

DESY – FS in PoF III

Strategic positioning of DESY FS in PoF III



Edgar Weckert

DESY, WA
Hamburg, 23. April 2013



Helmholtz-Gemeinschaft Deutscher Forschungszentren

18 National Research Centres
3.4 billion € budget
32 700 employees
Research fields



Energy
Earth and Environment
Health
Key Technologies
Matter
Transport and Space



PoF III: The new structure of the research field 'Matter'

Programs and Topics:

1. Matter and Universe
(DESY, GSI, KIT, HZDR)
 - Investigation of the fundamental building blocks of matter
 - Cosmic matter in the laboratory
 - Matter and radiation from the universe
2. From matter to materials and life (former PNI)
(DESY, HZB, HZG, GSI, KIT, FZJ, HZDR)
 - In-house research on the structure, dynamics and function of matter
 - Investigation of matter using brilliant light sources
 - Neutron sources for the investigation of condensed matter
 - Physics and materials science with ion beams
 - Research with highest electro-magnetic fields
3. Matter and technology
(DESY, HZB, HZG, GSI, KIT, FZJ, HZDR)
 - Accelerator research and development (ARD)
 - Detector technology and systems
 - Management and analysis of largest amounts of data



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 - Detector technology and systems
 - ~~- Management and analysis of largest amounts of data~~
 - cross program/topic activity



PoF III: The new structure of the research field 'Matter'

Programs and Topics with DESY-FS contribution:

1. Matter and Universe

2. From matter to materials and life (MML) (DESY, HZB, HZG, GSI, KIT, FZJ, HZDR)

- In-house research on the structure, dynamics and function of matter
- Investigation of matter using brilliant light sources

3. Matter and technology (DESY, HZB, HZG, GSI, KIT, FZJ, HZDR)

- Accelerator research and development (ARD)
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- ~~Management and analysis of largest amounts of data~~
- cross program/topic activity

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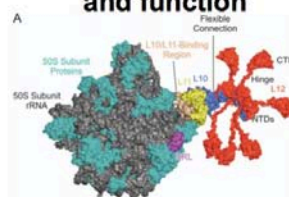
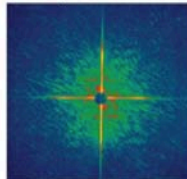
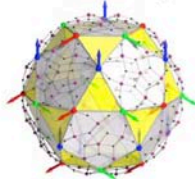
The Helmholtz program 'From Matter to Materials and Life'

Provide the means to gain essential information on the

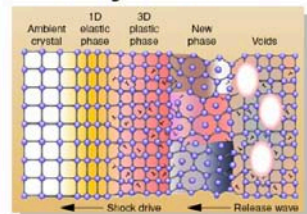
Structure,

dynamics

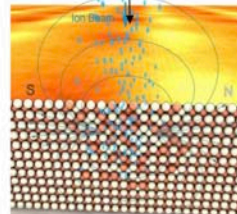
and function



of matter and materials, *which can not be obtained on the lab scale,*
and modify the above
ions



← Light




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The Helmholtz program 'From Matter to Materials and Life'

**Operate large scale infrastructures for the investigation and modification
of matter and materials**


Photons




Neutrons




Ions



High Electromagnetic Fields



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The Helmholtz programme „From Matter to Materials and Life“



Universities





MAX-PLANCK-GESellschaft

Research






Matter






Industry

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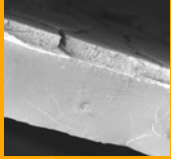





Topic Photons in MML

From fundamental research...

Atomic and Electronic Structure:	Materials Science, Nano Science, Life Science, Geo Science, Environmental Science, Cultural Science,...
Ultrafast processes:	Materials processes on short timescales,...
Extreme Conditions:	Matter & materials at highest pressures, temperatures,...

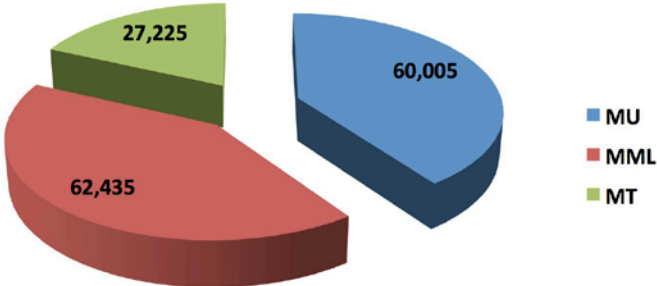
...to Solving Grand Challenges

		
Energy	Health	Key Technologies
energy materials ... catalysts for fuel cells	better medication ... structure and function on a molecular basis	processing technologies ... welding, forming

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PoF III: Research field 'Matter'

Program resources (k€)



■	MU
■	MML
■	MT

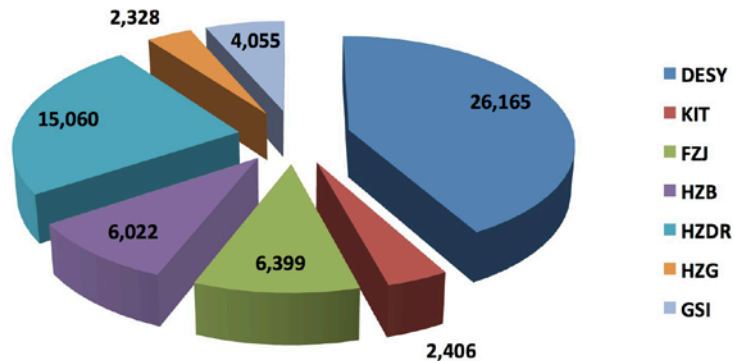
Numbers are on full cost basis !

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PoF III: Topic 'From Matter to Materials and Life' LK I

LK I - resources for the program 2 'MML' (k€)

LK I:



Numbers are on full cost basis !

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MML – DESY-FS: LK I in-house research

Present in-house research sub topics in MML LK I:

- Atoms, molecules, and plasmas
- Magnetism, superconductivity, and highly correlated systems
- Materials for energy, transport and information technologies
- Micro and Nano Science and Technology
- Soft matter, health and life sciences

Ongoing discussion process in MML for renaming of the subtopics (only base funded FTEs listed):

- **Extreme states of matter: from cold ions to hot plasmas** → 54 FTE
- **Magnetism, superconductivity, and highly correlated systems** → 9 FTE
- **Materials for energy and transport** → 14 FTE
- **Nano Science and materials for information technologies** → 17 FTE
- **Soft matter, health and life sciences** → 26 FTE

Future LW hiring procedures:

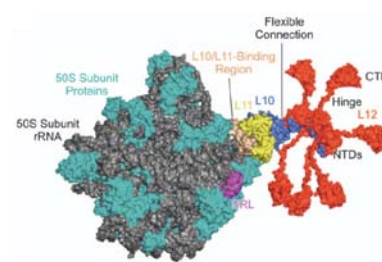
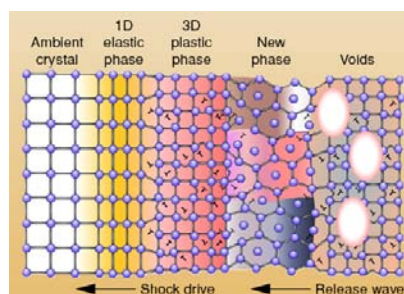
- X-ray optics and nano-science (on going)
- FEL science (FLASH, XFEL: planed 2013/2014)
- appointment of LWs for materials science, theory and matter under extreme conditions must be cancelled due to 20 M€ DESY contribution to XFEL.EU operation
- recruitment initiative:
 - 1 pending (CSSB), 2 new proposals coming up (AMO-theory, bio-/nano-science)

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MML – DESY-FS: LK I in-house research

- Establishment of a Center for Structural Systems Biology (CSSB) at DESY with a number of national and international partners
 - own in-house activity in structural biology and infection research
- Establishment of and contribution to user consortia at the European XFEL (~50 M€, FIS roadmap, major investments)
 - Heisenberg RIXS (hRIXS, dynamics at XFEL.EU, static structure at BESSY II)
 - Serial Femto Second Protein Crystallography (SFX)
 - Helmholtz International Beamline for Extreme Fields (HIBEF)



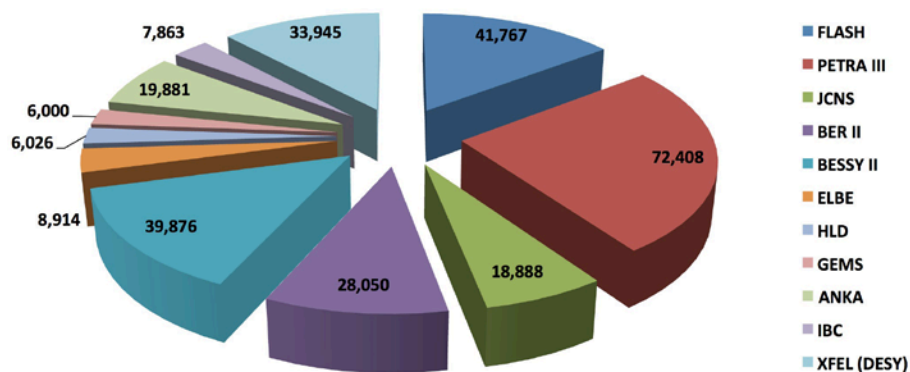
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PoF III: Topic 'From Matter to Materials and Life' LK II

LK II – resources for the program 2 'MML' (k€)

LK II:



Numbers are on full cost basis !

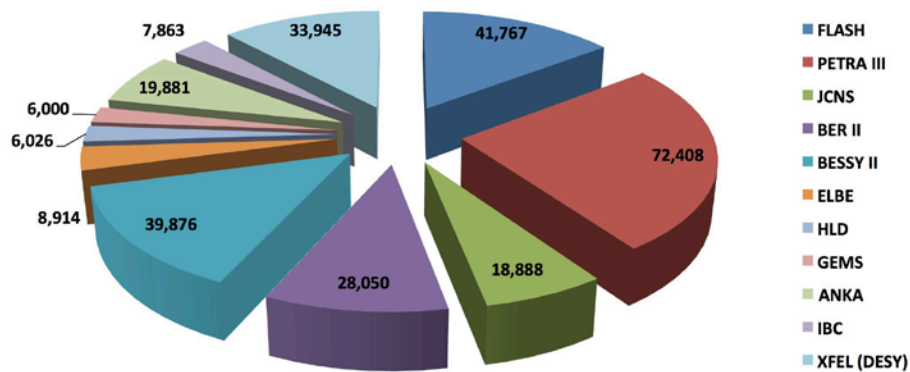
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PoF III: Topic 'From Matter to Materials and Life' LK II

LK II – resources for the program 2 'MML' (k€)

LK II:



Numbers are on full cost basis !

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MML – DESY-FS: LK II operation of the facilities

Strategic aims:

- **FLASH:** user operation as a world class soft X-ray free electron laser (FEL) facility
 - commissioning of the FLASH II seeded laser facility
 - novel FLASH II experimental stations for fs timing experiments
 - in-house research focusing on the fs-dynamic and function of matter
- **PETRA III:** user operation as a world class hard X-ray SR source
 - completion and commissioning of the PETRA III extension project
 - with contributions of national (HZG, BGI) and international partners (India, Sweden, Russia)
 - 8/10 beamlines in PoF III; chronological order according to PSC recommendation
 - novel instrumentation for hard X-ray experimental techniques
 - in-house research focusing on the structure and function of matter on the nano scale in a broad range of scientific fields
- **European XFEL:** contribution to the operation to the world's most brilliant hard X-ray FEL
 - establishment of a strong Helmholtz in-house research activity
- **Establishment of the NanoLab (in collaboration with HZG) with facilities for**
 - in-house research and user support for PETRA III and FLASH

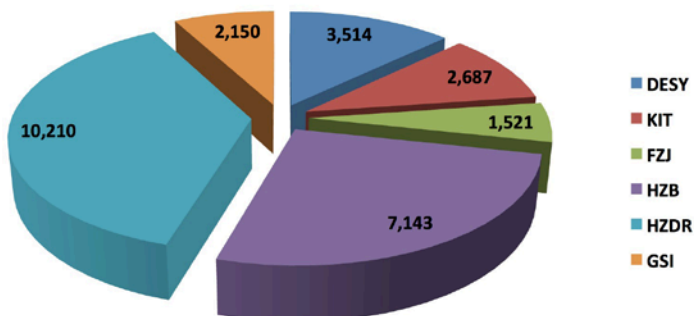
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PoF III: Program 'Matter and Technology'

Resources for the program 3 'Matter and Technology' (k€)

LK I:



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DESY-FS: Program 'Matter and Technology'

Program speaker: Ties Behnke

Topic 3.1: Accelerator Research and Technology

Topic speaker: Reinhard Brinkmann (DESY)

Subtopics:

- superconducting RF technology
- concepts and technologies for hadron acceleration
- fs and ps electron and photon beams
- novel acceleration concepts

DESY - FS (group of Franz Kärtner, FS-CFEL2) will participate with about **10 FTE** to the subtopic 'fs and ps electron and photon beams'

Strategic aims:

- Coherent inverse Compton scattering from nano structured photocathodes
- Laser based highly efficient THz generation (XmJ)
- THZ-Acceleration for compact sources

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DESY-FS: Program 'Matter and Technology'

Topic 3.2: Detector technology and systems
 Topic speaker: Mark Weber (KIT)

DESY group FS-DS will contribute to this topic:

-- personnel: **15 FTE**

The total DESY contribution is roughly twice as much.

Strategic aims:

- **Development of new detector systems for photon science**
 - fast pixel detectors for soft X-rays (PERCIVAL)
 - fast pixel detectors for XFELs (AGIPD, DSSC)
 - fast area detectors for very hard X-rays (LAMBDA)
- **R&D for future detector technologies**
 - 3D integration toward high compact detector modules
 (Helmholtz cube: aim for more functionality in smaller pixels)
- **Detector support for experimental stations at DESY and for DESY scientists**

