

Welcome

25th European Synchrotron Light Source RF Meeting

DESY Hamburg, Germany

8 November 2021

Wim Leemans

Accelerator Division (M-Division)



Mission for Accelerator Division

Invent, design, build and operate
accelerators to enable top notch science
at
DESY and elsewhere

1997: Dieter Einfeld initiative!

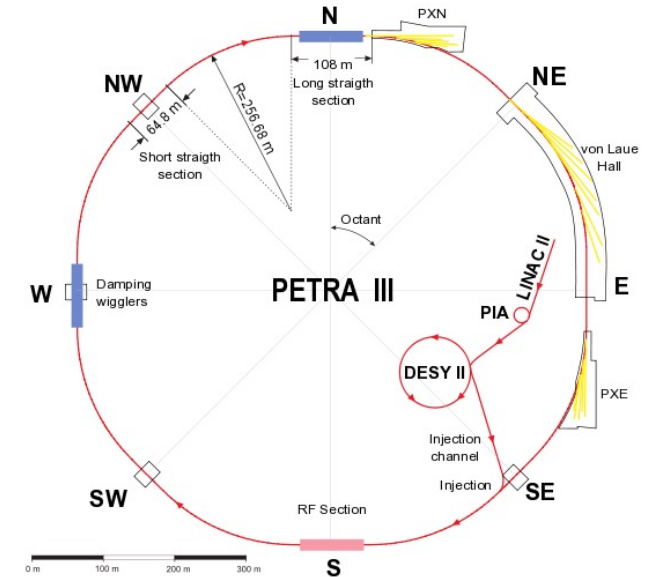
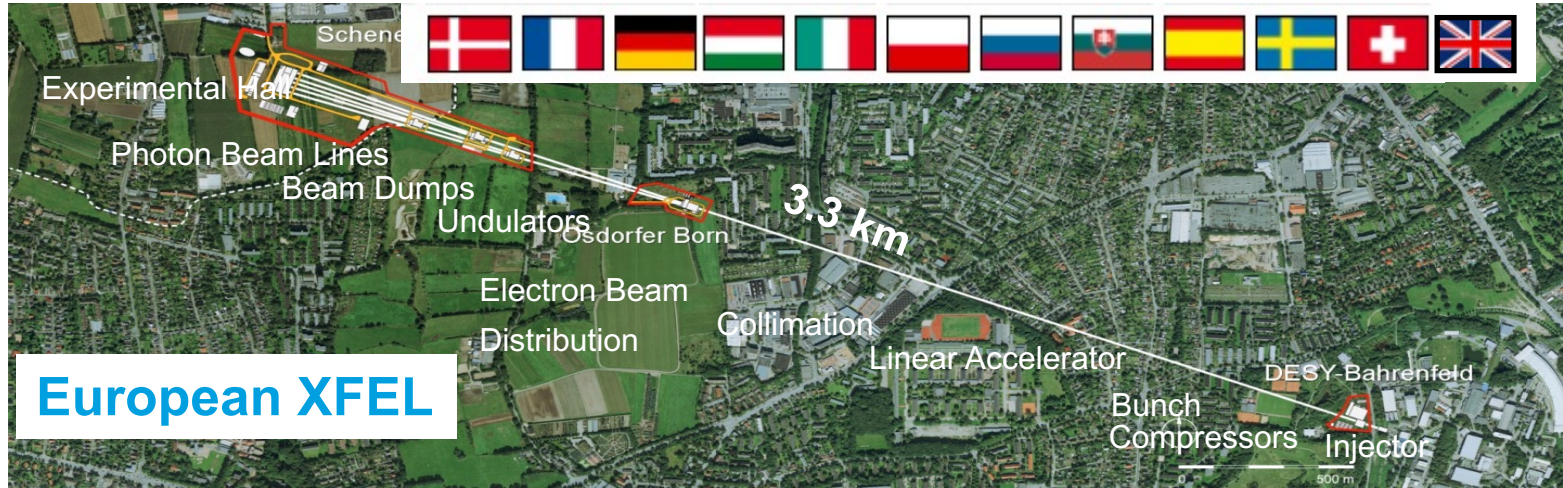
2009: Hamburg as real host

2021: Hamburg as virtual host

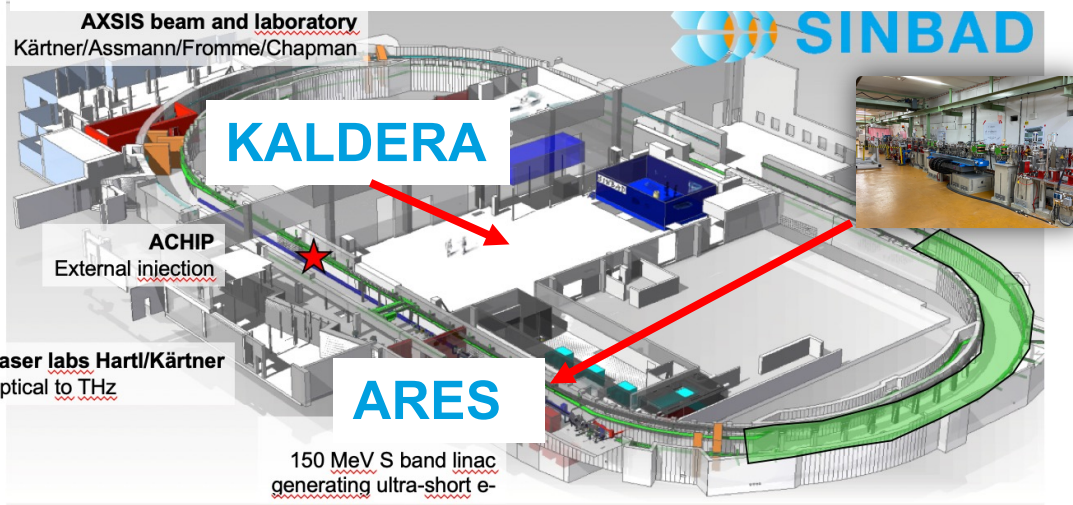
We will need another chance!

The Accelerator Division runs large (and small) scale infrastructure

Invent, design, construct and operate accelerators to support forefront science and society



- + REGAE ultrafast electron diffraction facility
- + PLASMED X laser plasma accelerator for medical applications



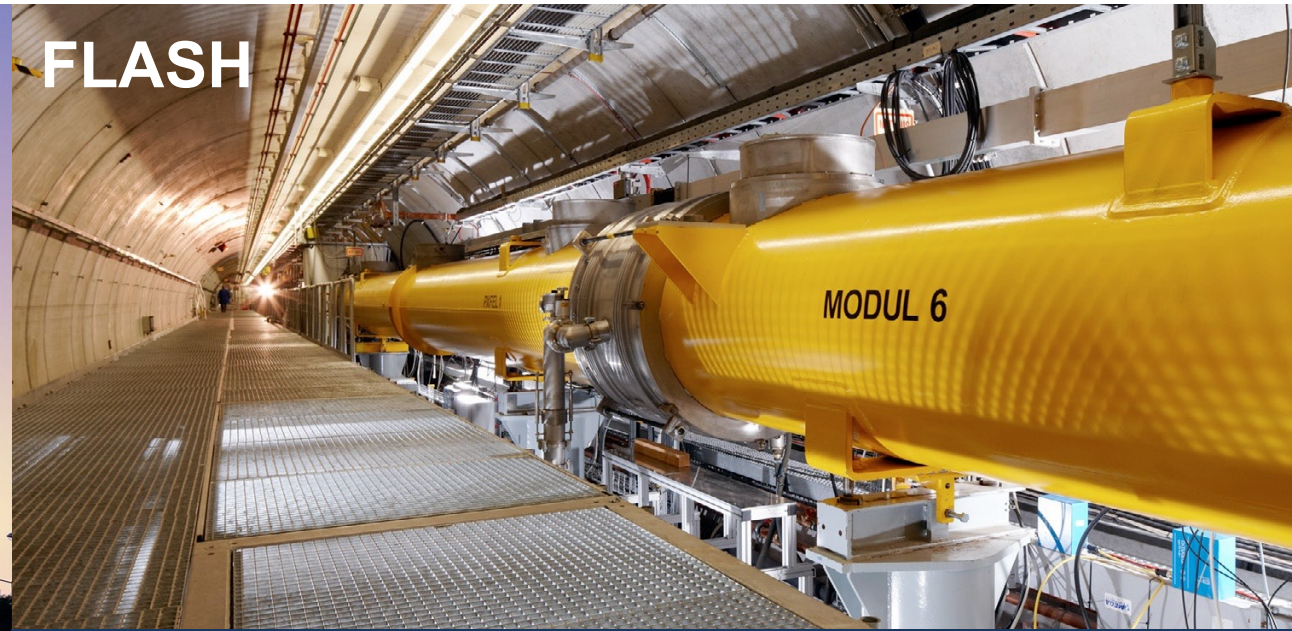
PITZ facility in Zeuthen



Our machine operations: PETRA III., DESY II TestBeams, FLASH and EuXFEL



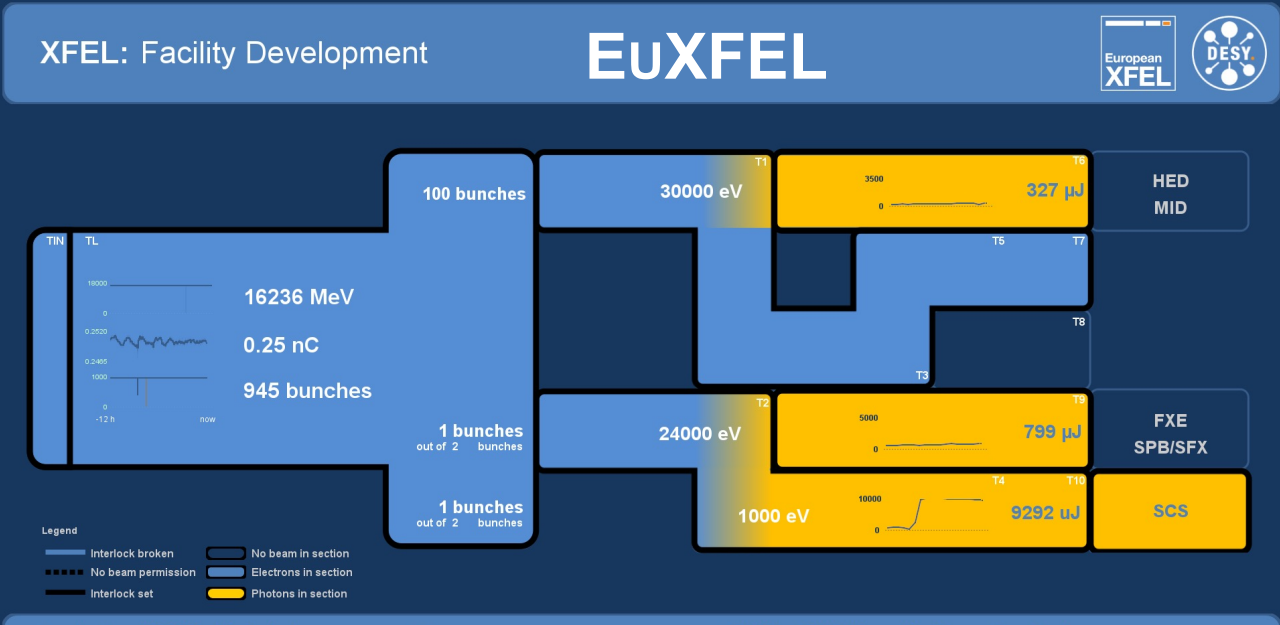
PETRA III



FLASH



DESY II TestBeams



Our projects: machine upgrades PETRA IV., FLASH2020+, XFEL, KALDERA

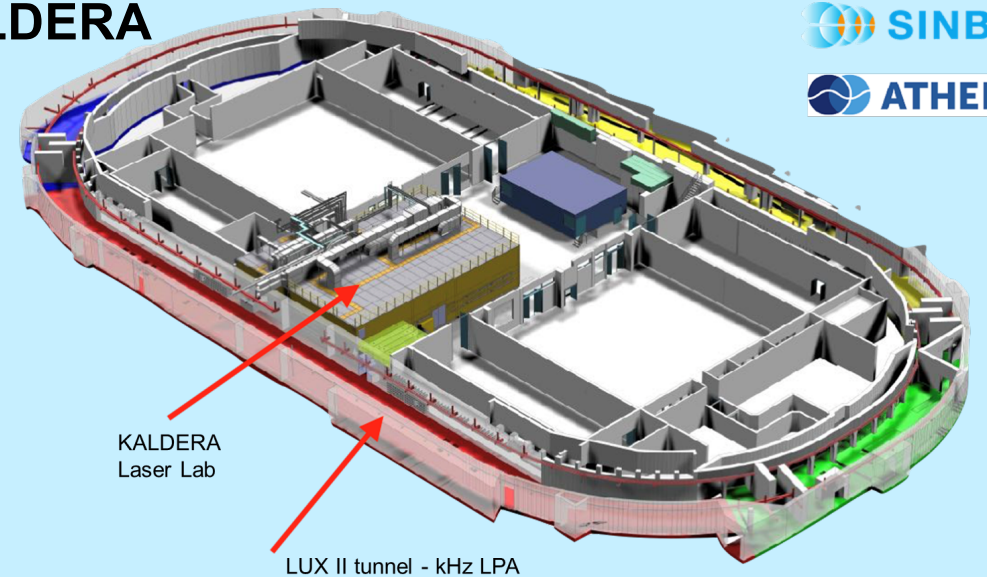
PETRA IV.
NEW DIMENSIONS

FLASH2020+

➤ TDRs in progress



KALDERA



PETRA IV. X-ray microscope for chemical, biological and physical processes

Scientific excellence in X-ray Analytics to address global challenges



Unprecedented beam parameters

➤ TDR in progress – extended by 6 months



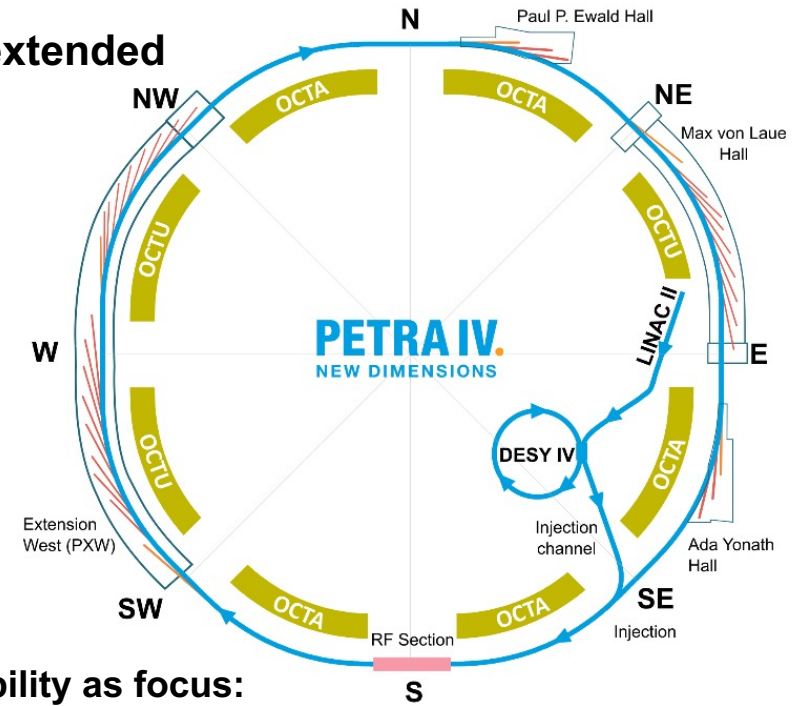
- > New machine 2.3 km length
- > 100-times higher intensity
- > 100-times faster experiments
- > Experiments *in situ* und *in operando*

➤ Highlights:

- Additional funds obtained from BMBF for TDR
- New lattice: redesign for H6BA lattice
- New logistic plans
- Procurement/prep phase extended



Riccardo Bartolini
Project leader



➤ Sustainability as focus:

- Hybrid magnets
- Waste heat recuperation
- High efficiency RF systems, ...

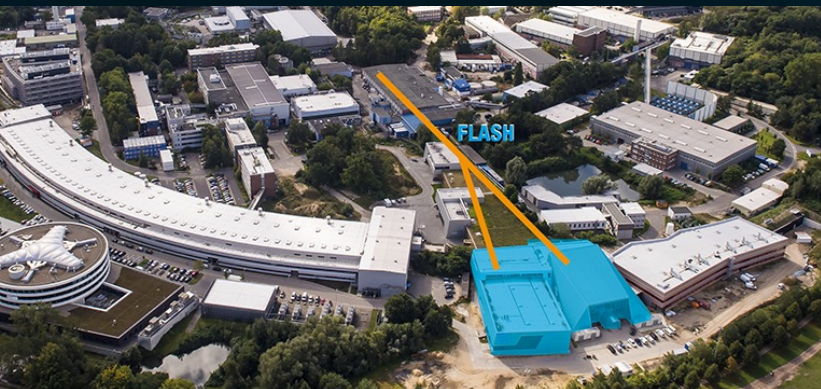
Development of Photon Science user facilities



FLASH2020+ Upgrade

FLASH will be kept at the forefront

- Provide seeding to users
- Higher photon energies and polar
- Optimized operation modes in the



Lucas Schaper
New project leader
(since September 2021)

Enrico Allaria
Former project leader
(returned to Trieste)

FLASH2020+

Development of Photon Science
user facilities

Upgrade of the European XFEL – R&D

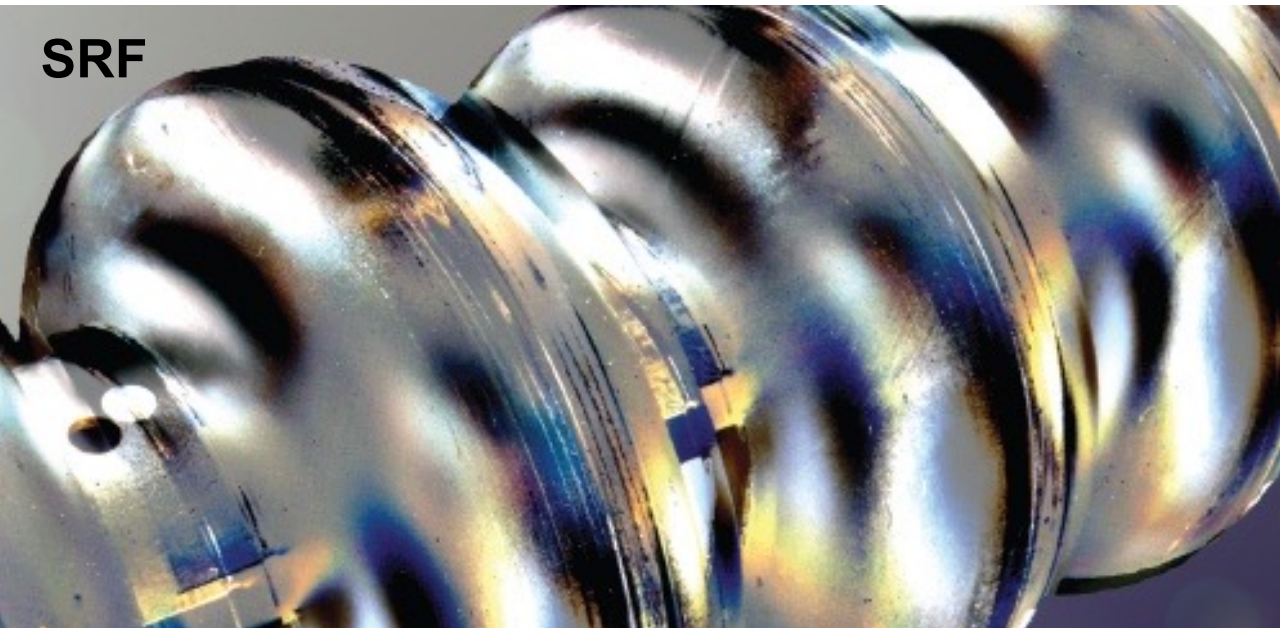
DESY conducts R&D for XFEL, supported by operation funds of European XFEL GmbH

- **Strong link of ARD-SRF to XFEL: future CW operations based on today's technology**
- **Other R&D items towards improvement of the facility's performance include**
 - advanced FEL concepts
 - advanced beam controls
 - feedback systems
 - automatization
- **Novel lasing concepts and harder X-rays**
 - Superconducting undulators

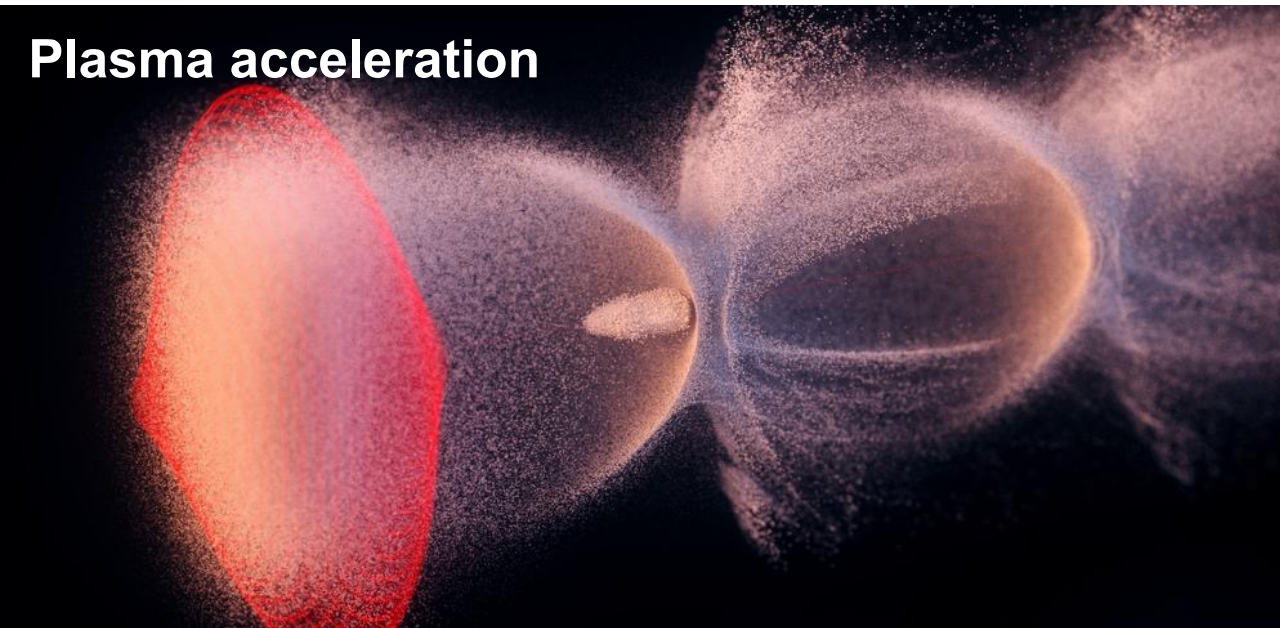
Development of Photon Science user facilities

Our R&D projects: SRF, plasma, small-scale facilities, control systems / IPC...

SRF



Plasma acceleration



Small-scale accelerator facilities

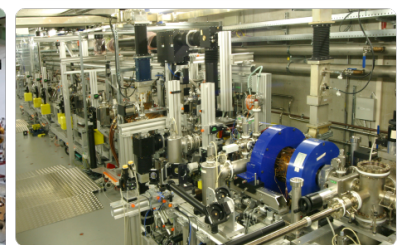
- ARES
- PITZ
- REGAE



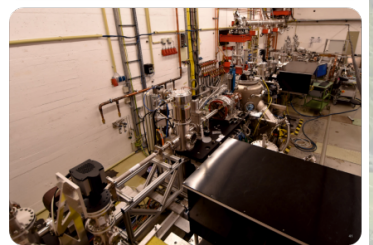
ARES



PITZ @DESY Zeuthen



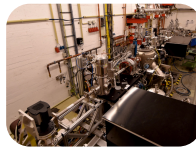
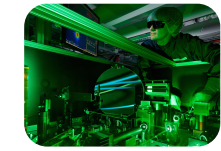
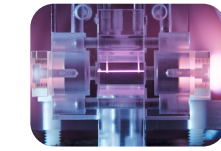
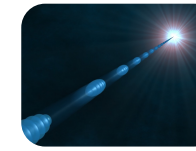
REGAE



Intelligent process control Machine learning



Summary



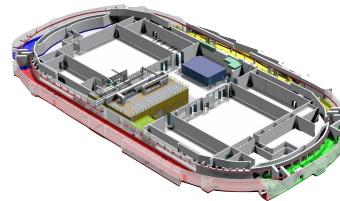
- **The Accelerator Division is engaged in operations, new facilities and strong R&D programs**

- **Machines** are operating well – dedicated teams delivering performance and science
- **PETRA IV, FLASH2020+, KALDERA** projects are progressing well. Eu-XFEL upgrades in planning
- **R&D** is strengthening further

FLASH2020+

PETRA IV.
NEW DIMENSIONS

- SRF
- Plasma accelerators
- Artificial intelligence – machine learning -- robotics



- **Central theme: sustainability!**

- High efficiency RF structures and power sources
- High reliability is central for user happiness!

