Matter and Technology

A program in matter

Ties Behnke, DESY
Program speaker
14.5.2013

Matter and Technology

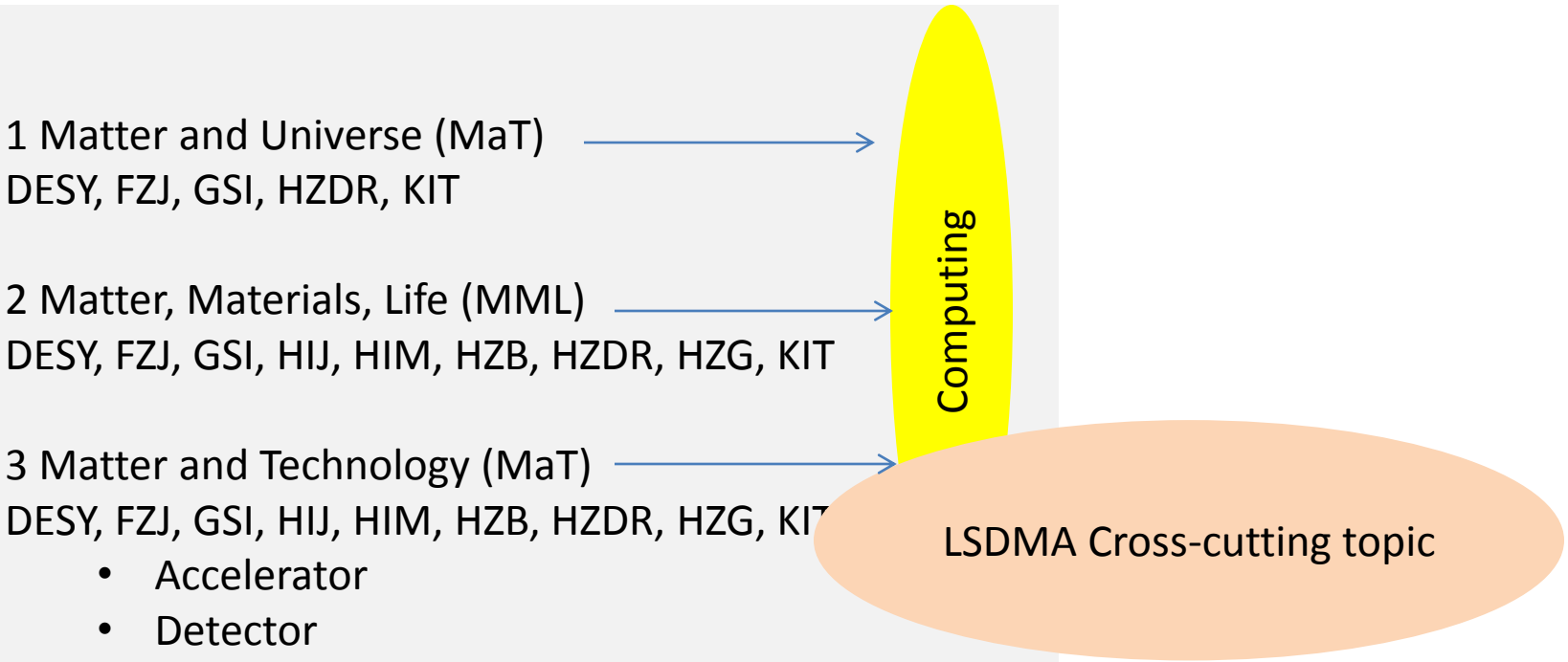
A program in matter

Technology: central foundation for research in “matter”

Our new program:

- Fundamental developments in the area of accelerator and detector science needed by the experiments to be conducted at our facilities.
- Research reaching into the future, but driven by the needs of the community: research for the day after tomorrow
- Close cooperation with other areas within and outside of Helmholtz.

Structure of Matter

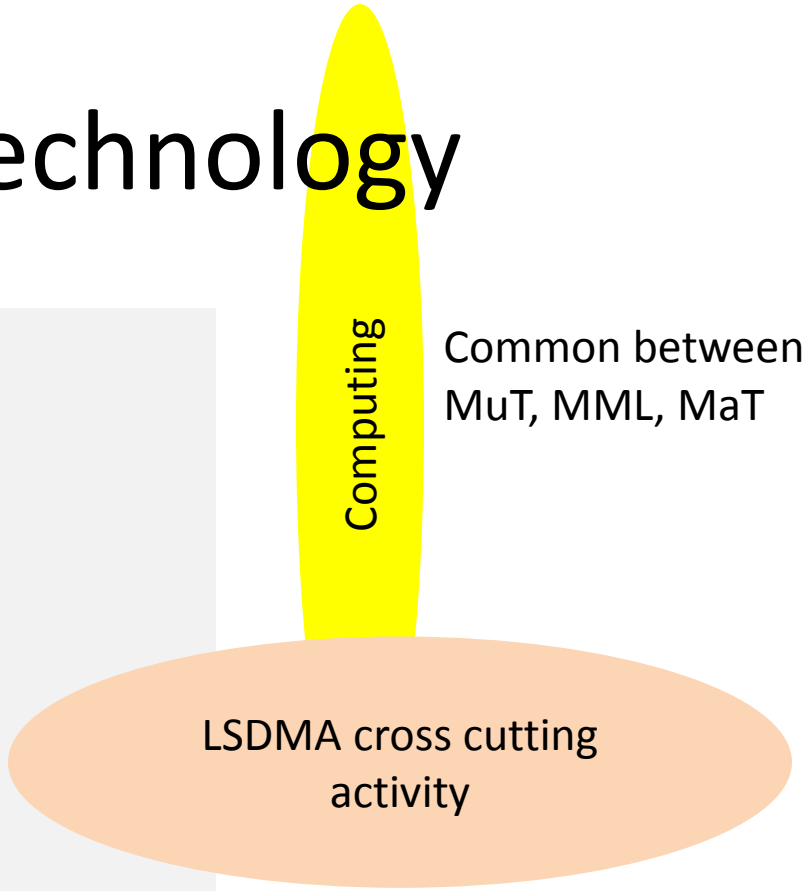


Matter and Technology

3.1 Accelerator (ARD)
DESY, FZJ, GSI, HZB, HZDR, KIT

3.2 Detectors (DTP)
DESY, FZJ, GSI, HZDR, KIT

Matter



Key Technologies

Accelerator

- Strenghtening and further development of accelerator science
- Close cooperation within Helmholtz and with Universities
- Platform for possible participation in EU funding schemes and other third party projects

  – *Since ARD start large interest also from international partners*

Organisation

Sub-topic coordination:	HZB, HZDR	FZJ, GSI	DESY, KIT	DESY, HZDR
	ST1:Superconducting RF technology	ST2:Concepts & tech. hadron acc.	ST3:ps & fs el. and photon beams	ST4:Novel acceler. concepts

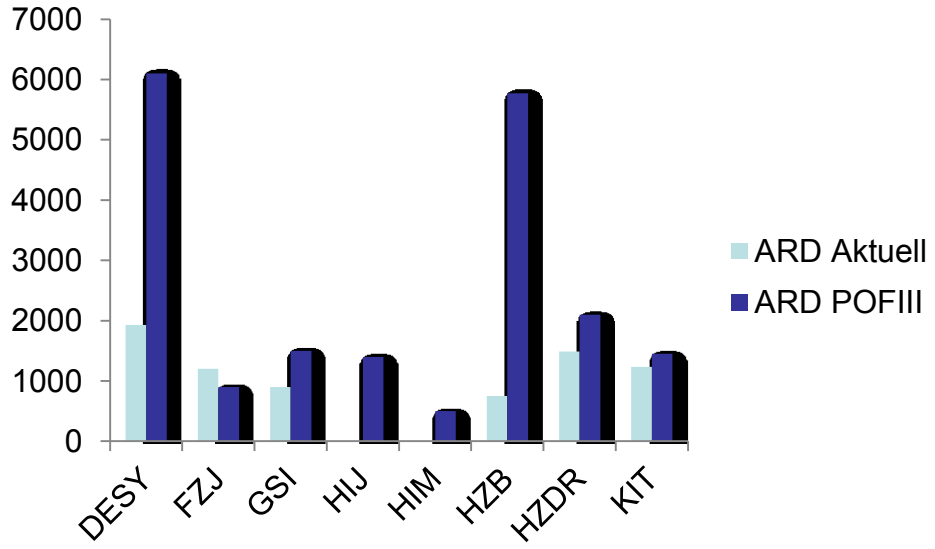
Development of new technologies, looking sometimes far into the future

Planning: Accelerator topic

nach sub-topics:

Implementationsphase | **PoF-III Phase**

Jahr	2014		2015	2016	2017	2018	2019
	Förderung	Aktuell					
Gesamt	**5000**	**7498**	**18454**	**19719**	**19854**	**19994**	**19864**
ST1 SRF tech	1459	1790	6788	7088	7288	7288	7288
ST2 Hadr acc	938	1290	1730	1730	1730	1730	1730
ST3 ps-fs beams	1552	2588	5328	5698	5642	5763	5651
ST4 novel acc	1051	1830	4608	5203	5194	5213	5195



Budget: about 20 M€ / Jahr

(note: costs are given in actual costs, without overheads etc.)

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Detectors

From Matter White Paper (5 Seiten Papier)

- Coordinated development of modern and cutting edge detector technologies
- Position Helmholtz als a partner for international cooperations and as a center of excellence in detector science as a partner for research and industry
- Coordination of the education of the next generation of scientists
- Translate the technological building blocks into systems useful for the community
- Build up a national detector laboratory and ASIC laboratory

Detector

"Detector Technology and Systems Platform" DTP

Technologien zum Aufbau hochintegrierter Detektoren

- Silicon developments
- 3D detector technologies
- Interconnection technologies
- Fundamental properties (radiation hardness, etc)

Ultraschnelle Datenauslese und Verbindungen

- Fast readout, high bandwidth data transfer
- Low level reconstruction
- Advanced algorithms

Exemplarische Detektortypen

- Application of technologies to concrete detector systems
- Prototype systems
- Application to specific problems (e.g. Neutron detection, photon detection, ..)

Detector

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- Silicon developme
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Ultraschnelle Datenausle

- Fast readout, high
- Low level reconstruction
- Advanced algorithms

Criticism:

Topics are too technical

Topics are too detailed

A clear message is missing

Exemplarische Detektortypen

- Application of technologies to concrete detector systems
- Prototype systems
- Application to specific problems (e.g. Neutron detection, photon detection, ..)

Detector: reinvent the topics

"Detector Technology and Systems Platform" DTP

Detector enabling technologies

- Silicon developments
- 3D detector technologies
- Interconnection technologies
- Fundamental properties (radiation hardness, etc)

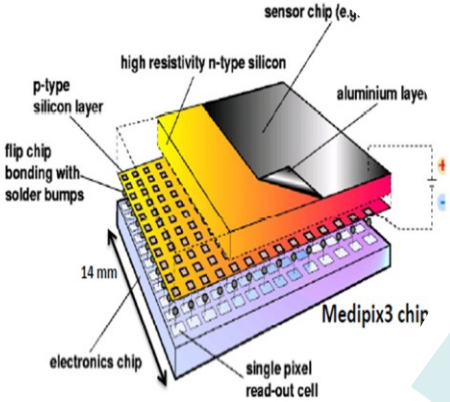
From Detector to the User

- Fast readout, high bandwidth data transfer
- Low level reconstruction
- Advanced algorithms

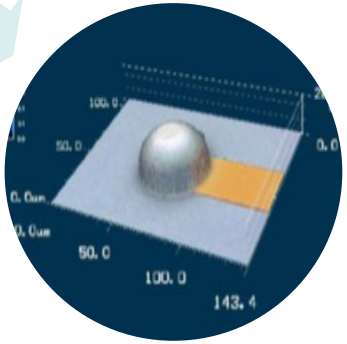
Prototypes: Make it work

- Application of technologies to concrete detector systems
- Prototype systems
- Application to specific problems (e.g. Neutron detection, photon detection, ..)

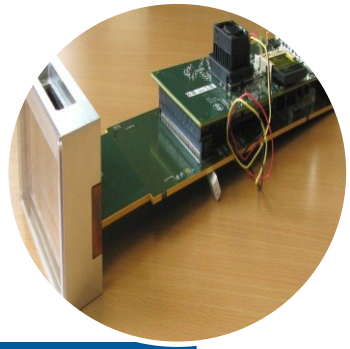
Example: Readout ASIC



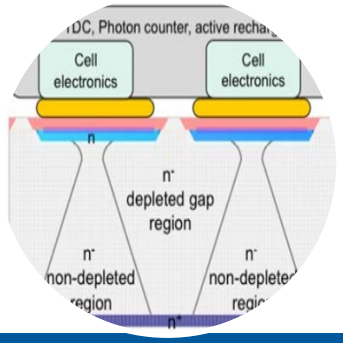
Chip development (ST1)



Interconnection technologies (ST1)



Fast readout (ST2)



Apply to other system(SiPM) (ST3)

ENDO TOFPET US
Endoscopic TOFPET & Ultrasound

commercial application (e.g. medical)

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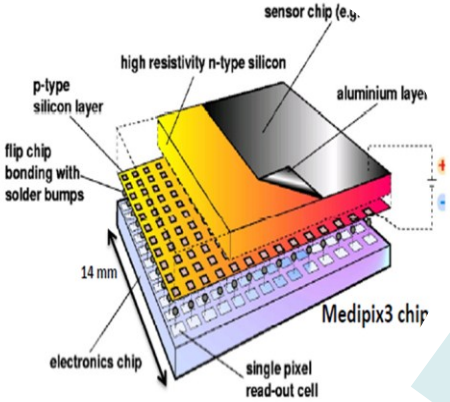
Example: Readout ASIC

We need to clearly show the benefit from out topic to the research area and to HGF in general



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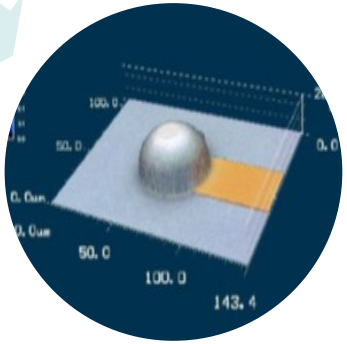

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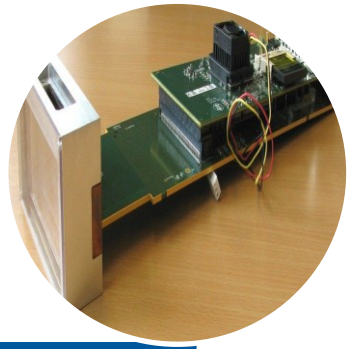

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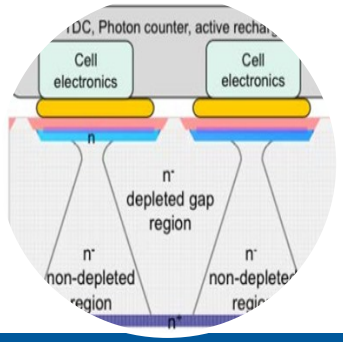

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Positioning of the topic

We are in a difficult situation:

Politics: strong pull towards application engineering, strong cross-area applications are favored, applications outside of matter are wanted

Matter: focus on current facilities, on providing solutions for short term problems

> Resources for research into new technologies are very small.
> We can only succeed if we manage to leverage some resources from the running projects onto new projects.

But: to succeed in the review we need a viable and stand-alone scientific program and justification.

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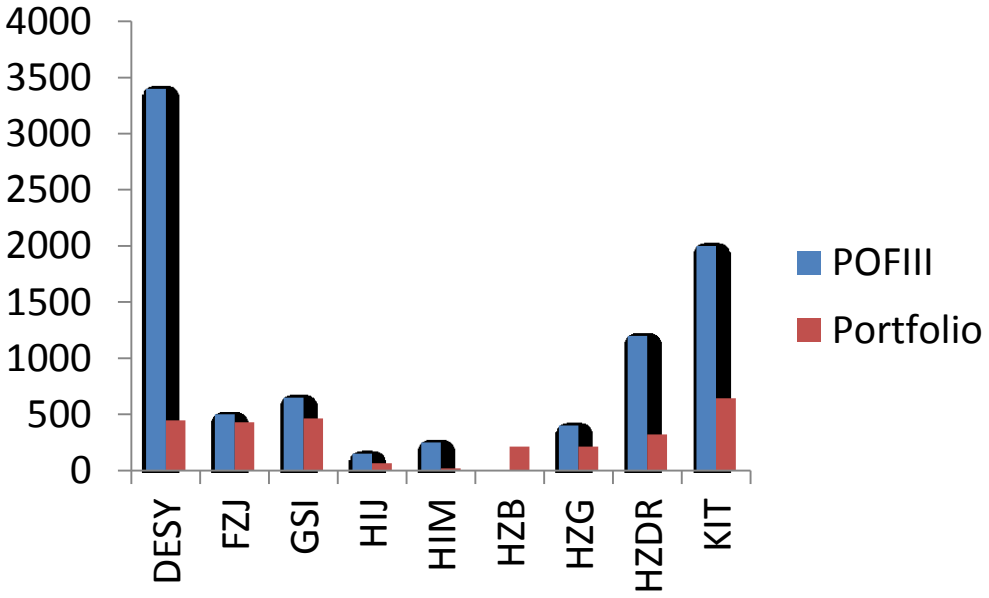
Budget Detector

Already out of date, but roughly correct

Det	POFIII	3400	500	650	150	250	0	400	1200	2000
	Port	448	429	465	64	19	214	214	321	643

POFIII budget/ year: 8550

Portfolio funding: 3000 Actual Portfolio: 6200



Total Volume: 8 M €/ year

(note: costs are given in actual costs, without overheads etc.)

Computing

Cross cutting activity within the research area Matter

- Computing is important for all topics in matter
- It was not possible to make it into a sustainable topic within MaT
- Computing will now be a cross-cutting activity connceting MaU, MML and MaT

(my take on topics)

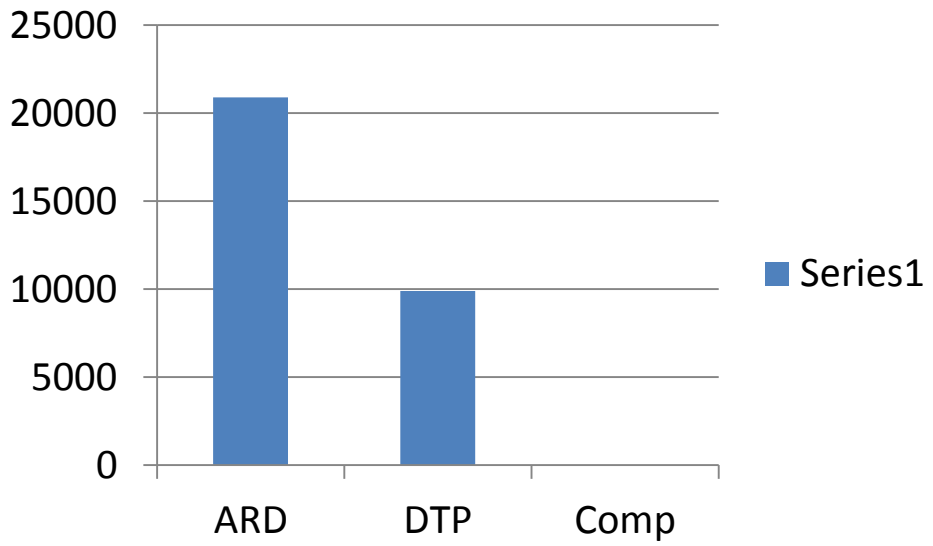
- Big data (LSDMA, Querschnittsverbund mit Schluesseltechnpologien))
- Interfaces(data formats, access to data, ID management)
- High performance computing for Matter
- Energy efficiency

Budget Discussion

Transition from portfolio (+ project) to program (POFIII)

- Financial framework needs to be clarified now
- Cross financing becomes more difficult
  - We need full cost financing
  - Our own contributions need to be integrated into the project
- The budget for the new project is not new money, but has to come out of the existing programs

Budget status:



POFIII

Proposal (ca 30-40 pages per topic)

- Description of LKI part
- Description of LKII part (not really relevant for us)
- Numbers

We need to define:

- Participating centers (is stabilizing)
- Associated partners
- Networks, cross-sectional activities, etc.

Note: Level of granularity (as defined by Helmholtz) is the program topic.
Competition is between programs and topics within Matter.

Any further granularity is of our own choosing and we can define how to handle this.

Associate Participants

- Program should be closely related to work by the partner, should depend on the work by the partner
- Associate member: member without money from the program
- criteria:
  - The partner is making a significant contribution
  - There exists a common strategy
  - The cooperation is part of the networking startegy of the center

Schedule

April: Results of the starting-values for the budgets have been defined

27.3.2013: Lenkungsausschuss: discussion of the programs. Decision to remove Computing as a stand alone topic

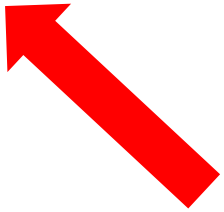
10.4.2013: Dialogplatform in Bonn:iteration with the BMBF on scope and content of the programs

18.6.2013: Presentation of the programs in Berlin to the commission of the senat
Decision on starting values
Decision of scope of the programs

Internal: end of June: first version of the topic available

1.11.2013: Due date for the proposal

2014: Review. Chair: Francesco Sette



First preliminary but complete topic text should be available end of June

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Professor Francesco Sette

Francesco Sette was born in Rome, Italy, in 1957, where he obtained his PhD in physics in 1982 summa cum laude. In 1983 he moved to the US and became first assistant scientist at the National Synchrotron Light Source at Brookhaven National Laboratory and then staff scientist at AT&T Bell Laboratories in Murray Hill. With C T Chen he opened the field of modern very high-energy resolution soft-X-ray spectroscopy with synchrotron radiation. He joined the ESRF in 1991 to develop the very high-energy resolution inelastic X-ray scattering group and became Director of Research in 2001. He took up the position of ESRF Director-General at the beginning of 2009. He is a member of many scientific committees around the world.

Conclusion

Mat is taking shape

Accelerator is in good shape

Detector will be in good shape after this meeting

Computing is still a working area, but is no longer of direct concern to us

The next 2 month are critical for the setting up of the program!