Wishes from the cross-cutting-activities from the pillar-1 and 3 activities

Workshop on
HGF-Detector Portfolio Pillar-1 (Technologies) – Meeting
…with Participation of Pillar-3

DESY, Hamburg
June 12th – June 13th

Radiation Physics, HZDR

Fine Fiedler

What‘s in a name

Von Schmidt, Christian Joachim Dr.

Betreff RE: AW: Name: Querschnittaktivitaeten

Von Graafsma, Heinz 'T.Cowan@hzdr.de'

Betreff **RE: [hgf_detector_eb] Re: AW: Name: Querschnittaktivitaeten**

An hgf_detector_eb@lists.kit.edu, Weber, Marc, Fiedler, Dr. Fine, 'T.Cowan@hzdr.de'

Kopie (CC) Buchwald, Christiane, Kopmann, Andreas

Ich auch! Sehr gut!

Heinz

Cross disciplinary application

Von Ritman, James

Betreff **Re: AW: Name: Querschnittaktivitaeten**

An Weber, Marc, Fiedler, Dr. Fine, 'T.Cowan@hzdr.de'

Kopie (CC) Buchwald, Christiane, Kopmann, Andreas, hgf_detector_eb@lists.kit.edu <hgf_detector_eb@lists.kit.edu>

hwald, Christiane

Antwort

Hi alle,

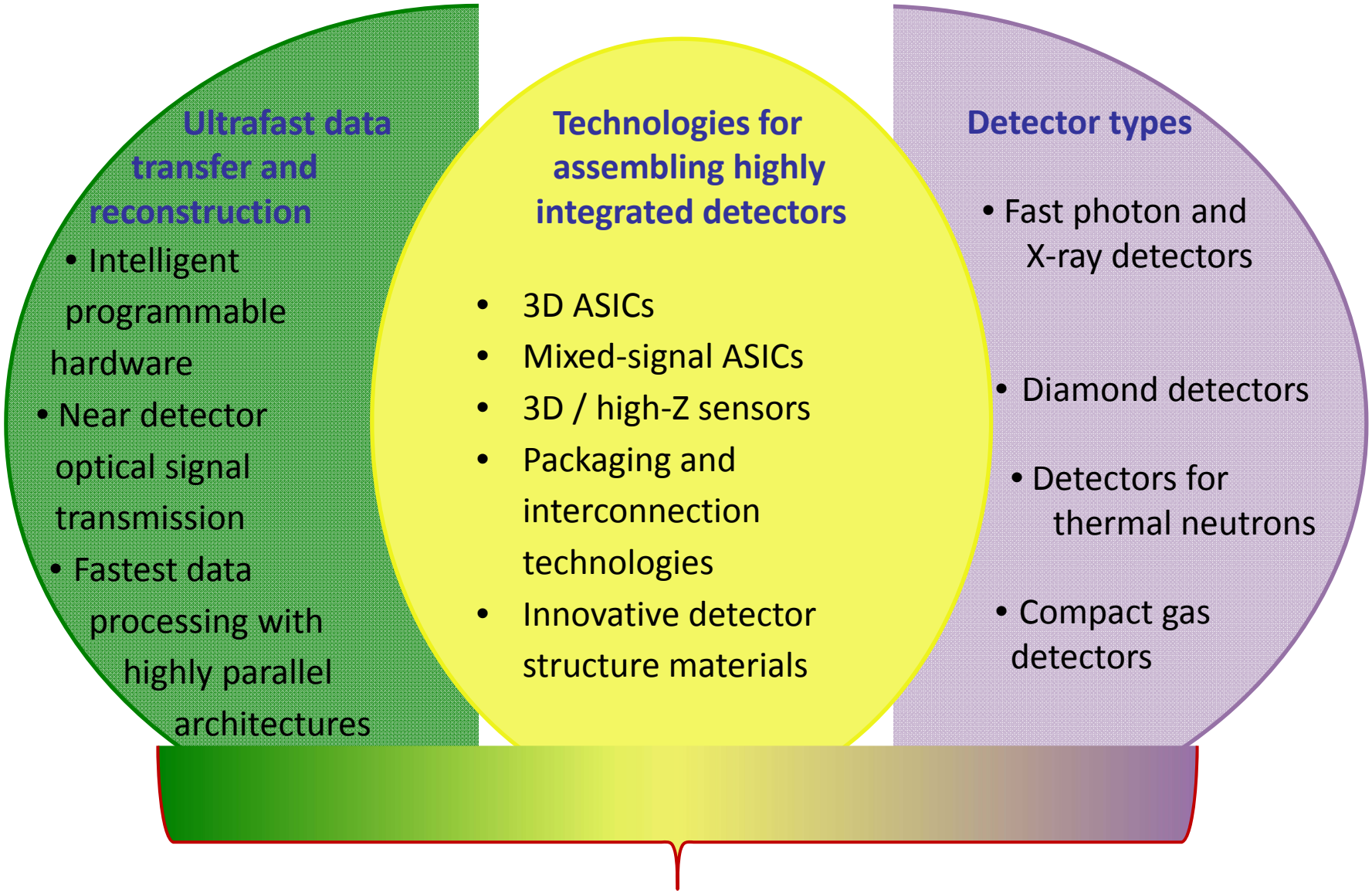
Ich stimme diesen Vorschlag auch zu.

Viele Gruesse,
Jim

Liebe Frau Fiedler,

ich finde das auch sehr gut. Wenn es keine Einwände gibt, können Sie dies doch schon in Hamburg verkünden...

Beste Grüße, Marc Weber


Ultrafast data transfer and reconstruction
• Intelligent programmable hardware
• Near detector optical signal transmission
• Fastest data processing with highly parallel architectures
Technologies for assembling highly integrated detectors
• 3D ASICs
• Mixed-signal ASICs
• 3D / high-Z sensors
• Packaging and interconnection technologies
• Innovative detector structure materials
Detector types
• Fast photon and X-ray detectors
• Diamond detectors
• Detectors for thermal neutrons
• Compact gas detectors
Cross disciplinary application

Objective of the cross disciplinary application (Querschnittssäule)

- A cross-section topic will look for specific application fields outside
  - high energy physic, “Matter” , Helmholtz Association

- Visibility of the technological competencies

- Search for interdisciplinary cross-program opportunities

- Particularly promising application, examples:
  - Dose monitoring for ion therapy
  - Reduced radiation exposure for Computed Tomography
  - Ultra-sound Computed Tomography
  - Non-destructive material analysis with positron life time spectroscopy
  - Homeland security

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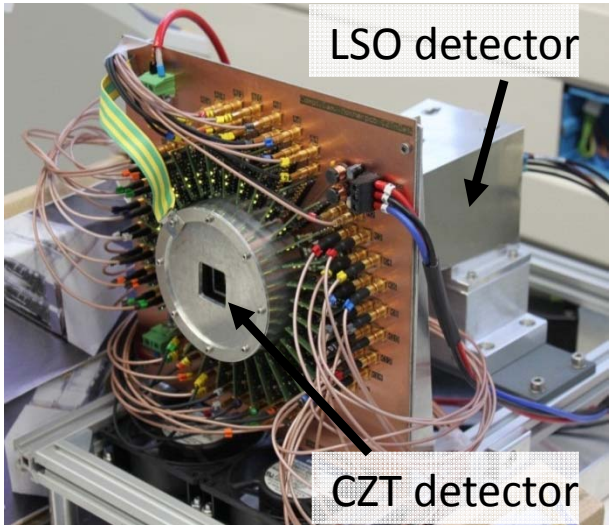
  - Neutron radiography

Dose monitoring for ion therapy – The development of a Compton Camera @ Dresden



Prototype system

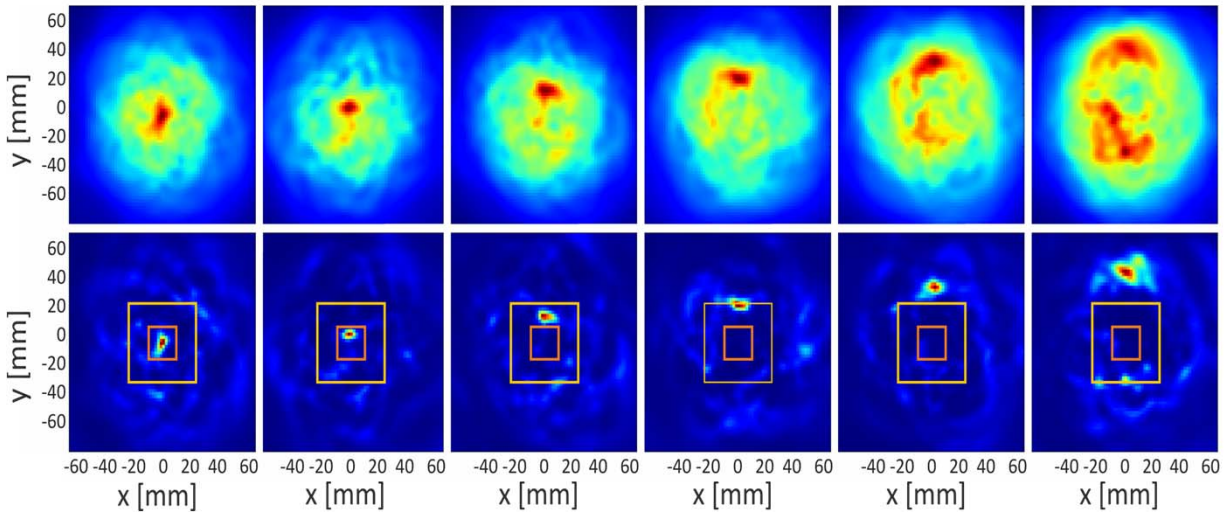
Objective: Development of a system for clinical use

Needed: **Detectors** (high energy resolution, high position resolution, fast, inexpensive)

Simulation for optimizing the system and developing an appropriate filter

Data processing

Reconstruction – preferably in real time



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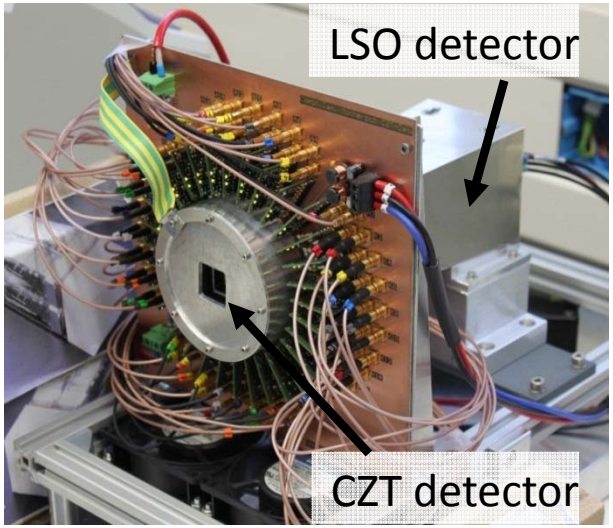

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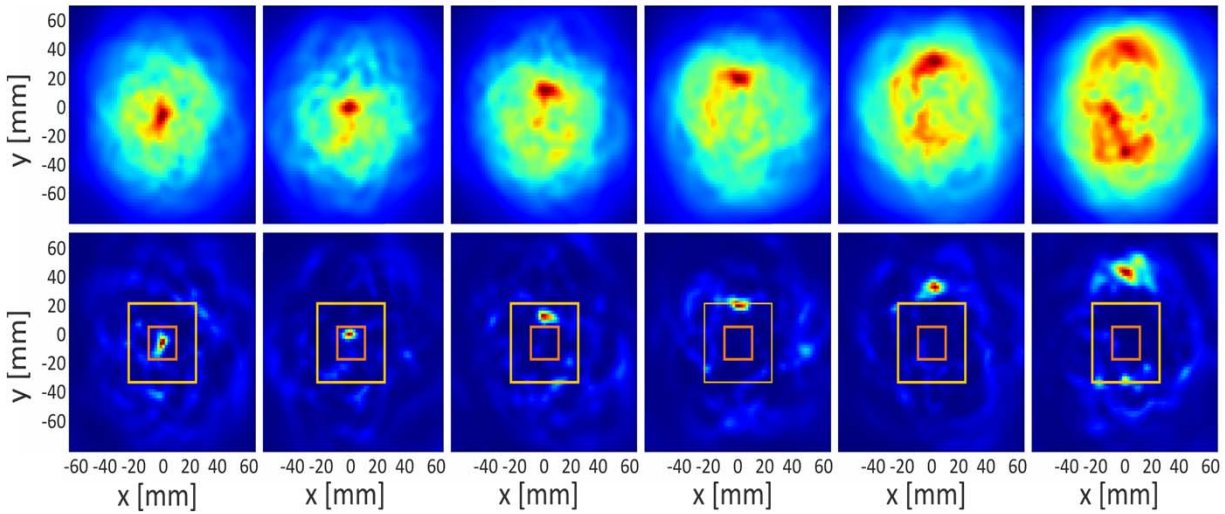

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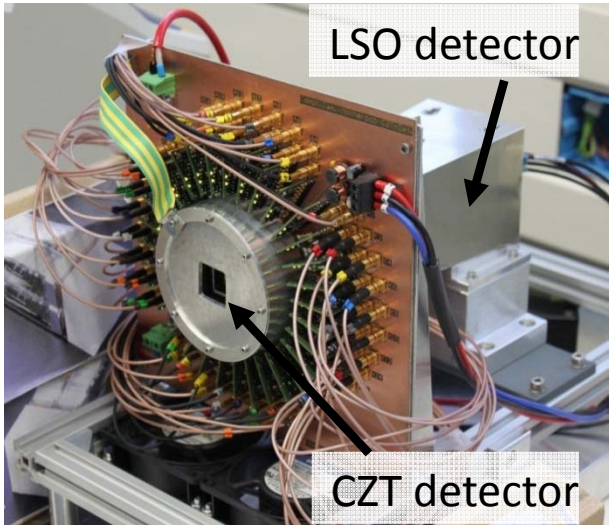


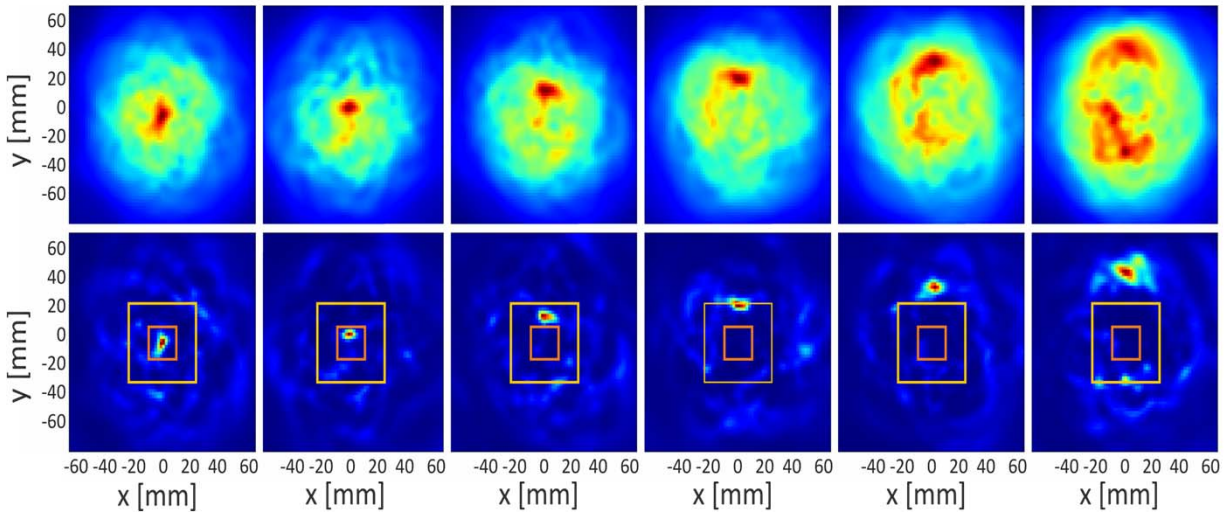
Prototype system

Objective: Development of a system for clinical use

Needed: **Detectors** – RTSD, high-Z Scintillators, Si-PM

Data processing – FPGA

Reconstruction – GPU



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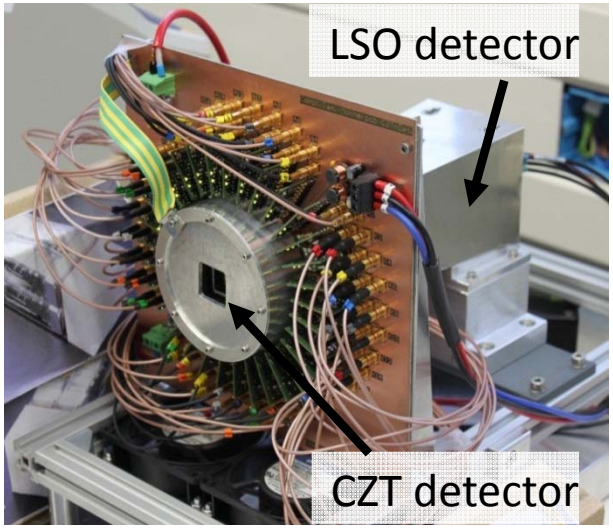

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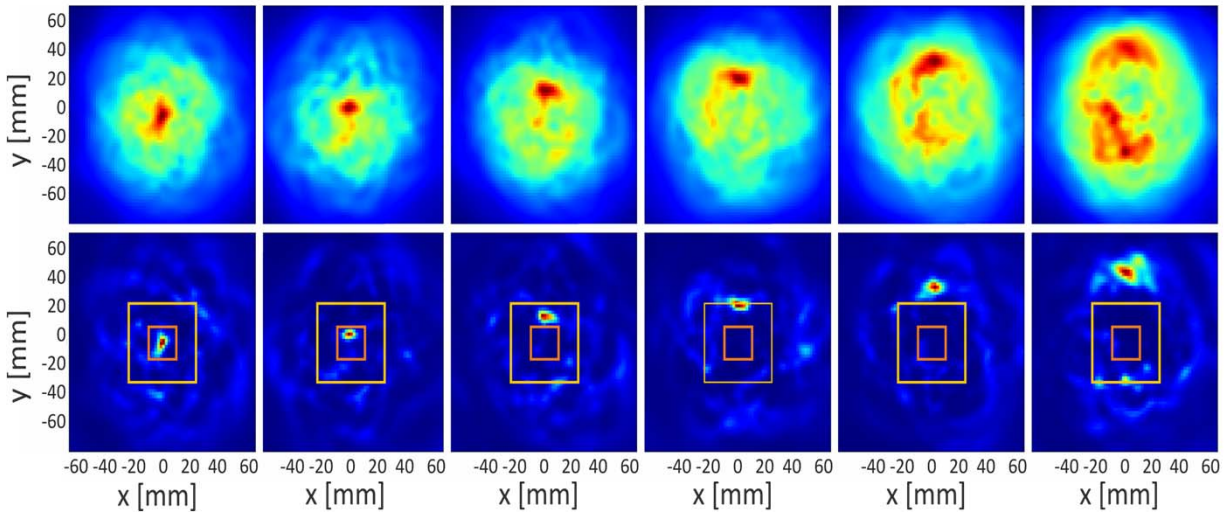
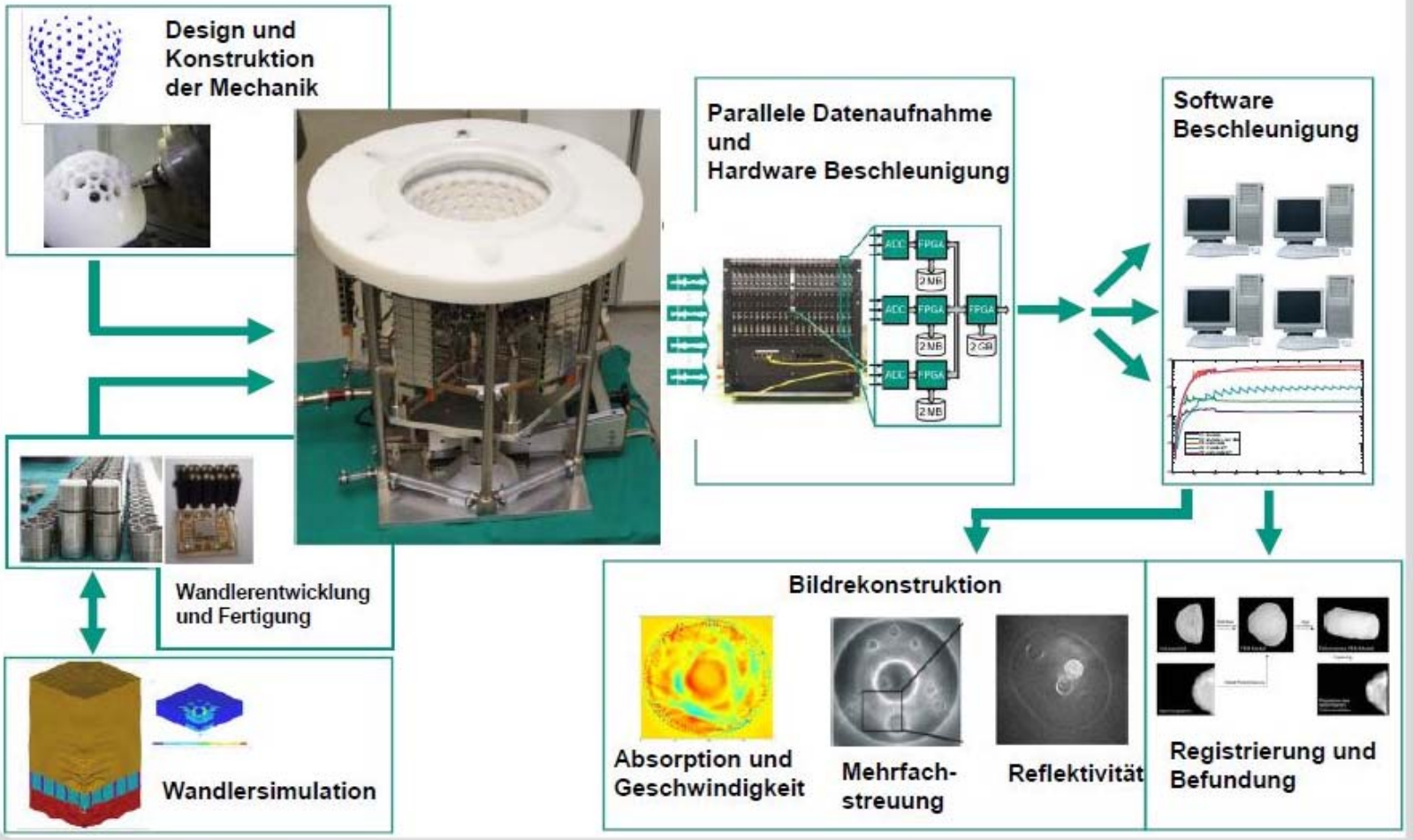


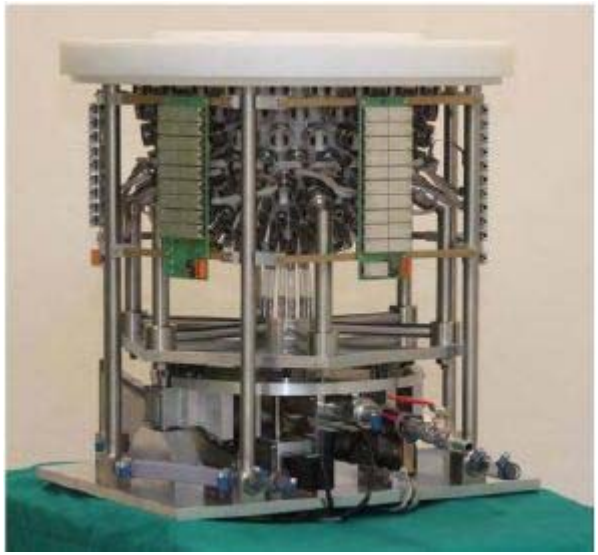
Examples for cross cutting activities I

Ultrasound Computer Tomography @ KIT



courtesy: N. Ruiter

Ultrasound Computer Tomography @ KIT



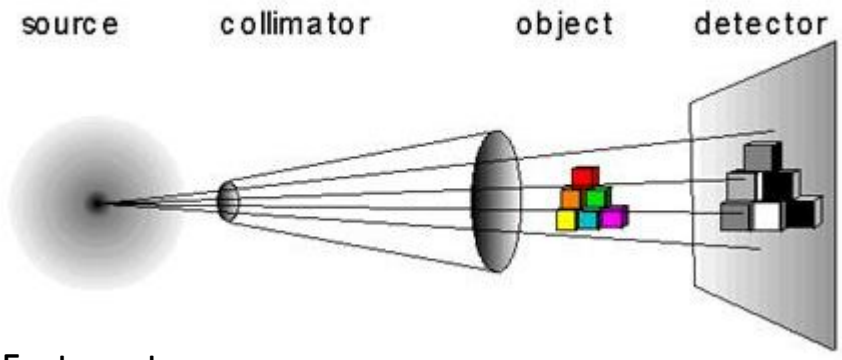
3D USCT II

- Imaging of early stage breast cancer
- Imaging without radiation exposure
- Fast data aquisition (6 s – 2 min)
- FPGA based computation applied for signal processing
- 20 GByte of raw data are acquired per breast volume
- Computing power of the FPGAs will further accelerate the data pre-processing and reconstruction

courtesy: N. Ruiter

Nicole V. Ruiter et al., Proc. SPIE 7968, 796805 (2011); doi:10.1117/12.877520

Detectors for neutron radiography



Fast neutrons

courtesy: J. Kettler

Complementary method to gain additional information about waste content

- Standard Detector technology:
  - Integrating detectors, e.g. Scintillators coupled to CCD or Image plates
- New approaches:
  - Event based detectors, e.g. Scintillators with wavelength-shifting fibers readout by PMTs
  - Better neutron/gamma discrimination

Profits/demands :

- Fast readout and data transfer systems for high event rates
- Online preprocessing of data for image correction and reconstruction

courtesy: G. Kemmerling

Valorization, dissemination, outreach

In the style of what our industrial partner (leading the corresponding workpackage) the in the FP7 project ENVISION (European NoVel Imaging Systems for ION therapy) developed:

Foreground Declaration Form

HELMHOLTZ GEMEINSCHAFT

HZDR
HELMHOLTZ ZENTRUM DRESDEN ROSSENDORF

„Detector Technology and Systems Platform"

Plattform für Detektortechnologie und -systeme

(2012–2015)

Project type: Portfolioprojekt

Start date of project: 1st February 2012 Duration: 36 months

Foreground Declaration Form

pilar n° and title:	
Foreground title	
Author(s):	
Contributor(s):	
Date:	

Revision record

Author	Rev.	Date	Description

DTSP No. Page 1 of 5

Content:

Revision record

LIST OF ABBREVIATIONS AND DEFINITIONS

Description of the foreground

Who are the authors and contributors?

Value for Helmholtz association

Plans for IP protection

Plans for publications

IP PROTECTION

IP EXPLOITATION

REFERENCES

Workshops for information exchange

Series on topical workshops

- Tomography, data processing and image reconstruction for medicine and engineering
  @HZDR, 10.-12.9.2012

http://indico.scc.kit.edu/indico/event/ws_tomography

- Imaging - Physics and Simulation
- Novel detectors and system design
- Data acquisition and monitoring
- Data analysis and reconstruction algorithms
- High parallel computing for reconstruction
- Software demonstration are welcome

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Wolfgang Enghardt – Tomography in Medicine

Uwe Hample – Ultra Fast X-Ray Tomography

Uwe Pietrzyk – Simulation of Tomographic Imaging Systems

Andreas Kopmann – GPU

2012 Workshop "Tomography, data processing and image reconstruction for medicine and engineering"

Dresden, Germany, 10. - 12.09.2012

HZDR

HELMHOLTZ ZENTRUM DRESDEN ROSSENDORF

First topical workshop within the framework of the Helmholtz portfolio project "Detector technologies and systems platform"

http://indico.scc.kit.edu/indico/event/ws_tomography

Topics:

- Imaging - Physics and Simulation
- Novel detectors and system design
- Data acquisition and monitoring
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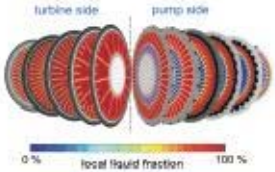


Sponsored by xxxx

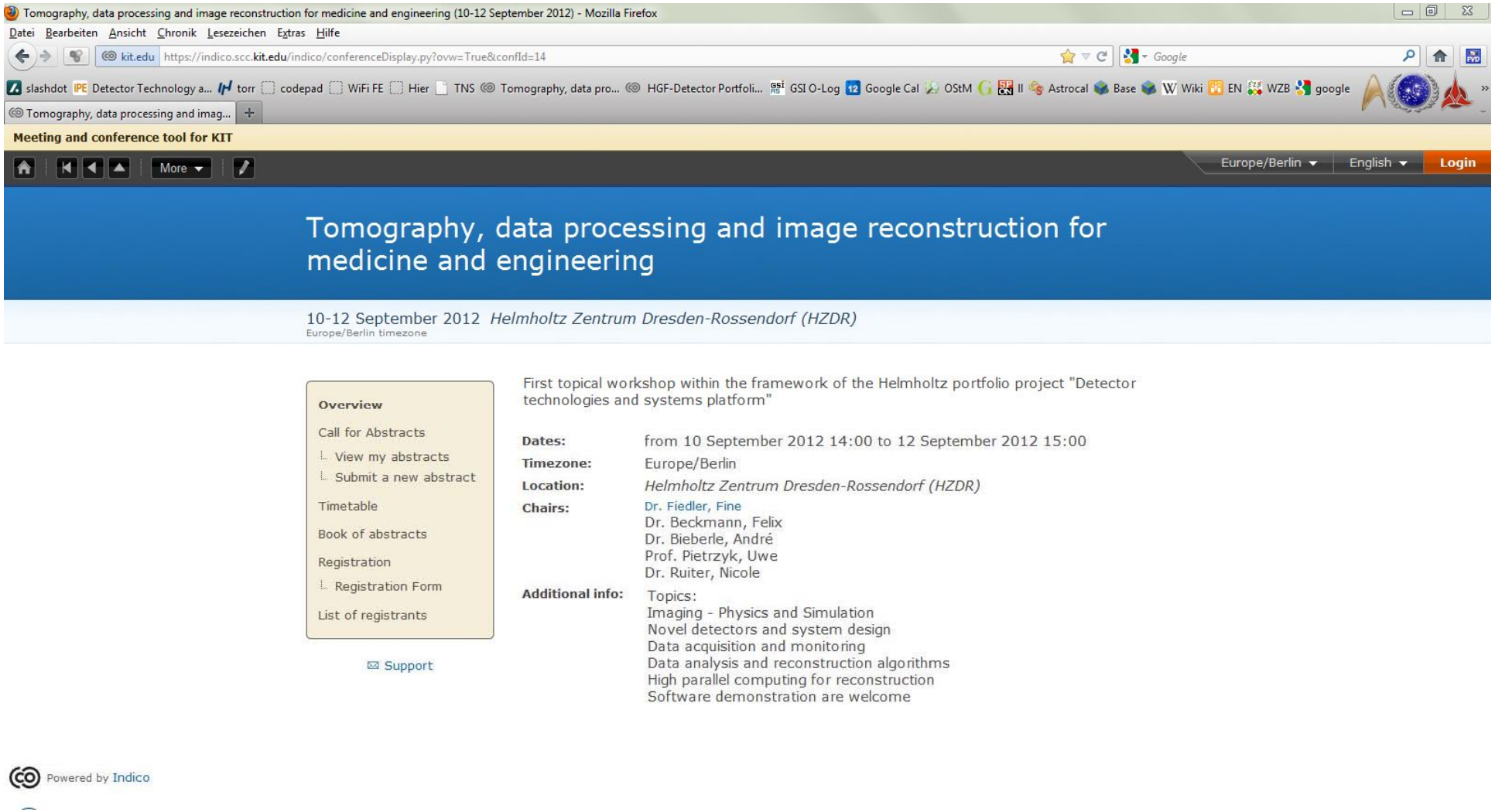
Abstract due: 29.07.2012

Notification of acceptance: xx.xx.2012

Registration deadline: 03.09.2012

Chairs: Felix Beckmann, André Bieberle, Fine Fiedler, Uwe Pietrzyk, Nicole Ruiter

Workshops website



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- Asic design, data reduction and processing
- FPGA programming
- Neutron detectors and the solutions for ^{3}He shortage
- Further topics and ideas are highly welcome

Website

HELMHOLTZ ASSOCIATION Detector Technology and Systems Platform

Home | Research topics | Partners | Contact

RESEARCH TOPICS

S1: TECHNOLOGIES FOR INTEGRATED DETECTORS

1: 3D-ASICs
2: Mixed-signal ASICs
3: 3D and high-Z sensors
4: Electronic packaging
5: Innovative detector materiales

S2: ULTRAFAST COMMUNICATION AND ANALYSIS

6: Intelligent programable electronics
7: Optical transmission for detectors
8: Schnellste Datenverarbeitung mit hochparallelen Architekturen

S3: DETECTOR PROTOTYPES

9: Fast photon and X-ray detectors
10: Diamand detectors
11: Detectors for thermal neutrons
12: Compact gas detectors

CROSS CUTTING ACTIVITIES

- In-vivo dose imaging in ion therapy
- Dose-free diagnostic imaging
- Neutron radiography
- Non-destructive testing with positron life time spectroscopy

Cross disciplinary application

The cross cutting activities will search for specific fields beyond the high-energy physics, beyond 'Matter' and even beyond the Helmholtz Association. It will make the technological competencies of the department well visible and will coordinate the interdisciplinary cooperation. In collaboration with the competent departments of the centers it will enable the optimal commercial use of research results and will support the direct transfer of technology to society.

Introduction

The transfer of knowledge obtained inside the research field 'Matter' to other fields of science and to the society in the sense of mission of the Helmholtz Association is an important concern of the platform. Therefore, in addition to the three technical pillars a column dealing with cross cutting activities, participating in all centers and columns, was defined.The task of this column is to investigate the benefit for other scientific areas from the technologies developed in the high energy physics. This will be strived by intensifying the cooperation, communication and networking between the Departments of the Helmholtz Association. With the help of topical workshops the future requirements for detector technologies will be identified and quantified. This implies a systematic search for interdisciplinary cross-program collaboration opportunities between the Departments of the Helmholtz Association. Similarly, also cooperating with academic and industrial partners . The technical capabilities of the platform will be collected and be made visible in appropriate brochures, information sessions, workshops, conferences and exhibitions. Another objective is the secondary use of the results obtained in the platform into concrete products and patents. In all these activities the Technology Transfer departments of the centers will be actively involved.

There are examples of several promising application areas for detector technology:

- In-vivo dose imaging in ion therapy
- Dose-free diagnostic imaging
- Neutron radiography
- Non-destructive testing for material analysis with positron life time spectroscopy

Contact:

Dr. Fine Fiedler
Coordinator Querschnitt
Helmholtz-Zentrum Dresden-Rossendorf (HZDR)

Get in contact »

Links:

...

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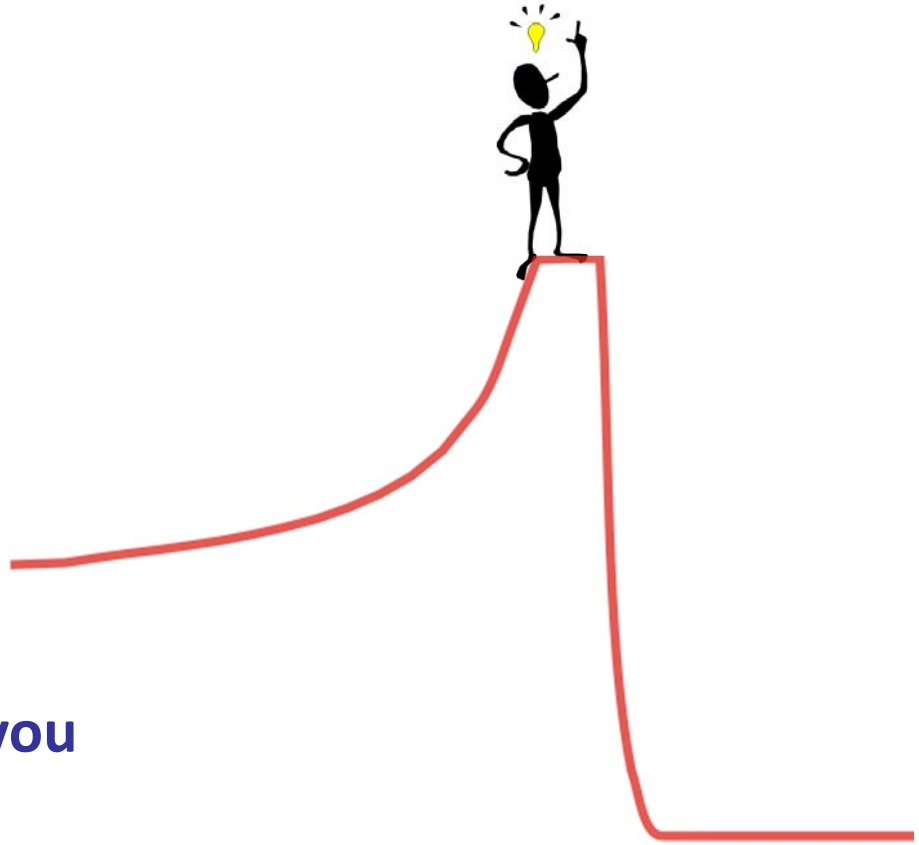
http://www.ipe.fzk.de/~kopmann/detector/html/q.html



Thank you

https://www.lists.kit.edu/wws/review/hgf_detector_querschnitt

11 people up to now…