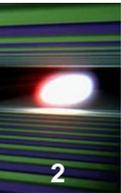




European XFEL

EuroForum School on Instrumentation 2013, CERN, May 27-31

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International research infrastructure for the application of soft & hard X-ray FEL radiation in user experiments by a multi-disciplinary science community.

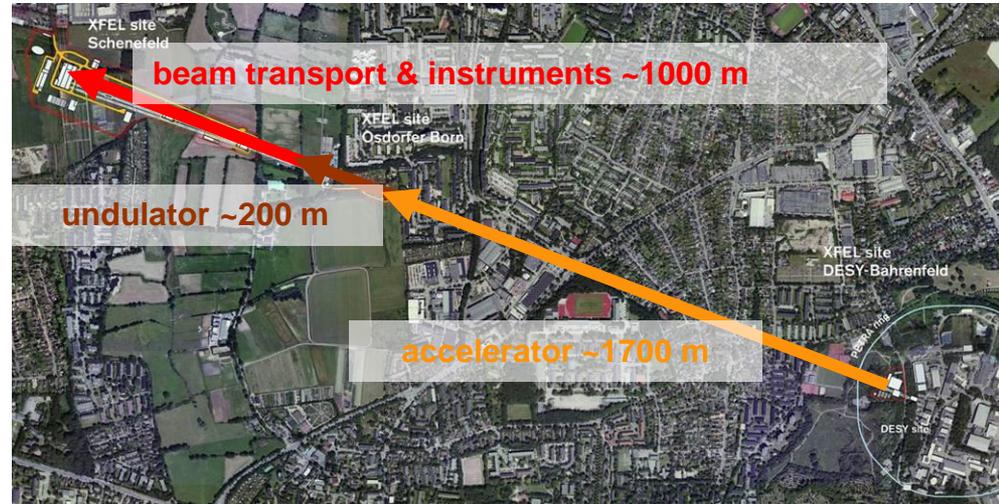
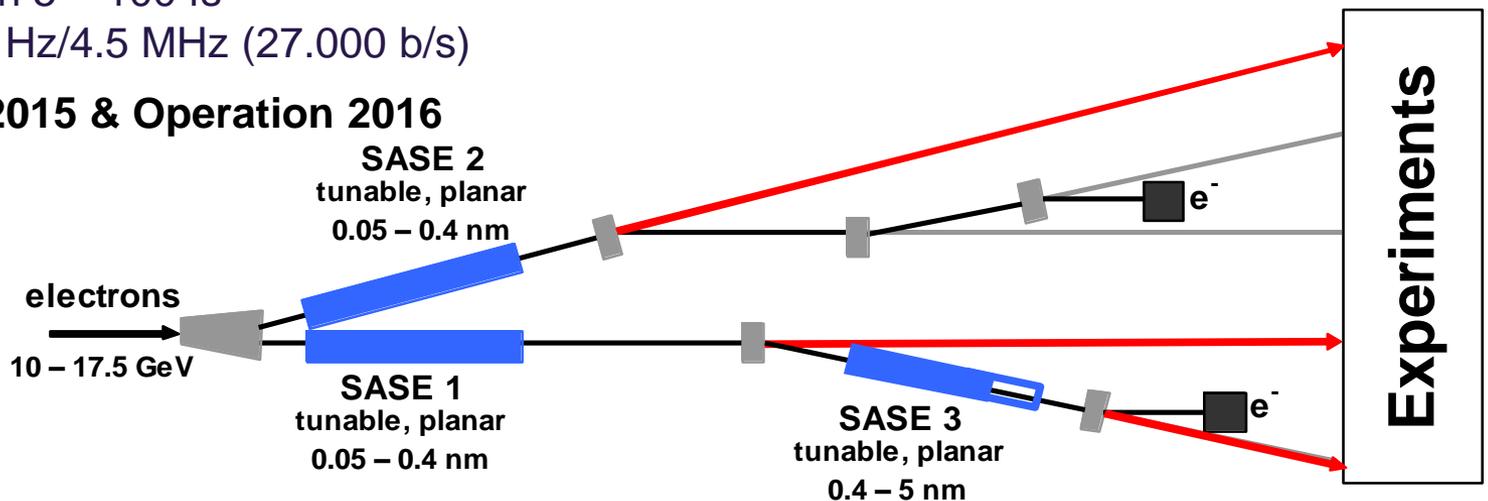
Instrumentation

- Super-cond. 17.5 GeV e^- accelerator
- 3 (5) FEL sources
- 6 (15) science instruments

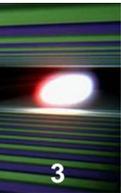
X-ray FEL characteristics

- X-ray range 0.3 – ~24 keV
- Pulse duration 5 – 100 fs
- Rep. rates 10 Hz/4.5 MHz (27.000 b/s)

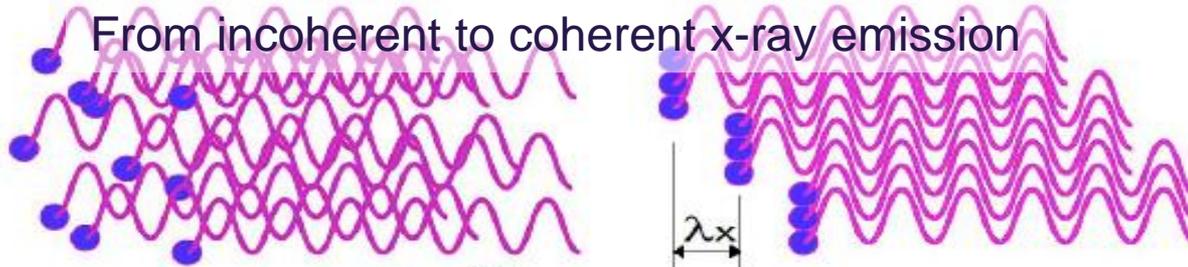
First beam end 2015 & Operation 2016



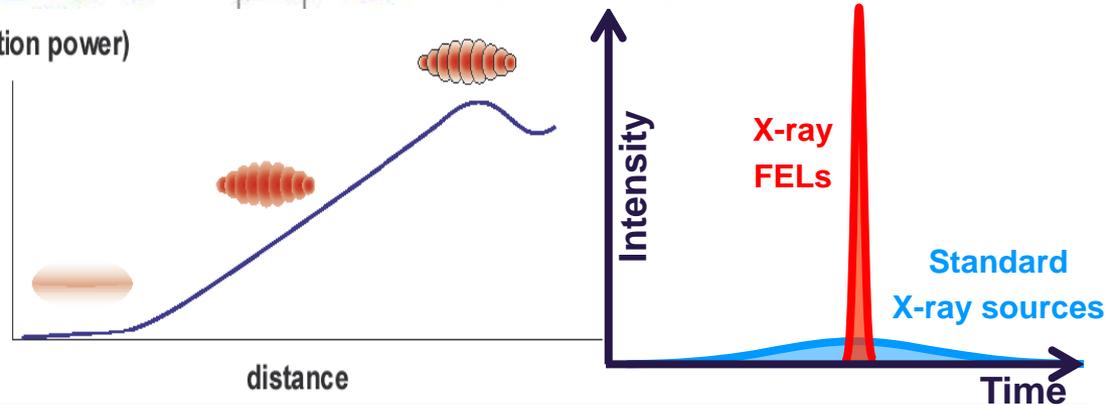
Main principle: X-ray FEL radiation

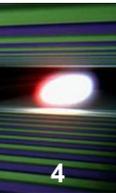


From incoherent to coherent x-ray emission



log (radiation power)





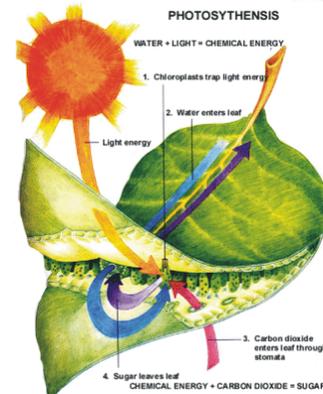
Science of condensed-matter & materials

- Understand the cause of out-standing materials properties, in particular in dynamic behavior
- Develop new & better materials



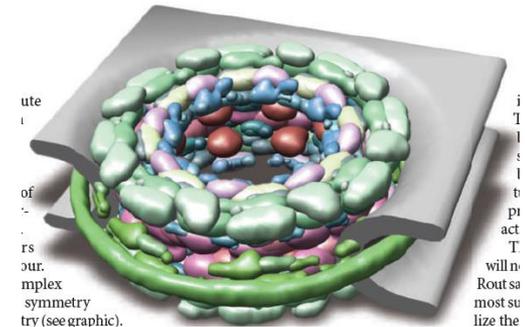
Ultrafast photochemistry & energy research

- ‚Look‘ and understand how chemistry works on the atomic level
- Develop better chemistry

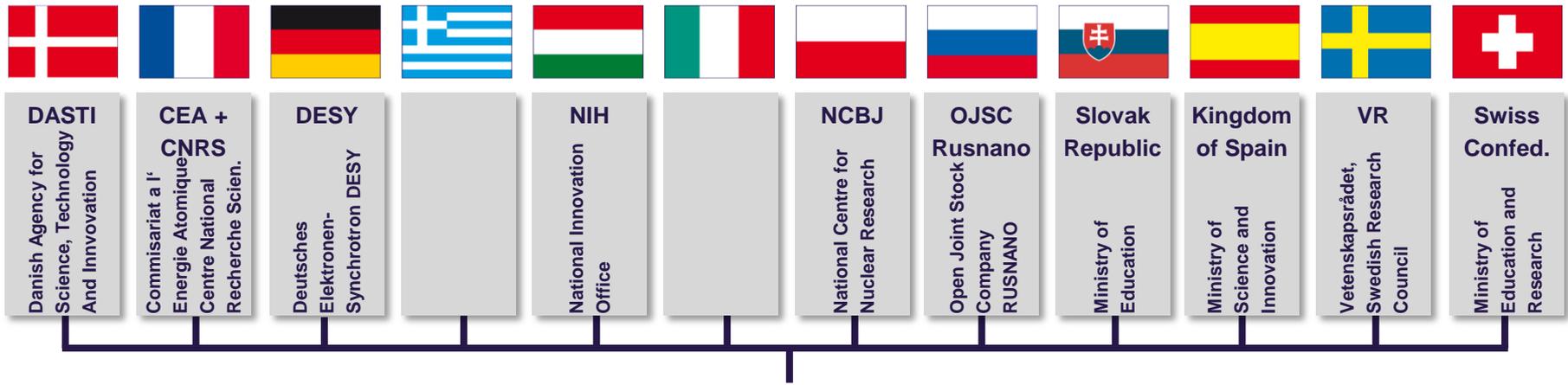
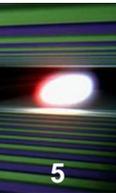


Structure of large biomolecules, complexes & cells

- Determine function of biological systems through solving their 3D spatial structure
- Develop new treatments & drugs



International organisation



Council & advisory boards



Accelerator Consortium

DESY: RF-system, LLRF,
..., AMTF, 3.9 GHz

Uppsala : Laser heater,
personnel, injector

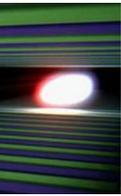


**European X-Ray Free-
Electron Laser Facility
GmbH
(European XFEL)**

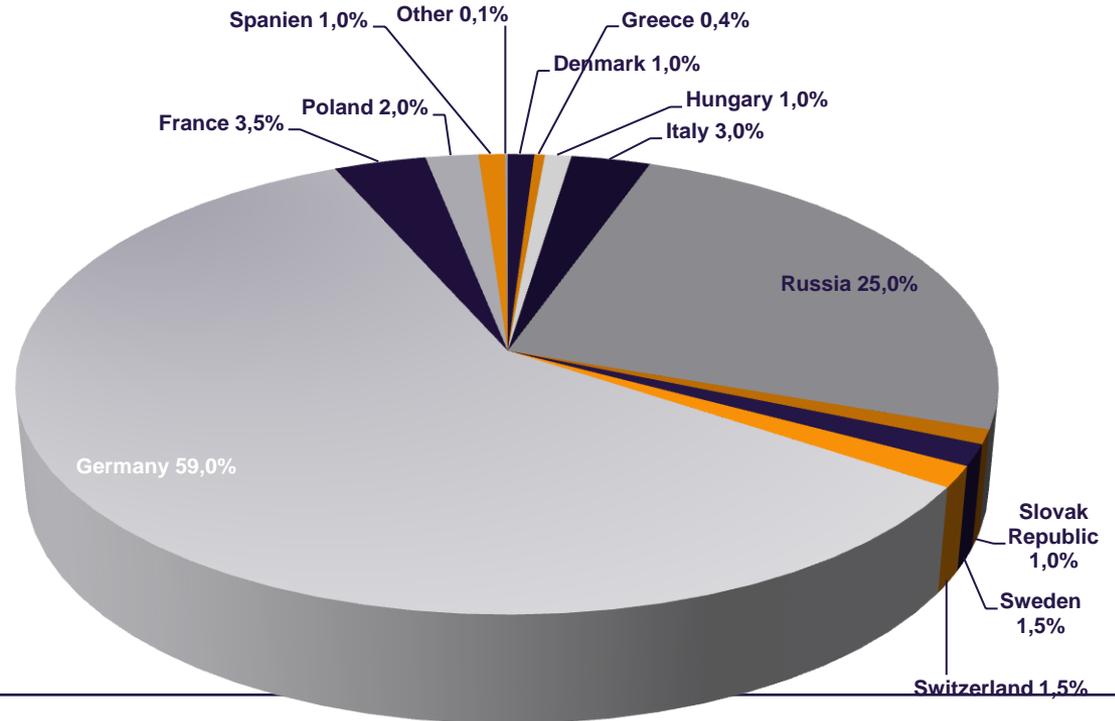
**Design, construction,
commissioning and
operation of the x-ray
systems**

- 14 techn./scient. groups
- 4 administrative groups
 - Technical services

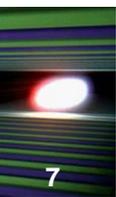
Key figures European XFEL



Total construction cost	1147	M€*
In-Kind contributions	~550	M€*
Staff European XFEL GmbH	~210	
Total staff (incl. DESY staff)	~550	
Start of user operation	2016	
Science users per year	~1000	

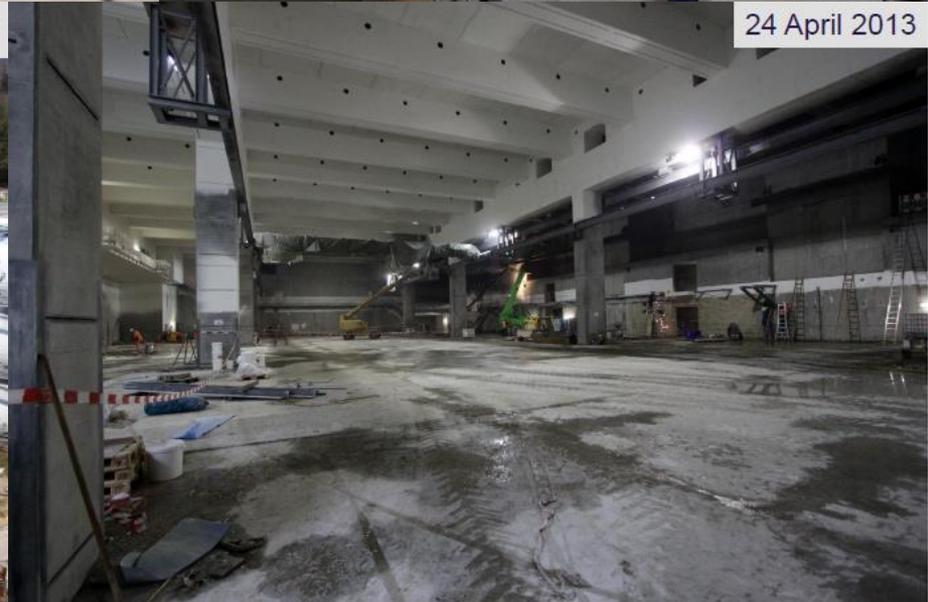


European XFEL civil construction

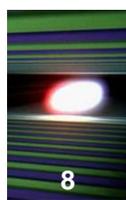


22 April 2013

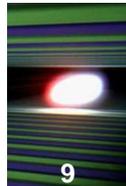
24 April 2013



European XFEL instrumentation

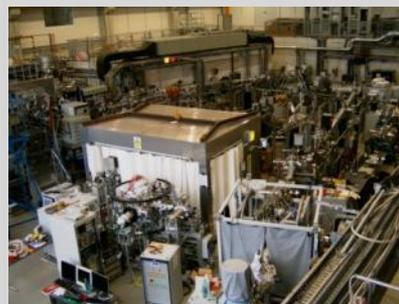


Summary: European XFEL mission



Large-scale research infrastructure for X-ray applications

- Design, construction, commissioning and operation
- Provide conditions for excellent scientific research
- Build & maintain state-of-the-art instrumentation
- Support user access and operation

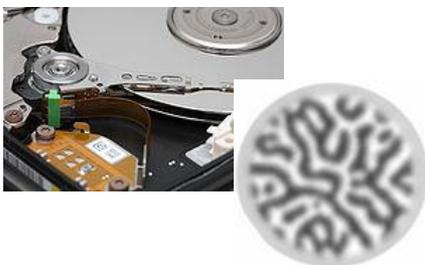


Knowhow & expertise

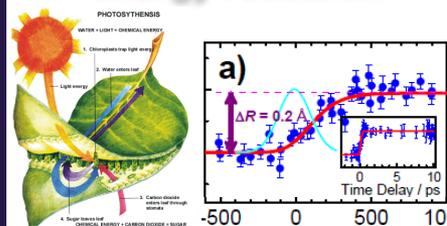


Application domains: **Structural and electronic dynamics of atoms, ions, molecules, clusters, condensed matter, plasmas**

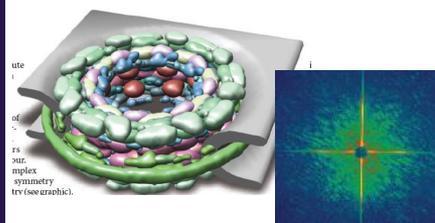
Science of condensed matter and materials



Ultrafast photochemistry and energy research



Structures of large bio-molecules, complexes and cells



Technology transfer



Education



Network of European facilities for structural research using a variety of probes: X-rays, neutrons, ions, light, e.m.-fields