

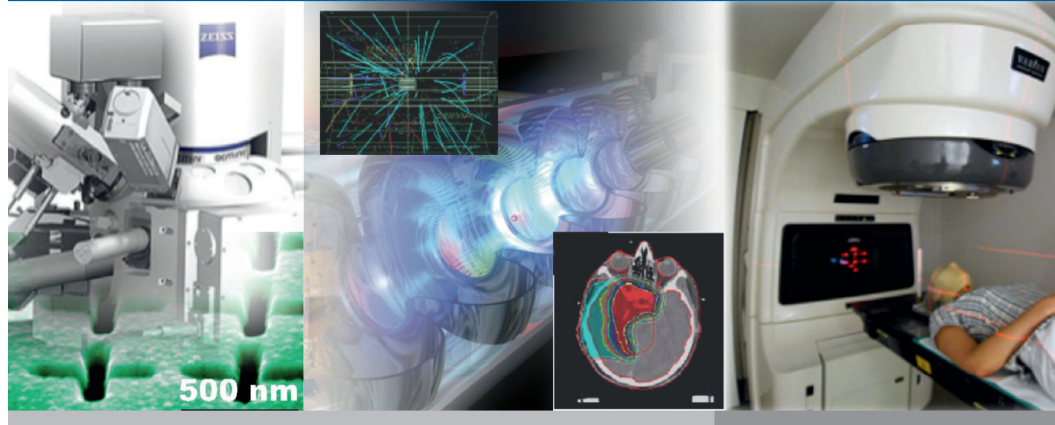
# Overview of the ARD Initiative.

R. Brinkmann, DESY

*ARD advisory committee meeting, GSI 21/22 Nov 2011*

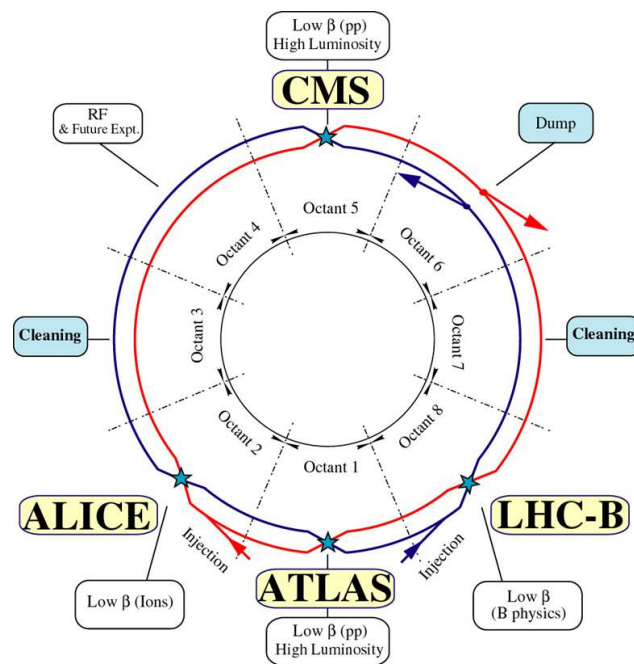
## **ARD** Accelerator Research and Development

Accelerators – Motors for Discovery and Innovation

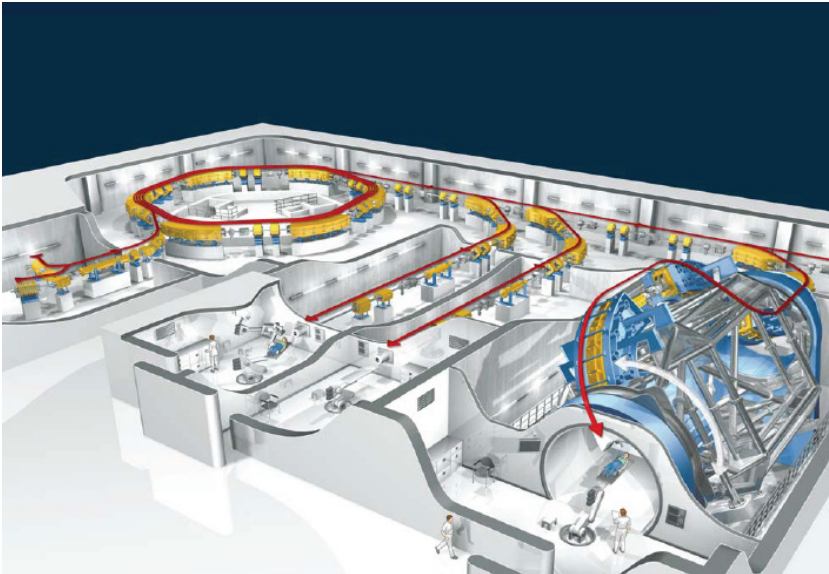


# Introduction: Accelerators as *enabling technology*

Originally developed for fundamental physics research – will remain crucial in this field in the future



# Example: Application in medicine



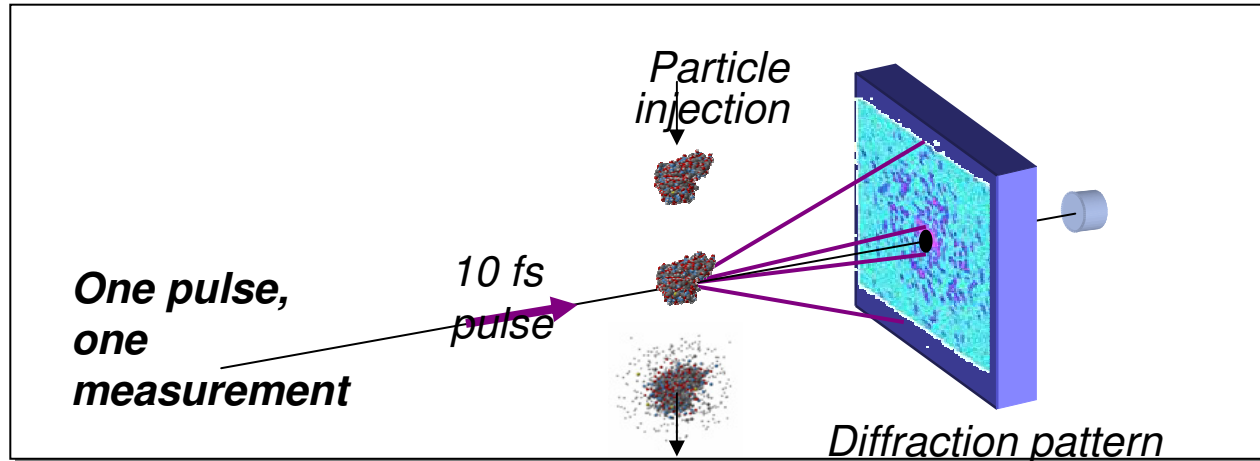
Heidelberg Ion Therapy Center –  
accelerator-based treatment of cancer

*(Pioneering work done at GSI,  
Proton treatment of eye tumors also at  
HZB)*

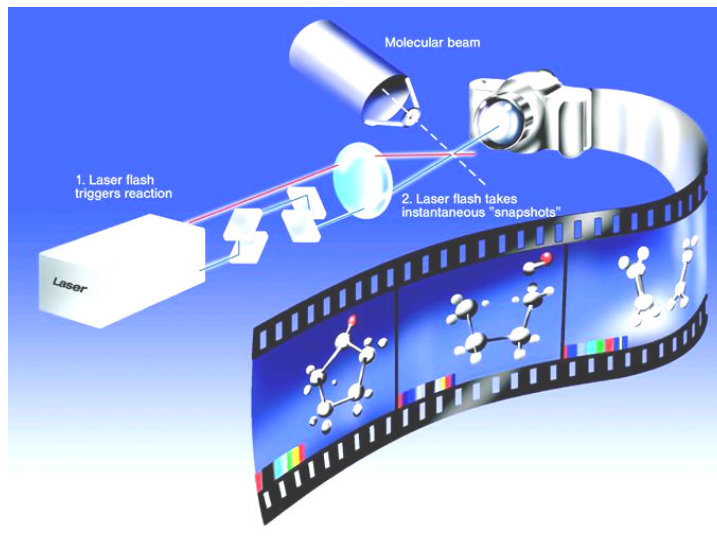




# Example: Structure of Matter with femtosecond FEL-radiation



*Pioneering work at DESY (FLASH)*



- Structure of single (non-crystalline) bio-molecules
- Movies of molecular processes in real time
- Matter under extrem conditions
- (...)

# Incomplete list of other examples...

- > Linac- ERL- and storage-ring-based facilities for radiation from THZ to hard X-ray
- > Isotope production for medical applications
- > Ion implantation
- > Waste transmutation/ADS (*not in Germany...*)
- > Perspective for table-top radiation sources with advanced acceleration methods
- > Femtosecond electron microscopes (*REGAE project @ DESY*)
- > Technologies for accelerators widely used in other areas: e.g.  $\mu$ TCA electronics standard (*DESY and other acc labs worldwide, ITER, ..., telecom industries*)
- > ***The topic of innovation, applications in industry and the society at large, is becoming increasingly important in the political discussion and for the priorities of future research funding!***

# Introduction to ARD process

- > **Pakt-II für Forschung** in Germany with an upgrade of 5% (well beyond inflation rate) strengthens research funding and supports an extension of the research portfolio in the Helmholtz Association
- > Lab directors of DESY, FZJ, FZD (now HZDR), GSI, HZB and KIT initiate a discussion of an **Accelerator Research and Development** program within the research area Structure of Matter in the HGF → *ARD Steering Board (lab directors) set up Feb 2010*
- > Scientists from these 6 HGF centers and collaborating institutes and universities produce a position paper (Oct 2010) on a research program with the following 5 topics:
  - PT1 Superconducting technology for accelerators (convener H. Weise, DESY)
  - PT2 Novel particle sources (convener P. Michel, HZDR)
  - PT3 New concepts for circular accelerators (convener P. Spiller, GSI)
  - PT4 Short bunches and electron-photon interaction (convener T. Cowan, HZDR)
  - PT5 Novel accelerator concepts for ultra-high gradients (convener U. Schramm, HZDR)

# Introduction ARD cont'd

- > Position paper was very positively received by HGF and at the Ministry for Education and Research (BMBF)
  - Decision by Helmholtz Senate to include ARD in the 1st round of the portfolio process
  - ARD team was requested to submit a proposal by mid-December 2010
  - Steering board appointed RB as program speaker
  - With expected funding frame, scope of the program had to be focused and some sub-topics taken out
- > proposal submitted 14 Dec, 2010
  - Evaluation by referees
  - Presentation to Helmholtz Senate Commission on 21 Feb, 2011



Antrag der Helmholtz-Beschleunigerinitiative

***Accelerator Research and Development  
Motors for Innovation***

**Beteiligte Helmholtz Zentren:**

Deutsches Elektronen-Synchrotron (DESY)  
Forschungszentrum Dresden - Rossendorf (FZD, ab 2011 HZDR)  
Forschungszentrum Jülich (FZJ)  
Helmholtz Zentrum für Schwerionenforschung (GSI)  
Karlsruher Institut für Technologie (KIT)  
Helmholtz-Zentrum Berlin für Materialien und Energie (HZB)

Koordinierender Sprecher: Dr. Reinhard Brinkmann (DESY)



R. Brinkmann, DESY, ARD-Initiative overview  
Advisory committee meeting, GSI 21 Nov 2011



# Basic objectives of ARD implementation

- > Create a platform for R&D on future-oriented novel accelerator concepts and technologies and increase the visibility of accelerator physics & technology as its own research program
- > Strengthen the networking between the partners, exploit synergies and support a strategic orientation of part of the universities' research activities within the Joint Research (*Verbundforschung*) program

In parallel to ARD initiative:  
initiative by Uni's to create  
**Committee for Accelerators**  
(Komitee für Beschleuniger  
KfB)

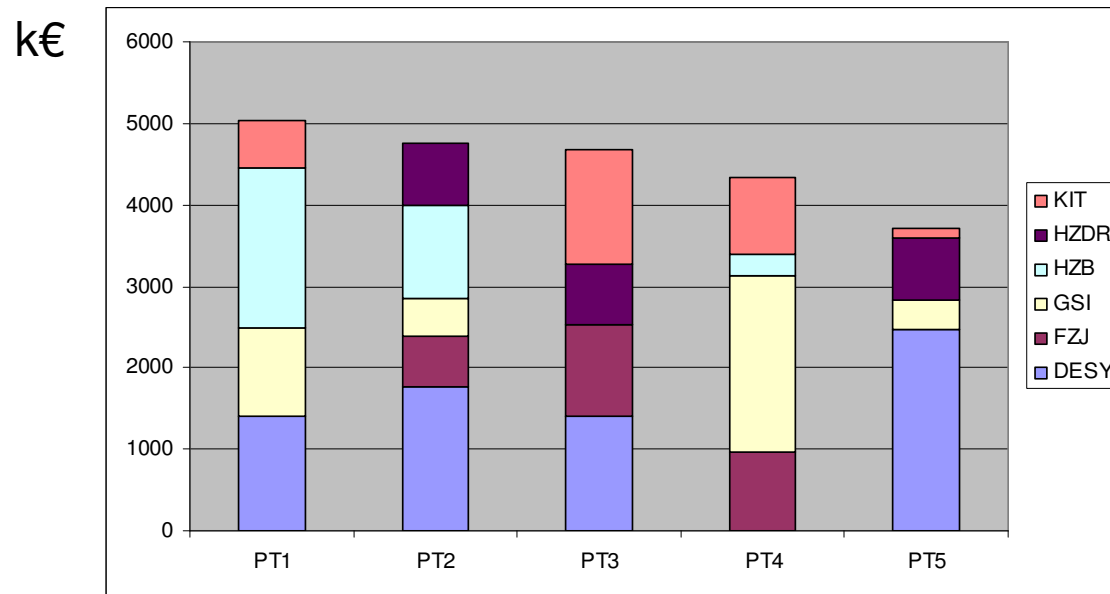


← **Constituting  
meeting of KfB on  
17 Jan 2011 at DESY**

- > Improve the positioning of HGF centers for European and international co-operations in accelerator research



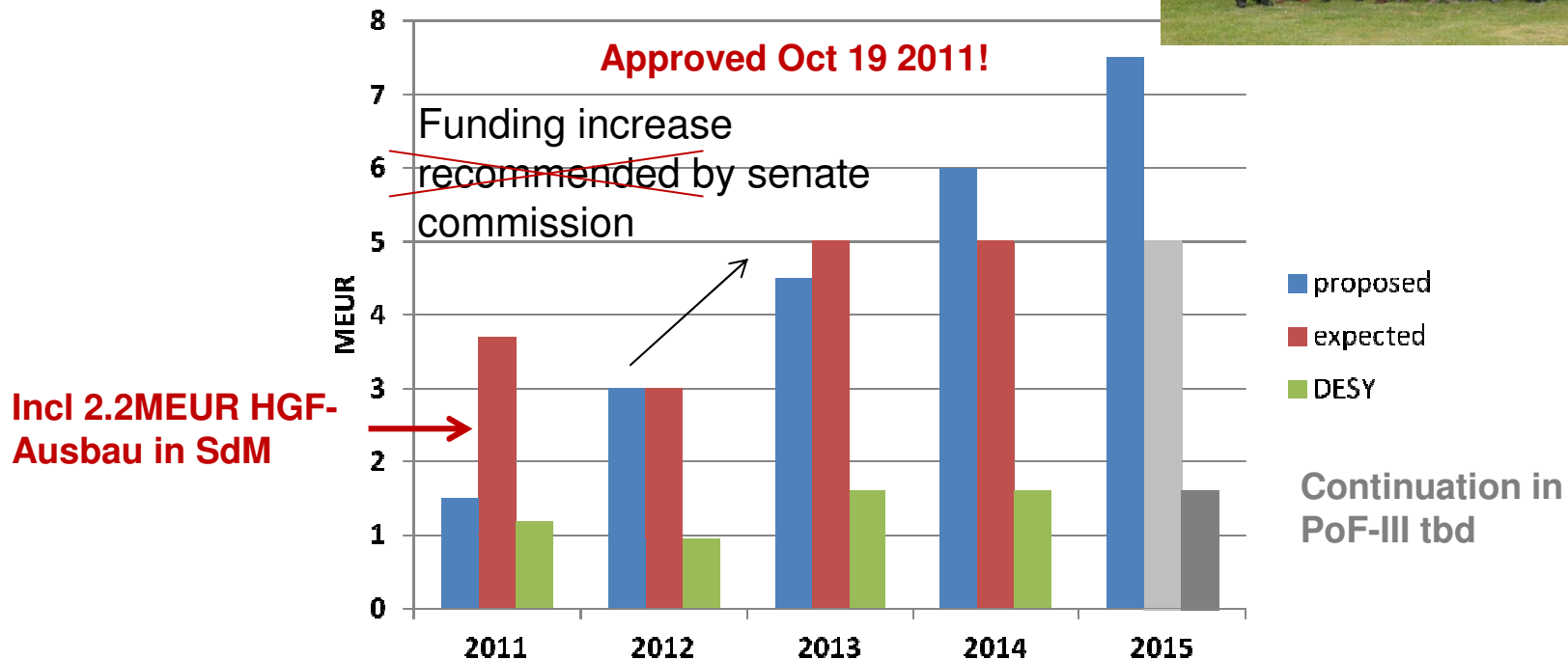
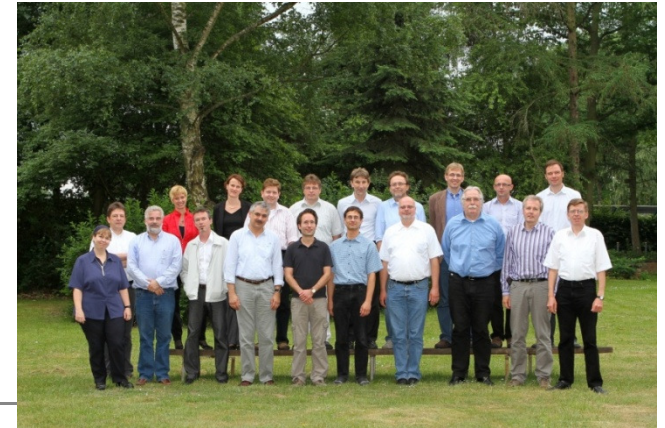
# Distribution of resources in the proposal (*sum 2011-15*)



Participating centers contribute with already existing infrastructure etc., and from already running baseline funding within POF-II (*program oriented funding period 2010-14*)

# Status of HGF ARD approval

- **Positive Senate decision 1.6.2011 –**  
Start-up meeting at DESY 7. June!



# Helmholtz Association – Germany's largest research organisation



Research centers: 17

Employees: ~ 33 000

Budget (Mrd.Euro) ~ 3,3

## Research Areas:

Health

Energy

Earth and Environment

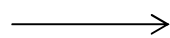
Key Technologies

**Structure of Matter**

Aeronautics, Space and Transport

# Structure in the Programme Oriented Funding

*Research field „Structure of Matter“ in POF-II*



*Research field „Matter“ in POF-III (2015 – 2019)*

- > **Elementary particle physics**
- > **Astroparticle physics**
- > **Hadrons and nuclear physics**
- > **Research with Photons, Neutrons and Ions**

ARD implementation phase 2011 - 2014 as part of portfolio process

## > **Matter and the universe**

- Research of fundamental building blocks of Matter
- Cosmic matter in the laboratory
- Matter and radiation from the universe

## > **From matter to materials and life**

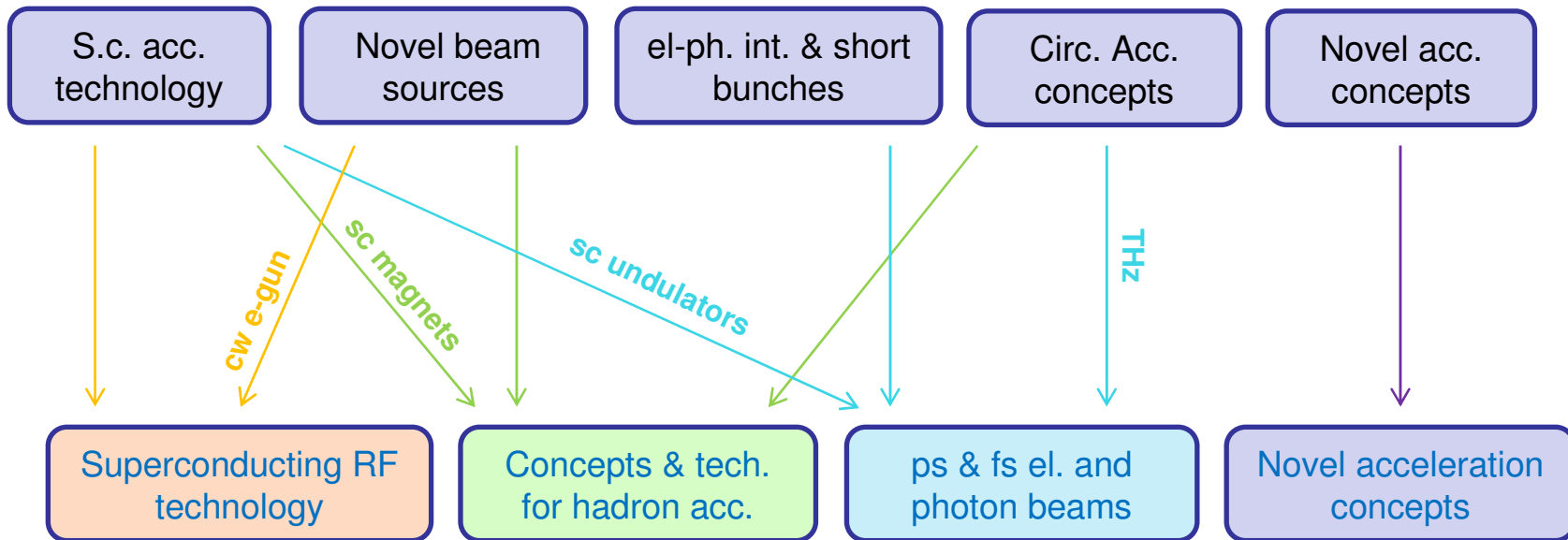
- Research of structure, dynamics and function of matter
- Research with brilliant light sources
- Neutron probes for condensed matter research
- Physics and material science with ion beams
- Research with highest electromagnetic fields

## > **Matter and technologies**

- **Accelerator research and development**
- Detector technologies and systems
- Handling and analysis of large data amounts

# Structure of ARD

As in the proposal

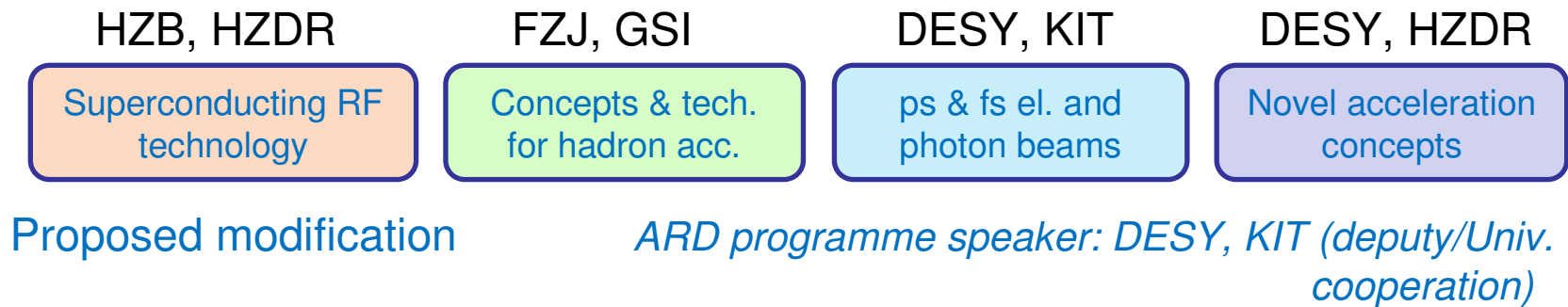
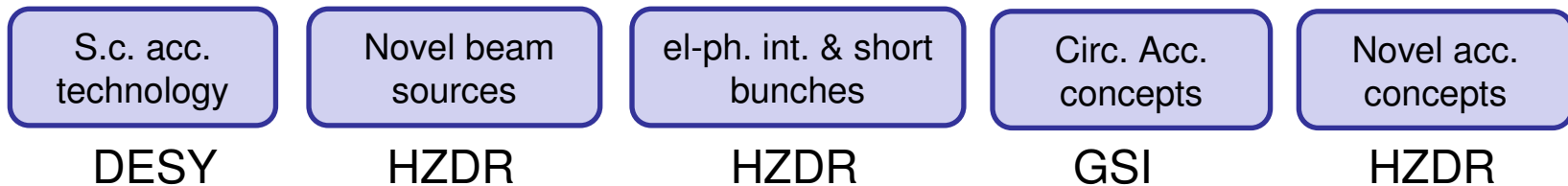


Proposed modification



## ...and coordination of sub-topics

As in the proposal      *ARD programme speaker: DESY*



Thank you for your attention!

# Objective of the meeting & committee charge

- > After the recent official start of the ARD program, we believe it is good and important to review our plans, the way we have structured the program, set our priorities, organised the cooperation between the centers and with universities and other institutes, etc.
- > We should position ourselves in the best way possible for the coming proposal, evaluation and approval procedure for the 3rd round of program oriented funding in Helmholtz (POF-III, 2015-19)
- > We are most grateful to the committee members who have agreed to spend their precious time with us today and tomorrow and help us with their invaluable advice:
  - Francois Amiranoff (E. Polytech.), Ralph Assmann (CERN), Wolfram Fischer (BNL), Norbert Holtkamp (SLAC), Leonid Rivkin (PSI) - *chair*

# Objective & charge cont'd

- > We ask the committee to discuss with us and give us advice on:
  - The selection of the research topics: do we set the right priorities, should we eliminate/postpone/add topics or give more emphasis to some of them w.r.t. others?
  - Is the structure of the program adequate for an efficient networking between the participating centers, with universities and international cooperation partners?
  - What can we do to improve the link of accelerator research to innovation and applications in other research areas in the Helmholtz Association, in industry or the society in general?