

12th MicroTCA Workshop

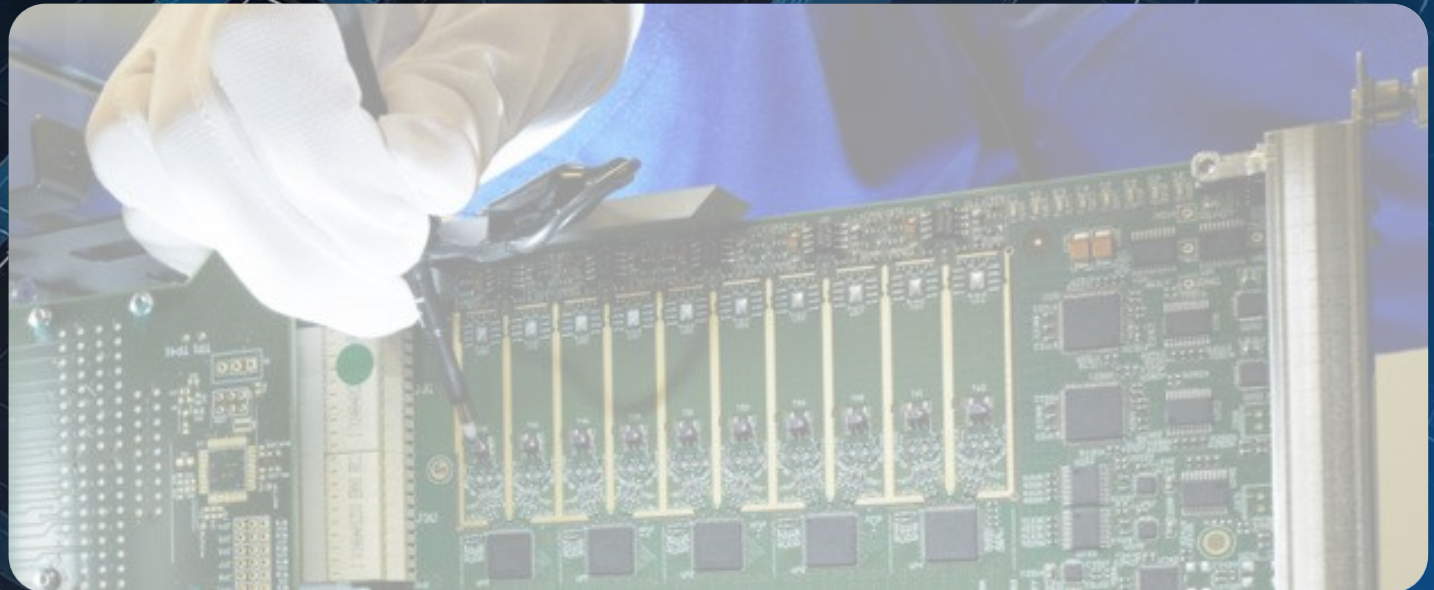
for Industry and Research

@ DESY. Hamburg
5-7 December 2023

Welcome!



Wim Leemans
Director Accelerator Division



DESY's user facilities serve more than 3,000 users per year

Reliability and efficiency are critical for our user facilities with peer-reviewed international access

6 GeV Storage Ring

27 beamlines
for *in situ* studies
of materials
(17 in operation)

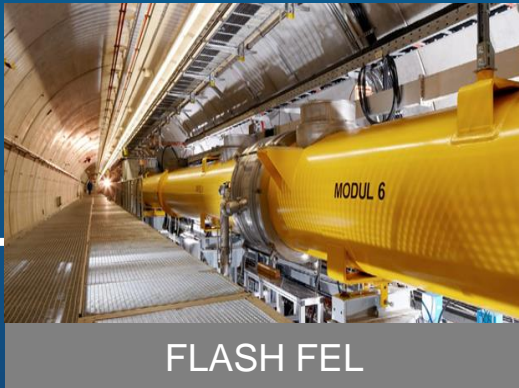


17.5 GeV X-Ray FEL

DESY
operates the
superconducting
linear
accelerator

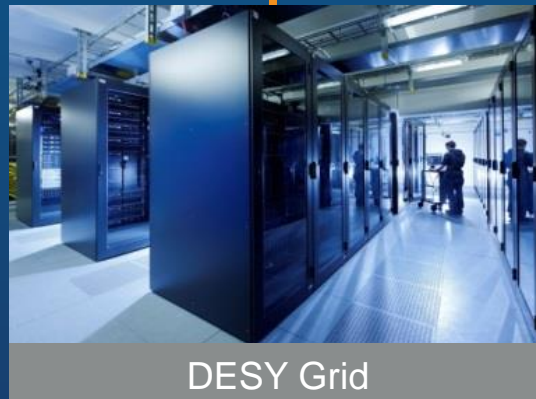
1.25 GeV Soft X-Ray FEL

Tandem FEL
8 exp. stations for
ultrafast processes



1-6 GeV e^- and e^+ Beams

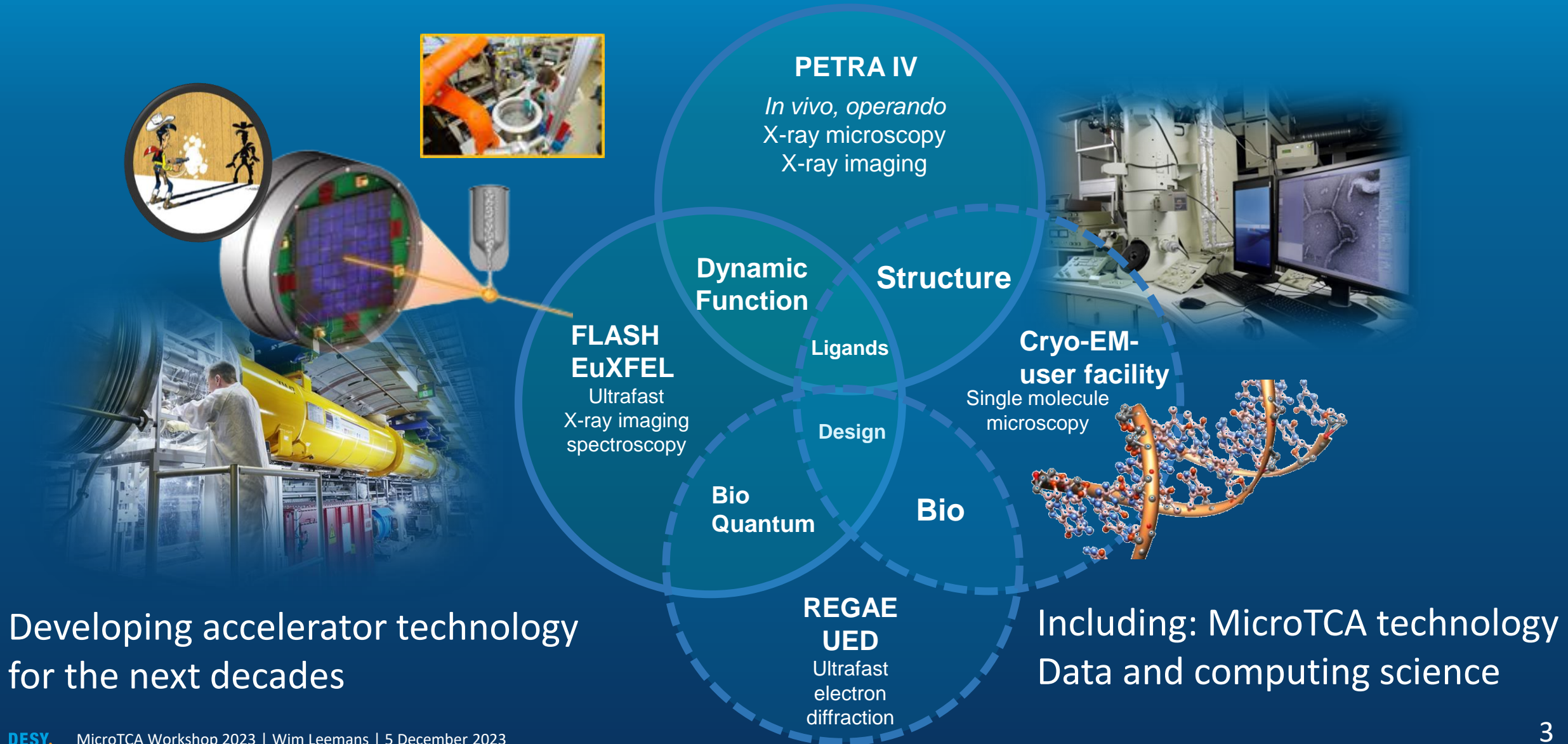
For detector testing
International use



15 PB TIER-2 Centre

For LHC users
In future also for Photon Science

DESY. Providing world-leading capabilities for photon science to address to most pressing challenges – National Analytics Centre

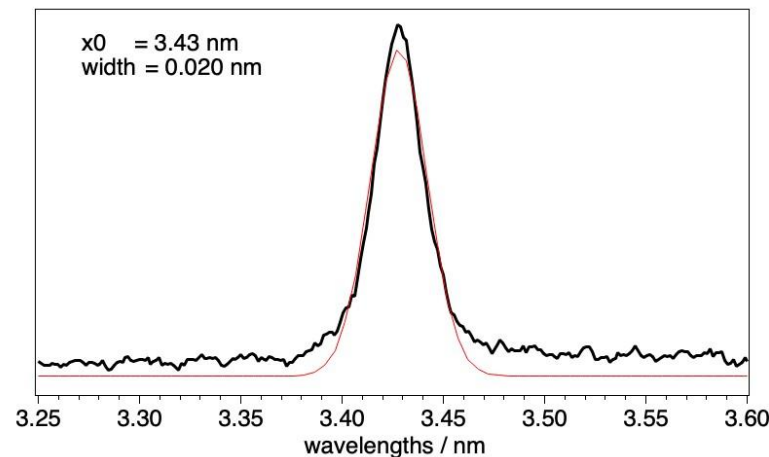


DESY. Demonstration of 3.43 nm wavelength at FLASH

As a result of the energy upgrade, FLASH can now reach photon energies extending into the oxygen K-edge

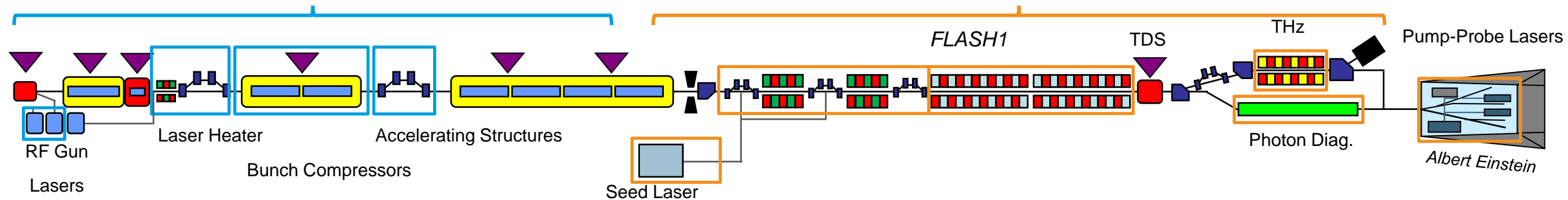


Wavelengths down to 3.43 nm delivered



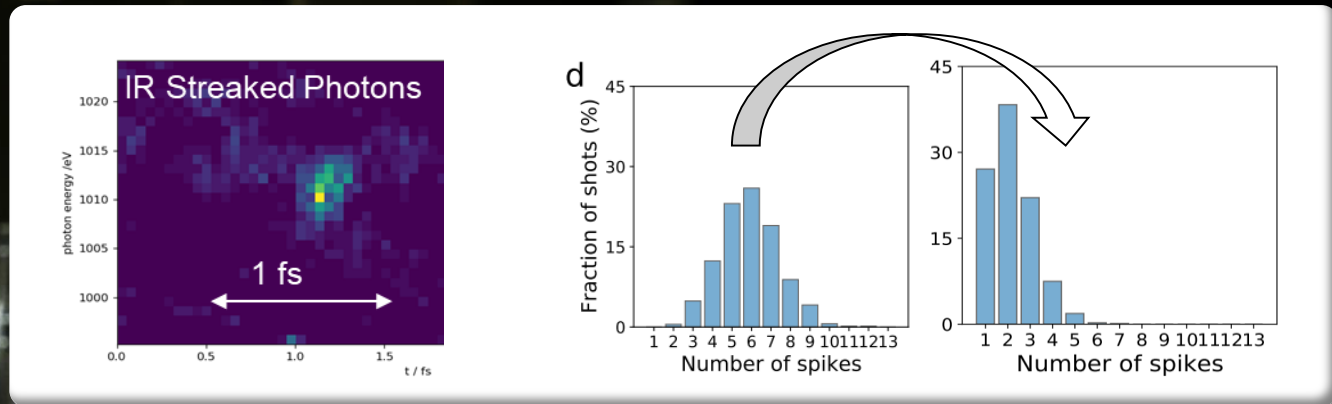
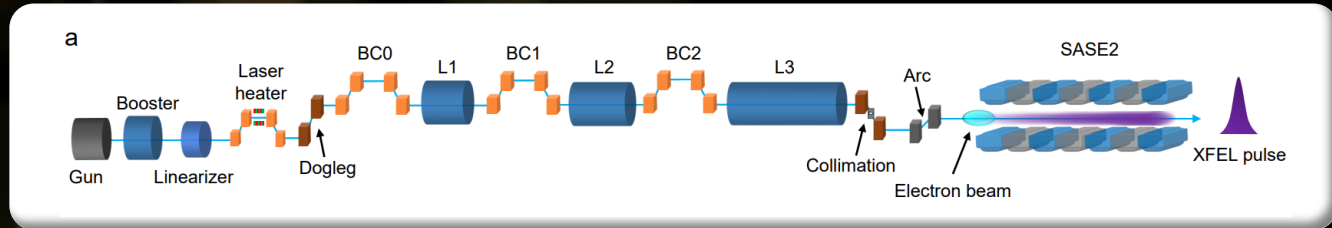
Successfully upgraded

Next installations



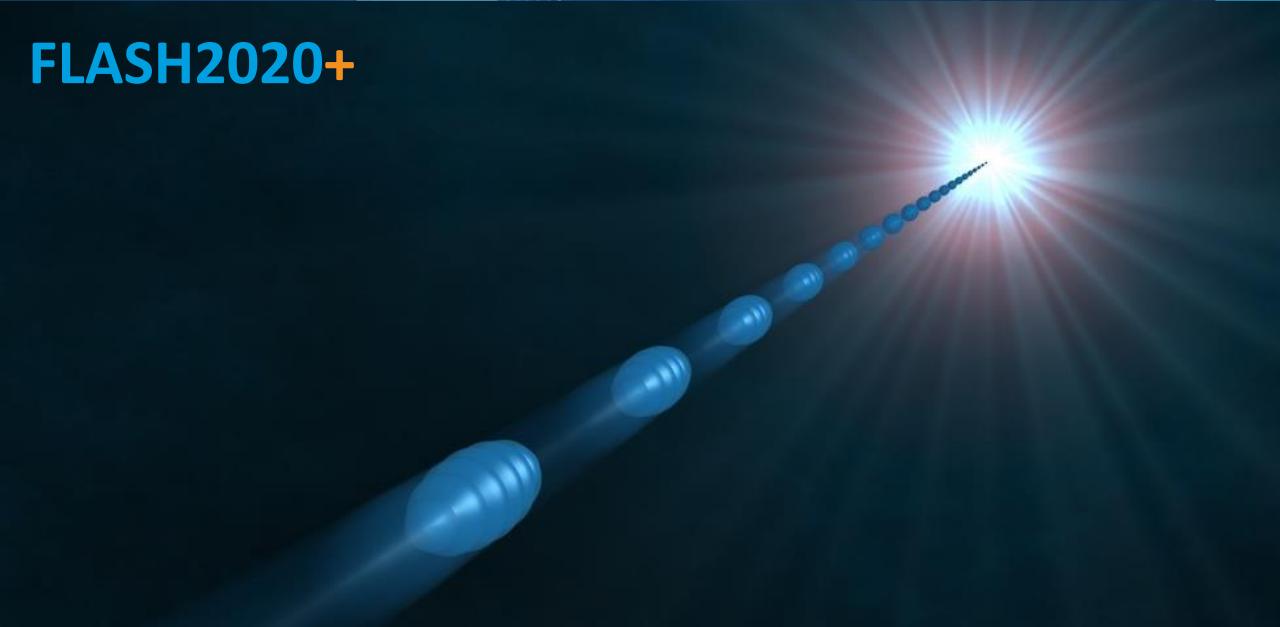
DESY. Record peak power and sub-femtosecond resolution at EuXFEL

Top performance in all beam parameters – 170 μJ in attosecond pulses!

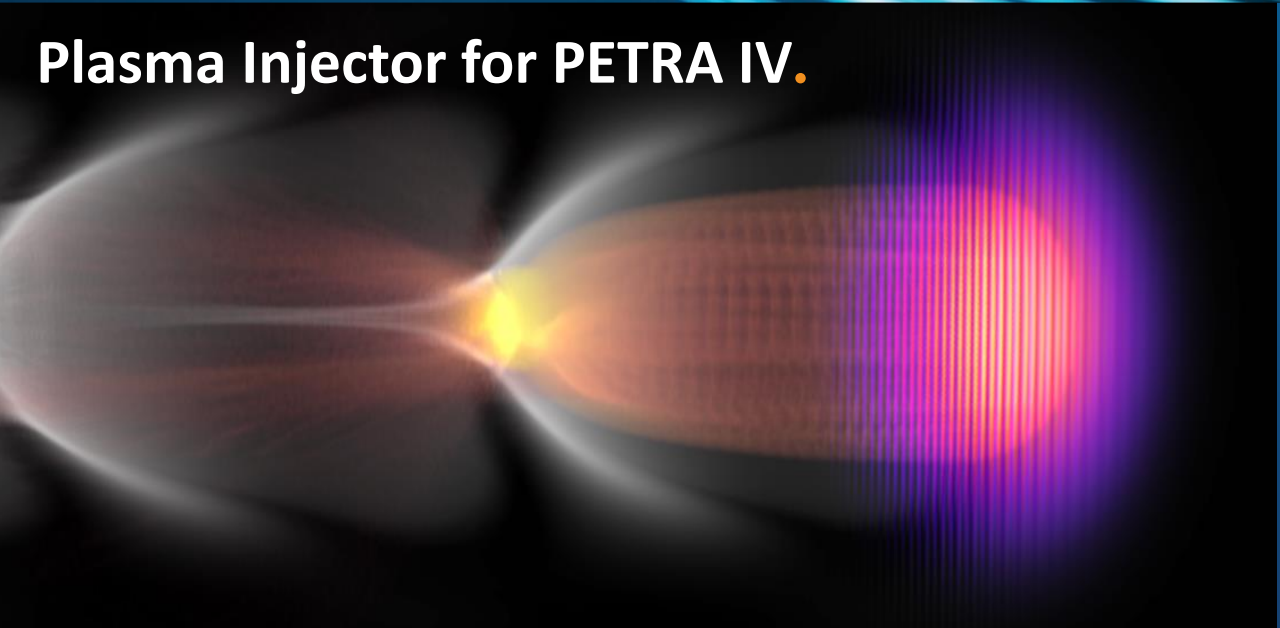


Projects: FLASH2020+ , EuXFEL upgrades, PETRA IV including Laser Plasma Injector

FLASH2020+

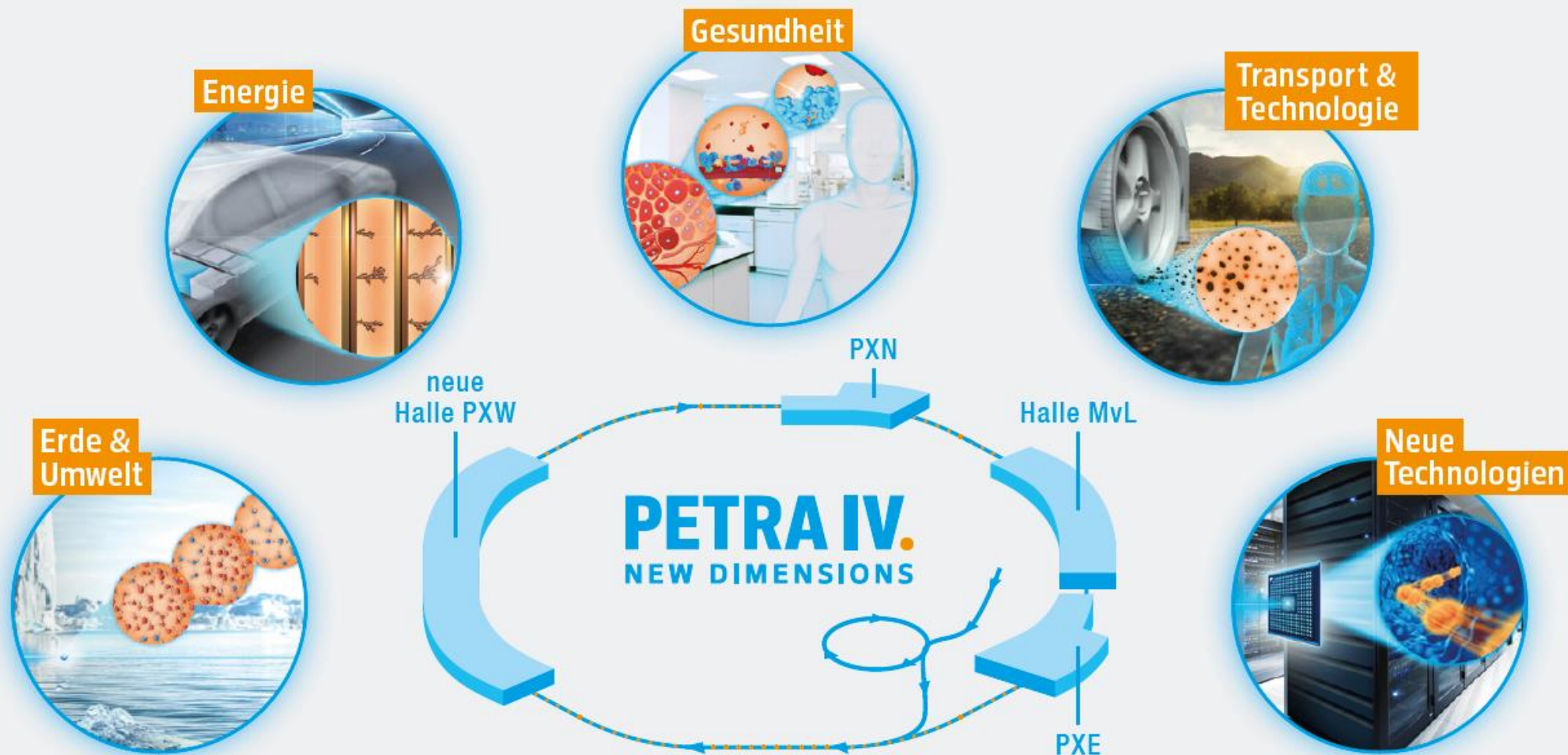


Plasma Injector for PETRA IV.



PETRA IV.

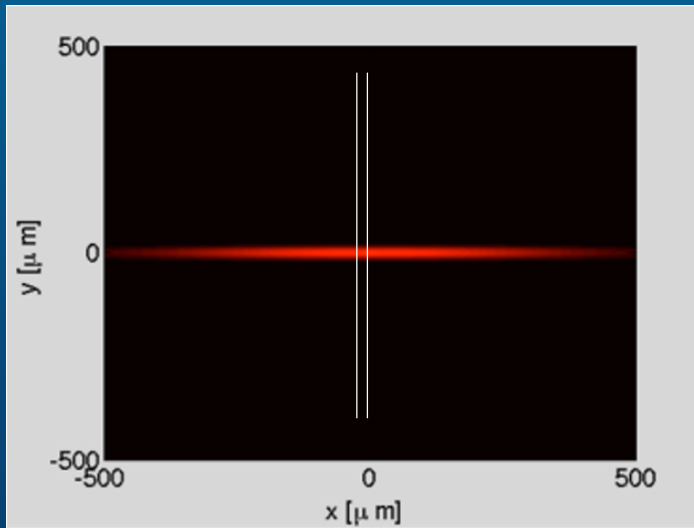
The Lab's Top Priority Project



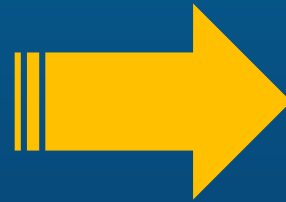
PETRA IV. Advancing into the quantum world

PETRA III

The world's best storage based hard X-ray source
for more than a decade

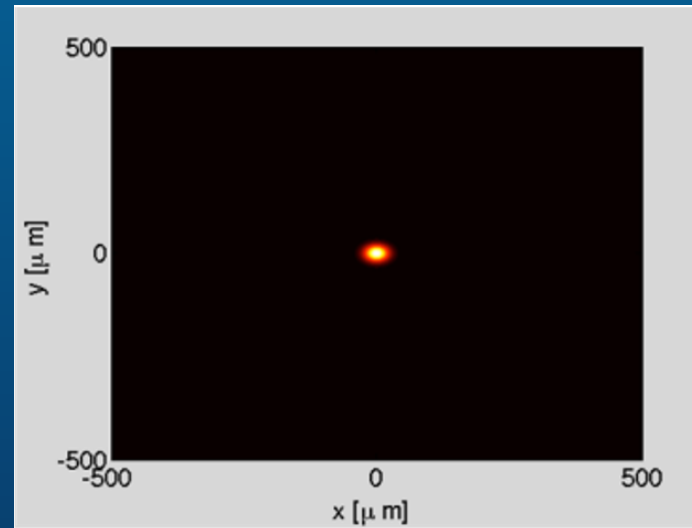


Electron beam
in the PETRA III ring



PETRA IV

World-leading X-ray microscope
for
design and control of materials
on the quantum scale



Electron beam
in the PETRA IV H6BA ring

≥ 500-fold (!)
increase in performance

- Disruptive new insights
- Innovations on the nanoscale

PETRA IV. – Securing innovation potential



PETRA IV will be the most powerful high-energy synchrotron radiation source

Performance
4th Generation



Performance
3rd Generation



Start of
operation
4th Generation

2020

2025

2025

2028

2029

Location

ESRF-EBS
Grenoble



APS-U
Chicago



HEPS
Beijing



Spring-8-II
Hyogo



PETRA IV
Hamburg



Breaking news: 44 M€ for pre-projects towards PETRA IV.

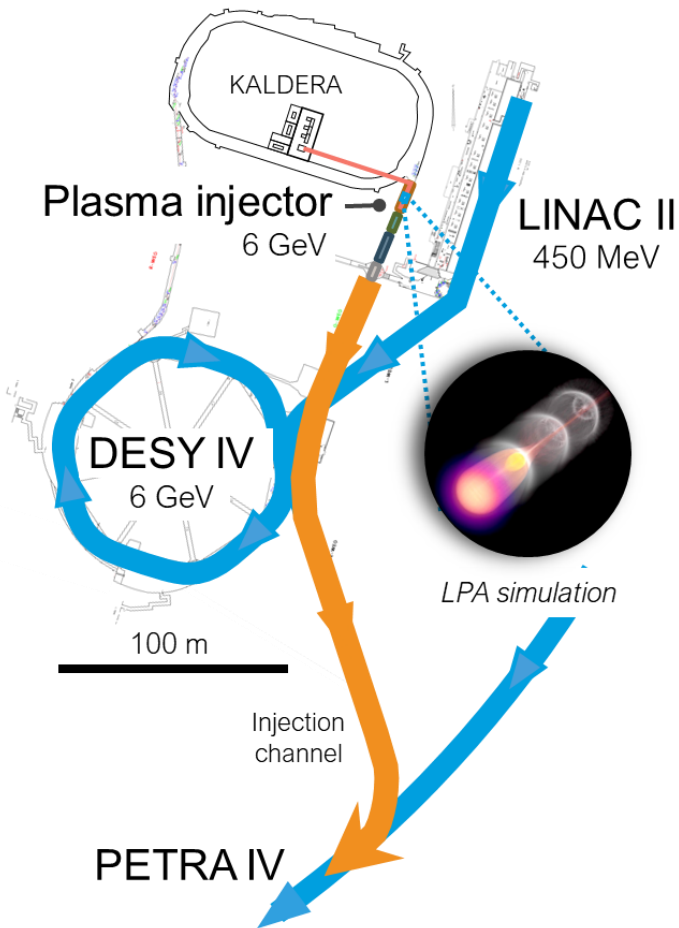
As a result of the Budget Committee for the 2024 federal budget:

DESY is receiving:
40 M€ from federal budget
+ 4 M€ co-financing from the City of Hamburg in pre-project funding, especially for innovative and energy saving injector prototype and the transformation of the business model

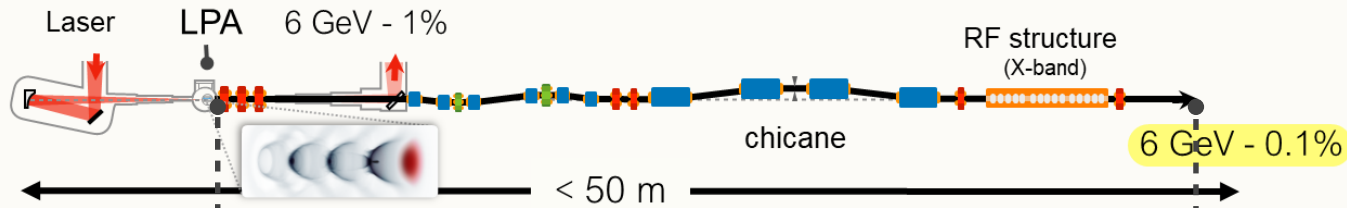
The start of a new era of cutting-edge research is assured!

DESY. Our “Moonshot” project: Plasma Injector for PETRA IV.

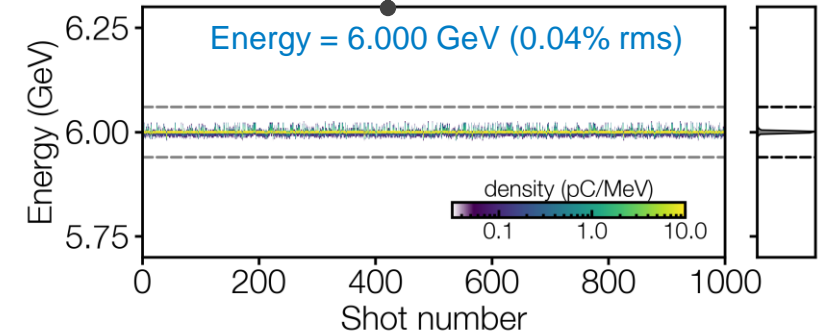
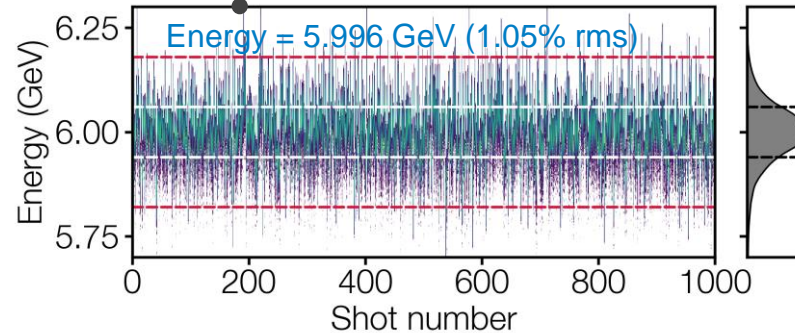
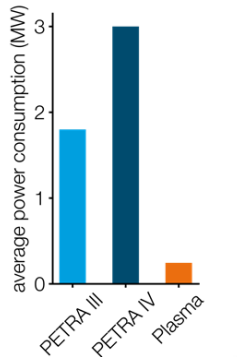
Innovative, energy-saving accelerator technology



Plasma injector schematic



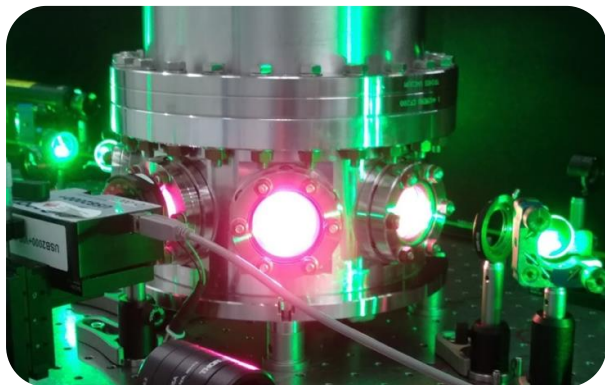
Injector power usage



KALDERA: DESY's flagship Laser plasma accelerator drive laser

We tailor drive lasers to our needs: High-repetition rate is key to active stabilization

Talk by Tomasz Jezynski, Thursday 11:45 am



High Rep-Rate Terawatt Laser

- Up to kHz-level rep-rate
- Sufficient bandwidth for active stabilization and feedback
- Full controls system integration

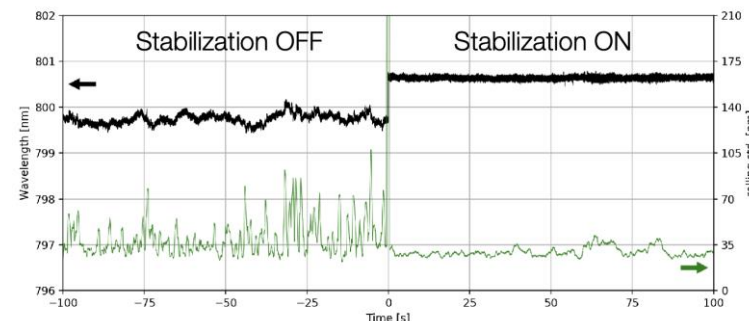
kaldera.desy.de

Examples for MTCA integration

Close cooperation of MLS, MCS and MSK groups

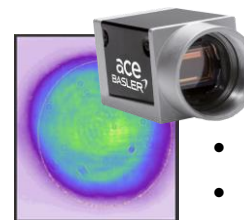
Active wavelength stabilization:

T. Hülsenbusch et al.



Fast cameras:

T. Jezynski, C. Dülsen, et al.



- MTCA-based camera readout
- FPGA image processing

DESY. TechTransfer: Foster start-ups, spin-offs & hightech companies

Tailormade infrastructure for successful transfer



DESY Innovation Village
Since 02/2019



Start-up Labs Bahrenfeld
Since 07/2021



DESY Innovation Factory
From 2025



From early stage research to successful commercialisation

MicroTCA Technology Lab

TECHLAB (desy.de)



Core Activities

Custom Development MTCA.4
(Hardware, Firmware, Software)

High-end Test and Measurement

System Configuration
and Integration





Have a fantastic workshop!
Welcome!

