
- Dinner in the Main Building of Lund University.
- Tomorrows programs is at the Faculty of Engineering, Lund University.
  Approximately 20-25min walk from Grand Hotel.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E-building, Faculty of Engineering
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E-building: faculty of Engineering

The Hosts

From VINNOVA´s evaluation 2011: "SoS builds on strong long-term relations with top industry partners in the international arena in the Center's strategic area which is highly relevant to the Swedish economy. The SoS team represents an impressive range of research talent and experience, including many staff with international records of achievement and clearly shows that they can compete on an international level. "

People in SoS

Director: Viktor Öwall, Co-director: Piertro Andreani
Chairman of the Board: Sven Mattisson, Ericsson AB

International Advisory Board

- Professor Jan Rabaey, BWRC, UC Berkeley, USA
- Professor Mike Faulkner, Victoria University, Australia
- Professor Qiuting Huang, ETH, Zürich, Switzerland

The Hosts

SoS
System Design on Silicon

Swedish Foundation for Strategic Research

WWW

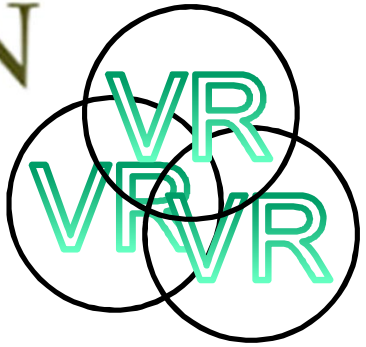
Wireless with Wires

UPD

Swedish Foundation for Strategic Research

Wireless Communication for Ultra Portable Devices

The Hosts



WWW

Wireless with Wires

UPD

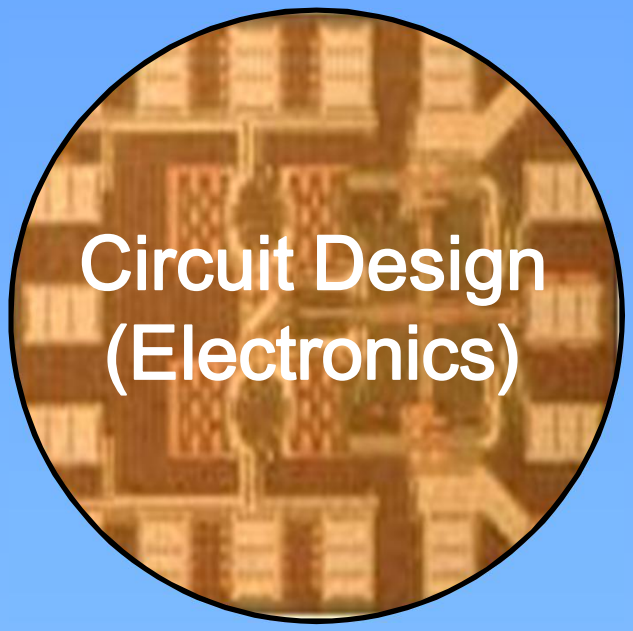
Wireless Communication for Ultra Portable Devices

During the breaks…

…if you get a minute during the breaks there are two slide shows. One presenting the grants…

…and one with introductions to tomorrows poster sessions.

Research Environment –
from both academic and industrial networks



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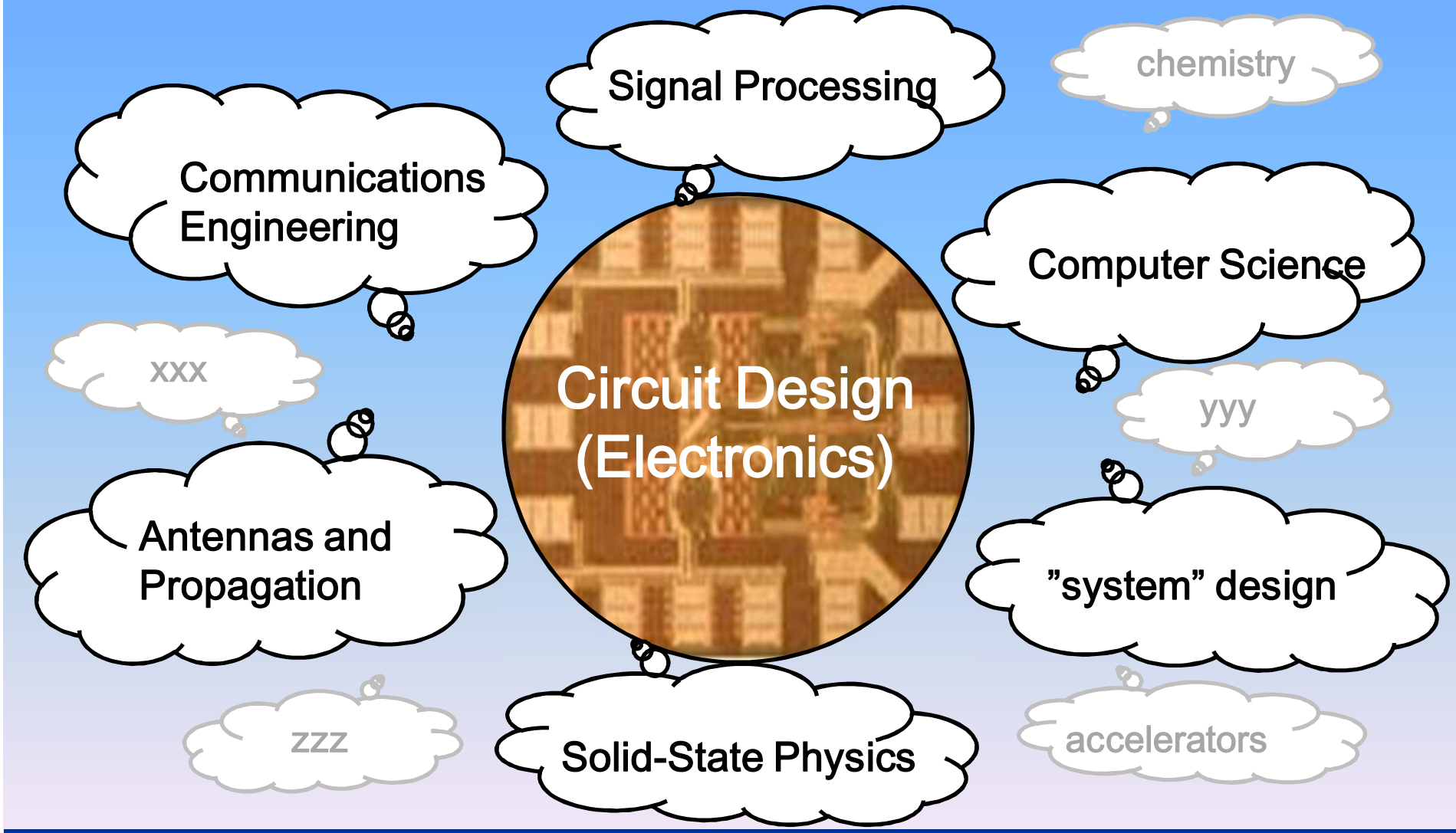

Research Environment –
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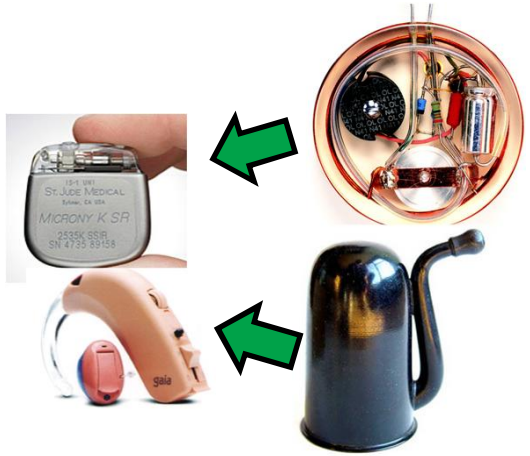
Application areas

Main Focus:

Wireless/cellular systems



Medical applications, including wireless

The sessions

Low Power Techniques

- *New Non-Volatile Memory Solutions: How They May (not) Serve Future Systems*
  by Liesbet Van der Perre, IMEC

The sessions

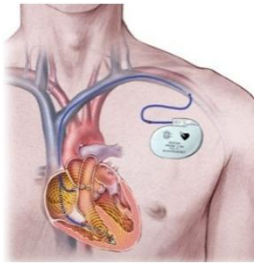
Low Power Techniques

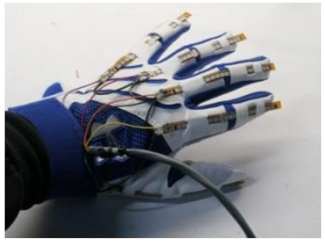
- *New Non-Volatile Memory Solutions: How They May (not) Serve Future Systems*
  by Liesbet Van der Perre, IMEC

- *Ultra Low Power Circuit and System Design, by* Henrik Sjöland, Lund University

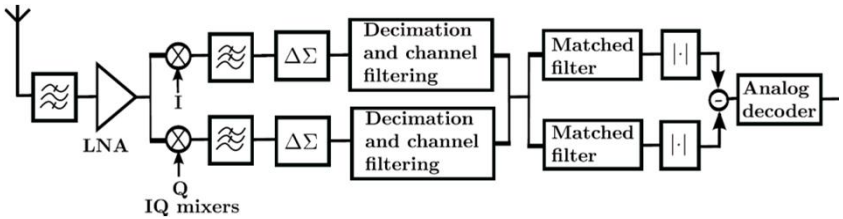
- *65-nm Semi-Custom Sub-Threshold Memories by* Oskar Andersson, Lund University

Ultra Low Power Circuit and System Design

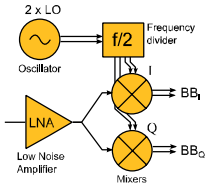


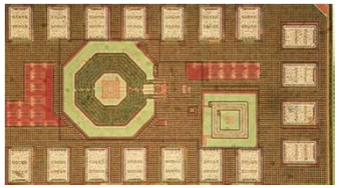


In some applications the battery must last the equipment lifetime!

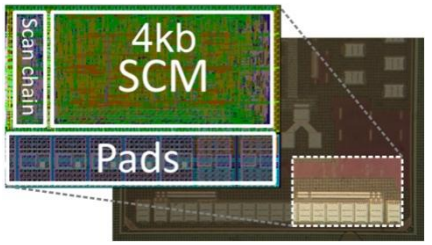


Receiver block diagram





2.45GHz quadrature front-end



Semi-custom sub-threshold memory

The sessions

mm-Wave Circuits I

- *60GHz Power Amplifiers and Transmitters in CMOS*
  by Patrick Reynaert, KU Leuven

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- *60GHz Power Amplifiers and Transmitters in CMOS*
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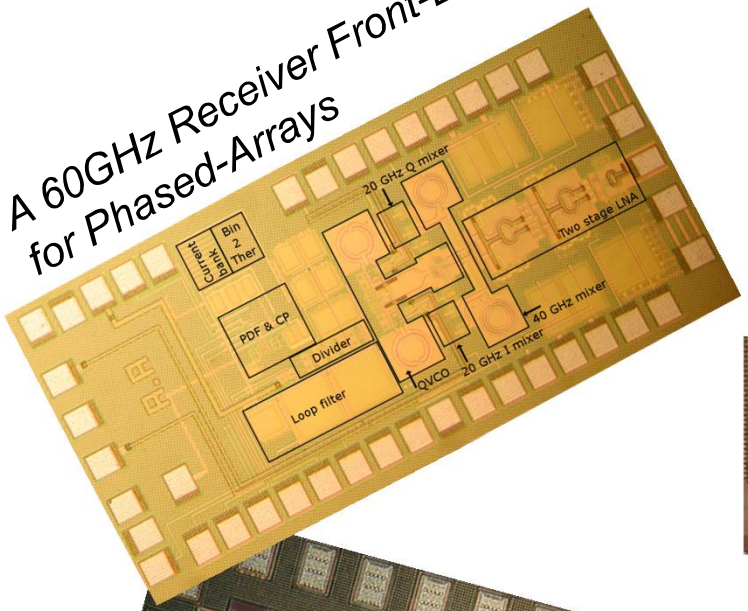
- *mm-Wave Circuit Design Activities at EIT*
  by Markus Törmänen, Lund University

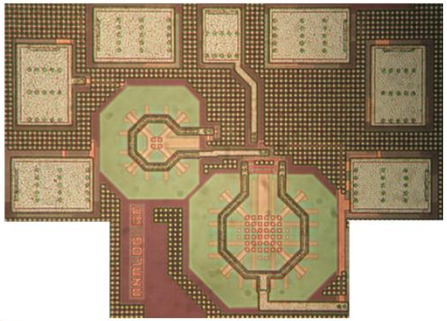
- *Low-Power InAs MOSFET RF Circuits*
  by Karl-Magnus Persson, Lund University

mm-Wave Circuit Design Activities at EIT

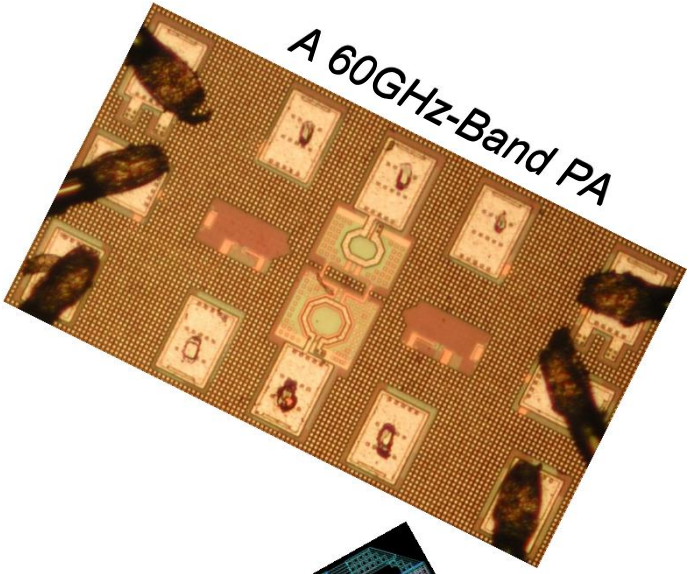
A 60GHz Receiver Front-End for Phased-Arrays



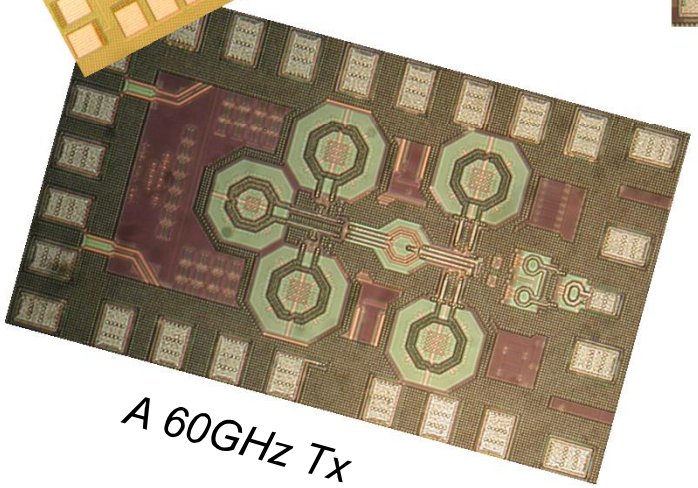
Recent and …



A 70 and 210GHz LO generator

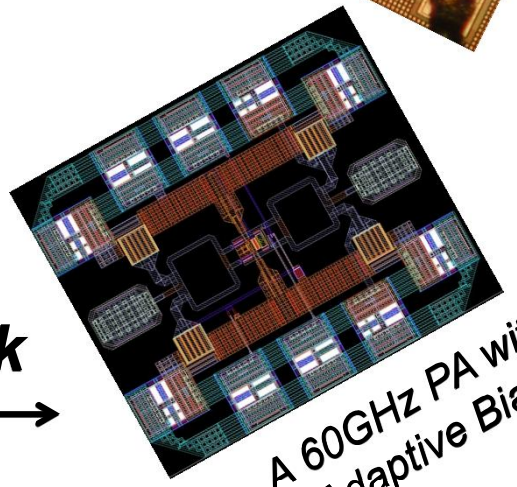


A 60GHz-Band PA



A 60GHz Tx

… ongoing work



A 60GHz PA with Adaptive Bias

The sessions

mm-Wave Circuits II

- *Analog and RF Requirements for Advanced CMOS Nodes: The SOI Perspective*
  by Frederic Gianesello, ST Microelectronics

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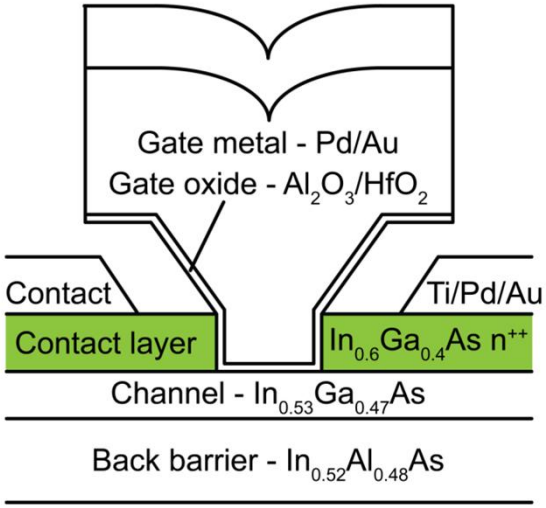
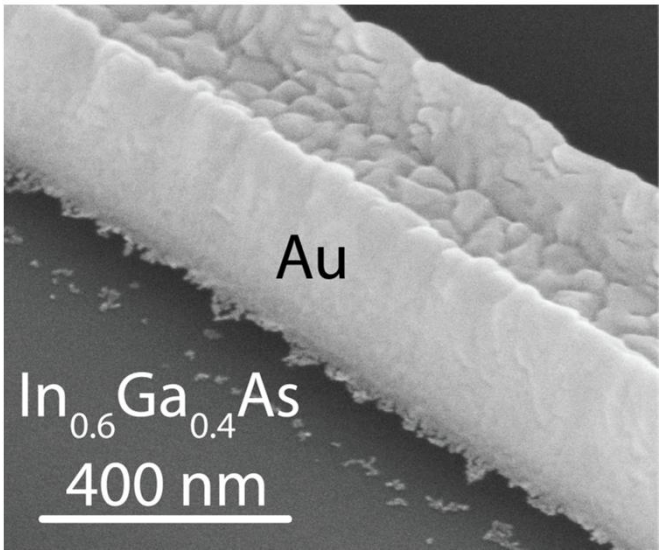
- *III-V MOSFETs for RF Applications*
  by Lars-Erik Wernersson, Lund University

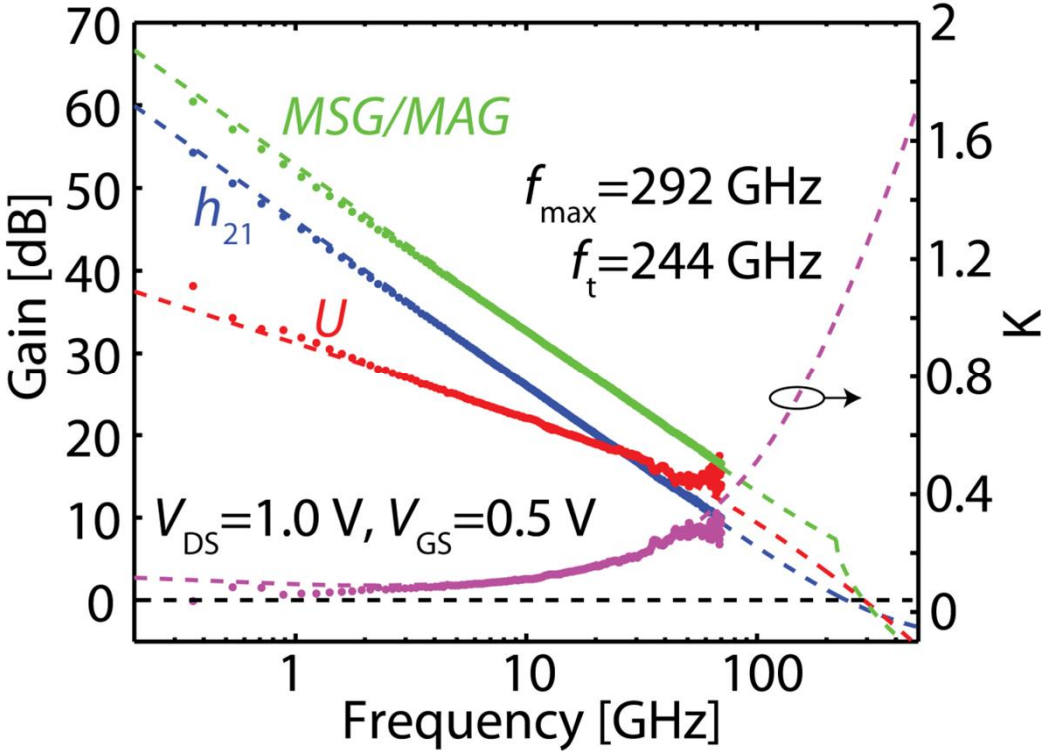
- *A Single III-V Nanowire CMOS Inverter*
  by Anil Dey, Lund University

III-V MOSFETs for RF Applications





Introduction of III-V Materials into MOS Technology



The sessions

Cellular Systems I

- *Methodology and Tools for Automatic ECO*
  by Pierre-Yves Challier, Cadence and
  Thierry Petit, ST Microelectronics

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- *Methodology and Tools for Automatic ECO*
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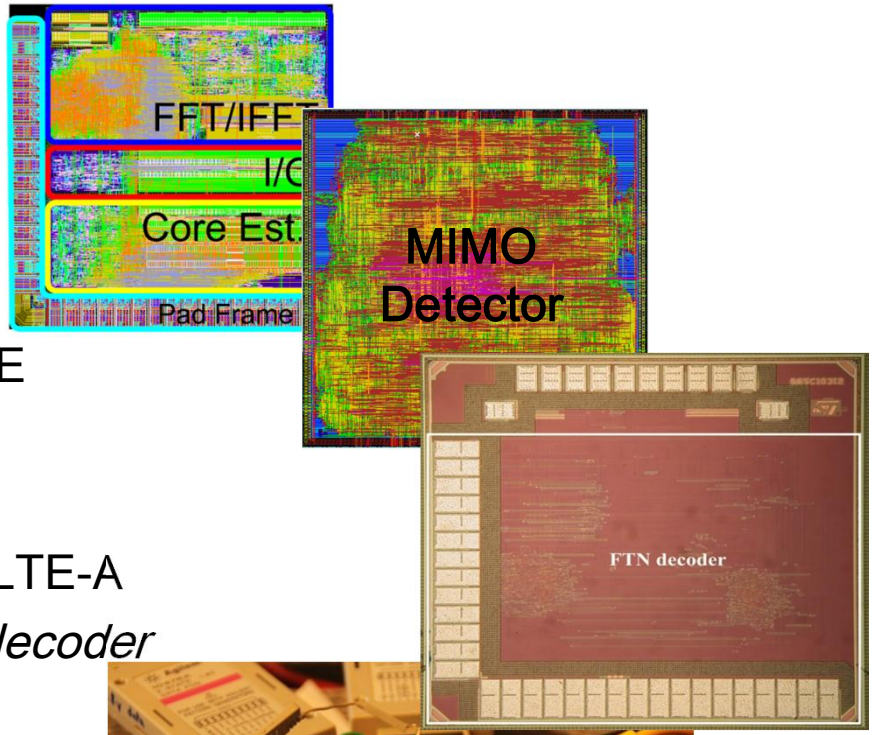
- *Cellular Electronics - Baseband Processing*
  by Liang Liu, Lund University

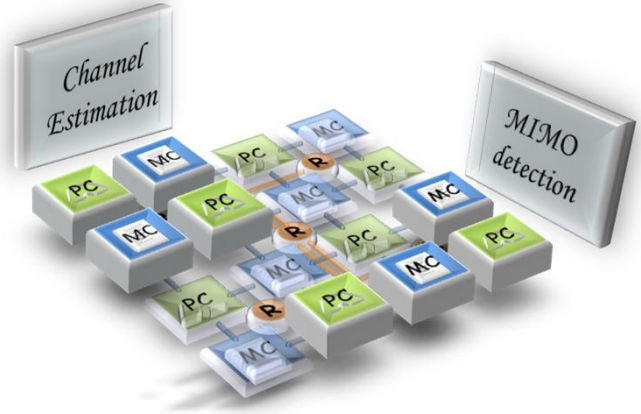
- *A Linearized 0.7 to 3 GHz Receiver Front-End*
  by Anders Nejdel, Lund University

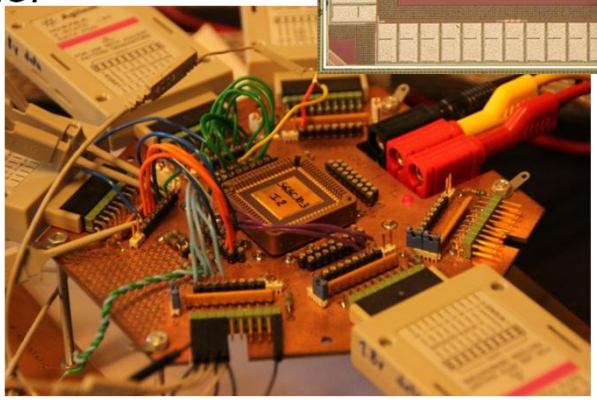
Research Activities in Baseband Processing

Research Projects:

- Multi-mode *DEF* using SDR platform
- Improved-MP *channel estimator* for LTE
- Link-adaptive *channel pre-processors*
- Multi-mode soft-output *MIMO detector*
- Multi-task *reconfigurable cell array* for LTE-A
- Chip measurements for FTN *iterative decoder*







The sessions

Cellular Systems II

- *Radio Base Station Evolution*
  by Hannes Medelius, Ericsson AB

The sessions

Cellular Systems II

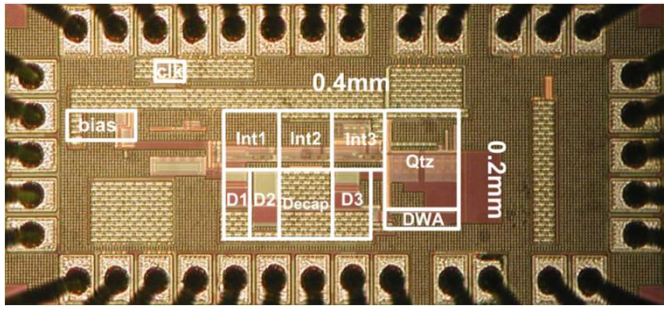
- *Radio Base Station Evolution*
  by Hannes Medelius, Ericsson AB

- *Cellular IC design - RF, Analog, Mixed-Mode*
  by Pietro Andreani, Lund University

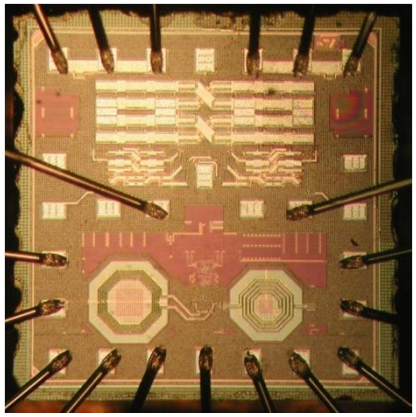
- *Low-Phase-Noise 3.4-4.5 GHz Dynamic-Bias Class-C CMOS VCOs with a FoM of 191 dBc/Hz*
  by Luca Fanori, Lund University

Cellular IC design - RF, Analog, Mixed-Mode

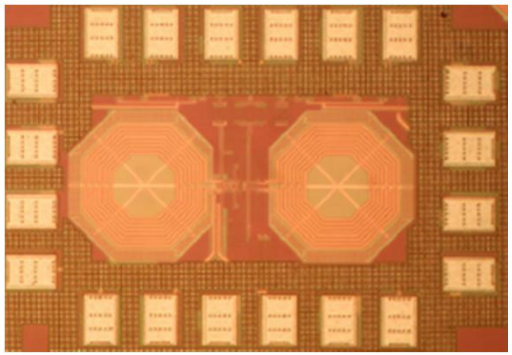
ΔΣ A/D



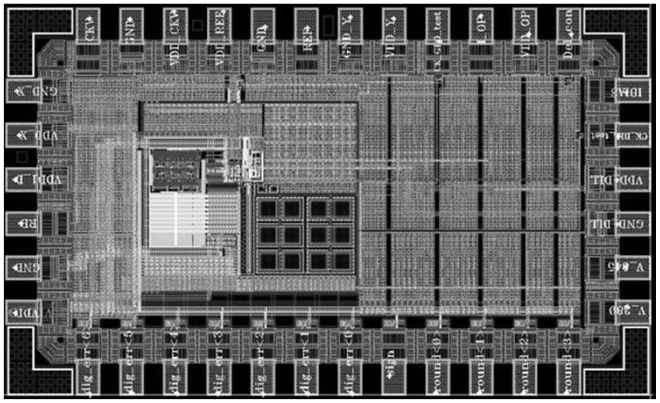
LO generation



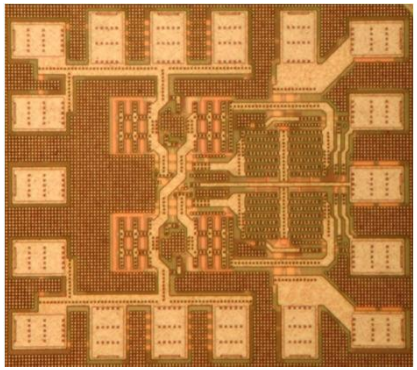
Linear RX front-end



Time-to-digital converter



30dBm PA



Class-C VCOs

Thank You and Enjoy!