

# 93<sup>rd</sup> PRC Meeting: Open Session

Physics Review Committee

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DESY PRC Meeting, 10/11 May 2022

HELMHOLTZ



# DESY

## A Helmholtz Centre

**National laboratory  
founded in 1959**

2700 employees and  
about 8000 users

Annual base budget 230 M€

Two locations:  
Hamburg and Zeuthen  
(near Berlin)

### **Four research areas**

Accelerator science  
Particle physics  
Astroparticle physics  
Photon science



# Particle Physics at DESY

## DESY's ambitions in HEP: a centre of excellence

- Serve as hub for the German universities to enable and/or strengthen contributions to international projects
- Host an attractive on-site programme of medium scale experiments
- Host a world-class theory group spanning a broad range of topics
- Be at forefront of technology developments (accelerator & detector R&D, computing)
- Provide infrastructure required by national and international researchers



# DESY Contributions to International Experiments

## ATLAS, CMS and Belle II

### Critical mass of people

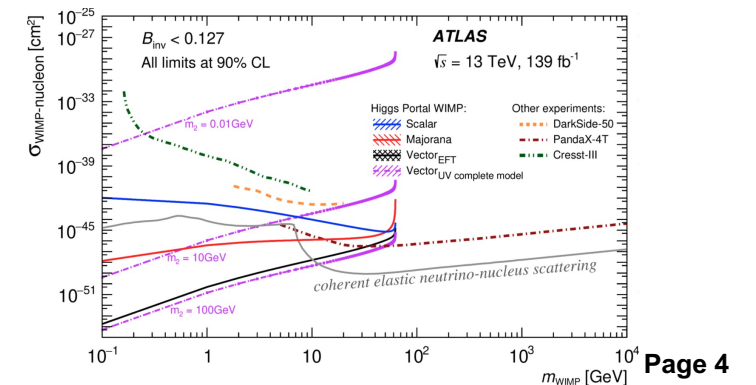
- Contribute to construction, detector and computing operation, management and data analysis

### Major hardware construction responsibilities with German universities

- ATLAS & CMS: construction of two tracker endcaps in new Detector Assembly Facility ("DAF")
- Belle II: construction of pixel vertex detector

### Interesting and important physics analyses are ongoing, e.g.

- Higgs physics, rare B-decays, lepton flavour universality tests, Dark Matter searches...



# On-Site Experiments

## Axions / DM searches, and LUXE

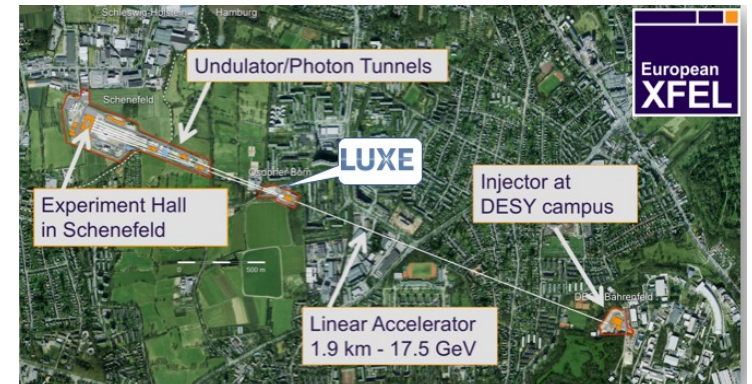
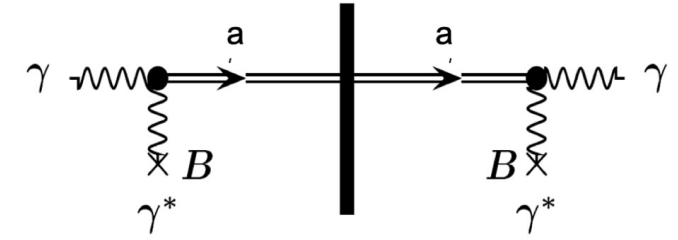
European particle physics strategy update highlighted need of natl. laboratories to complement CERN

**Axions:** huge phase space for axions / ALPs with different motivations. At DESY, three complementary experiments planned:

- ALPS II: light shining through a wall
- BabyIAXO: axions from sun
- MADMAX: axions from dark matter halo

### LUXE: Explore QED in high-intensity regime

- Probe the Schwinger limit using high-power lasers and the electron beam of the European XFEL
- Review of PRC and external reviewers ongoing (chair: Steinar Stapnes)



# Timeline of HEP Projects

## This decade



# Theory in Program *Matter and the Universe*

## A diverse portfolio

### Outstanding group at DESY spanning broad range of topics

- particle phenomenology (QCD – lattice and pert., Higgs, flavour, axions, ...)
- strong involvement in establishing the physics case of a future collider
- strong expertise also in particle cosmology, and string theory

### Features

- Wolfgang Pauli Centre as interdisciplinary centre of excellent; building construction starting
- central role in QU excellence cluster in Hamburg
- strong focus also on education and training



CLUSTER OF EXCELLENCE  
QUANTUM UNIVERSE

# Important Other Activities in FH

## Computing, testbeam, detector R&D and future colliders

### Computing Centres at DESY

- Tier1 for Belle II and Tier2 for ATLAS & CMS
- Smaller experiments, theorists and individuals

### Scientific Computing

- AI and ML, Quantum computing
- Data management and organisation

### Test beam facilities (DESY II)

- Single  $e^\pm$  with energies of 1-6 GeV at DESY
- “Beamline for Schools” activity with CERN

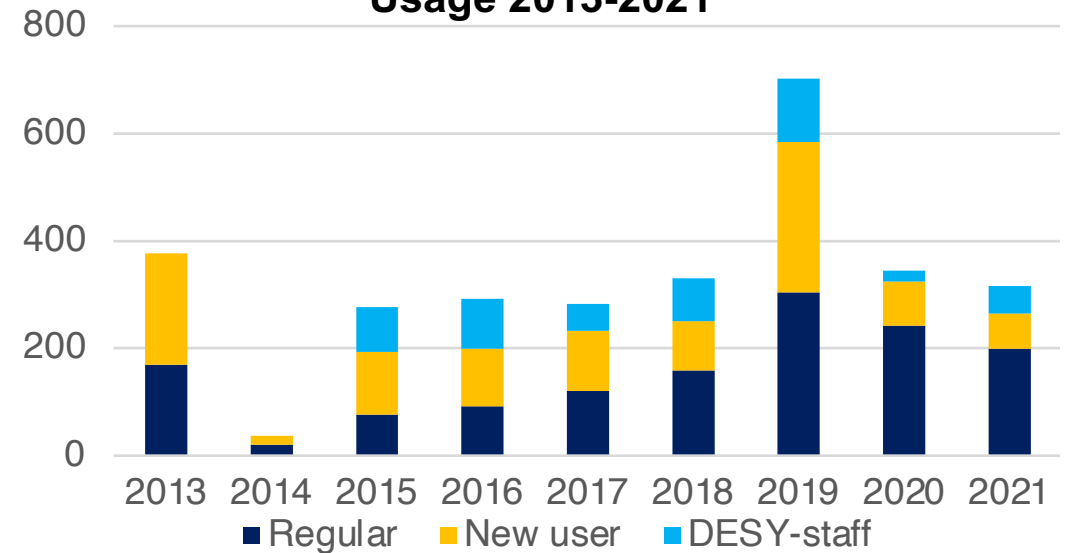
### Long tradition in detector R&D

- Silicon pixel detectors, high granularity calorimeters, cryogenic detectors, ...

### Future Colliders

- TESLA technology (ILC), PWFA accelerators
- Physics studies at future colliders

DESY II Test Beam Facility  
Usage 2013-2021



**Leverage synergies with other divisions (accelerators, photon science and astroparticle physics)**



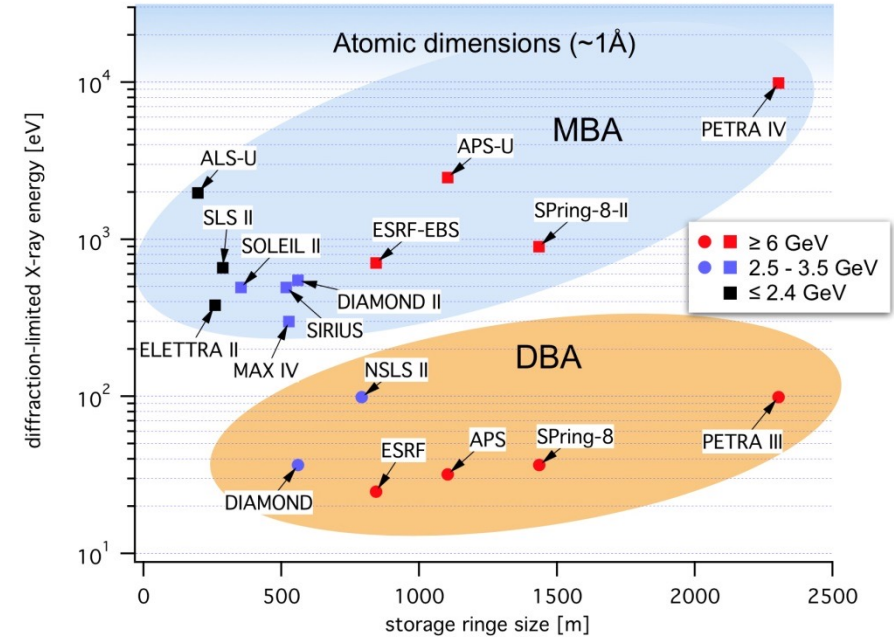
# General News

## DESY

- **PETRA IV highest priority future project at DESY.**

### Planned schedule:

- 2022: TDR
- 2023: National roadmap
- 2026: start construction
- **Suspended cooperation with institutions from Russian federation & Belarus: affects**
  - Guests & users, publications, research cooperations, hardware purchases, ...
- **Support for Ukraine and endangered scientists**
  - Accommodation of refugees in DESY guest houses
  - Temporary jobs at DESY for Ukrainian refugees and/or endangered scientists from Russia/Belarus



#StandWithUkraine

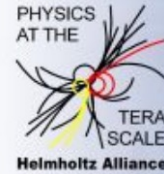


**Thanks to Ties Behnke for his brilliant leadership during 2021!**

# Backup

# Helmholtz Terascale Alliance

## Networking and Education



PHYSICS AT THE TERASCALE  
Helmholtz Alliance

- **Physics at the Terascale:** Network of German universities and HGF
- Several events each year
  - Typically five schools, see [webpage](#).
  - One community workshop
- Hoping for in-person events this year
  - But will keep some online presence as reach much wider

Date	Schools in the past year (all online)	Number of participants
03/2021	Machine Learning School	150
04/2021	Detector Workshop	165
04/2021	Computer Algebra & Particle Physics	99
11/2021	Monte Carlo School	63
11/2021	Resummation, Evolution, Factorisation (REF) Workshop	228
02/2022	Detector Workshop	235
03/2022	Advanced Statistics School	293

# Thank you

## Contact

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