

High Energy Density (HED) scientific instrument at the European XFEL

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Group leader for HED science
European XFEL



Satellite Meeting on of HED-HiBEF, Jan 23 2018
European XFEL User's Meeting 2018



What is the European XFEL?

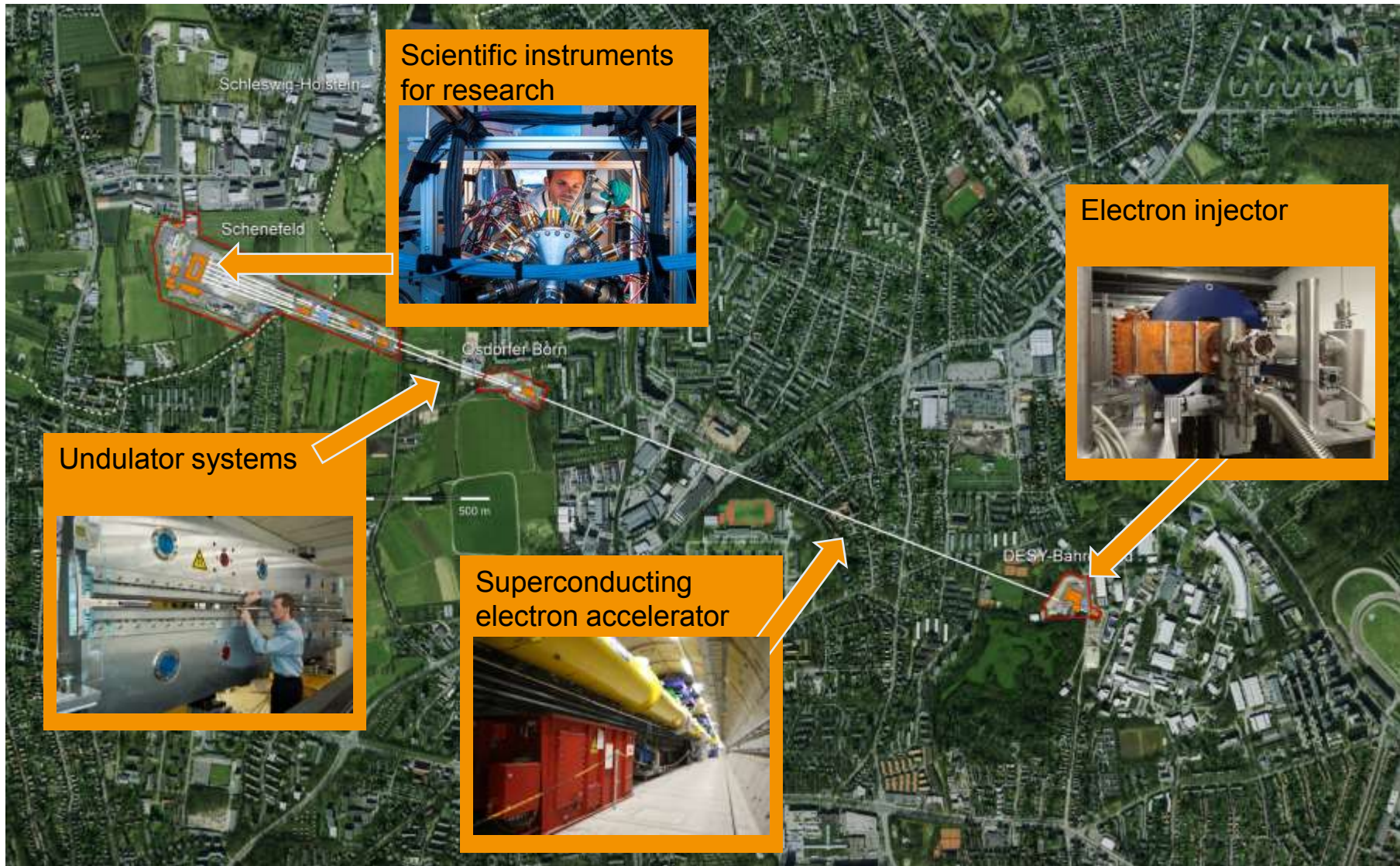


- Organized as a non-profit corporation in 2009 with the mission of design, construction, operation, and development of the free-electron laser.
- Supported by 12 partner countries.
- Germany (federal government, city-state of Hamburg, and state of Schleswig-Holstein) covers 58% of the costs; Russia contributes 27%; each of the other international shareholders 1–3%.
- Total budget for construction (including commissioning)
 - 1.22 billion € at 2005 prices (div by 6: 200 M€ per scientific instrument).
 - 600 M€ contributed in cash, over 550 M€ as in-kind contributions (mainly manufacture of parts for the facility).

European XFEL—a leading new research facility



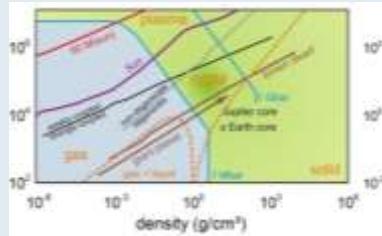
How it works: a closer look at the facility



HED instrument: scientific agenda

Laser Compression

Shock & ramp compression



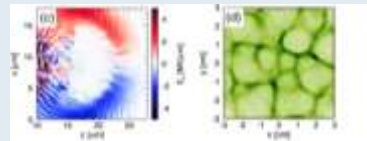
IC 2 for precision XRD

IC 1 for XRD, IXS, XES

DIPOLE-100X ns laser

Relativistic Laser-Plasmas

Electron transport,
Instabilities and filamentation,
Particle acceleration,
High EM fields

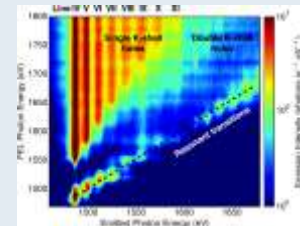


IC 1

Multi-100 TW laser

Isochoric X-ray excitation

Transport properties,
Hollow atoms, rates



IC 1 for XES, IXS, XRD
Intense X-ray pulses, SDL

Condensed Matter in Strong Magnetic Fields

Correlated systems,
magnetic order,
superconductivity



Goniometer in IA 2
split or 60 T solenoid coils

Diamond Anvil Cells

Fast dynamic piezo DAC
Pulsed laser heated DAC
Double-stage DAC



IC 2 for precision XRD
Dynamic DAC, pulsed lasers

Many more:

Strongly excited materials
QED vacuum birefringence
Self-sustained reactions

...

Today – Early science at the HED instrument

Early science at the High Energy Density instrument		<i>Chair:</i> M. Nakatsutsumi	European XFEL
13:20	Welcome, Overview of HED instrument, Early Science in 2019	U. Zastra	European XFEL
13:30	X-ray characterization for early science at HED (X-ray properties, harmonic rejection, focusing, monochromators, slits & monitors, timing tool, spectrometer)	Z. Konôpková	European XFEL
13:55	Experimental environment for early science (Interaction chambers; optical lasers, sample stage, x-ray detectors, high- and low resolution x-ray spectrometers)	M. Makita	European XFEL
14:20	Discussion / buffer		
14:30	Status report of BMBF Verbundforschung project: Split-and-Delay Line	S. Røling	WWU Münster
14:45	Status report of BMBF Verbundforschung project: Time resolved micro-diffraction of SHS reactions	B. Winkler	U Frankfurt/M.
15:00	Life as an European XFEL user (UPEX, proposal deadlines, PRP, funding, allocation periods)	S. Bertini	European XFEL User's office
15:30	Discussion / buffer		
15:45	Coffee break (foyer)		

■ Posters on balcony, tours to XHEXP possible

Today – status of HIBEF contributions

15:45	Coffee break (foyer)		
	Status of the HIBEF contributions	<i>Chair: N.N.</i>	
16:15	Welcome	T. Cowan	HIBEF
16:25	Status of HIBEF instrumentation	C. Bähtz / T. Toncian	HIBEF
17:10	Phase contrast imaging and focusing schemes	A. Schropp	HIBEF
17:30	HIBEF experiments using x-ray polarimetry	H. P. Schlenvoigt	HIBEF
17:50	Discussion / buffer		
18:30	Dinner Reception In the foyer of European XFEL headquarters (XHQ)		
20:00	HIBEF SAC-TAC meeting (Scientific and technical advisory committees, closed session)	C. Bähtz T. Toncian	HIBEF

■ Posters on balcony, tours to XHEXP possible

Time line

- Infrastructure installations completed: Feb-Mar 2018
- Lasing and beamline commissioning to start: April-May 2018
- Instrument and laser installations continue in parallel
- Thereafter: Instrument commissioning will start...
- HED: Commissioning with x-rays start in Jan 2019

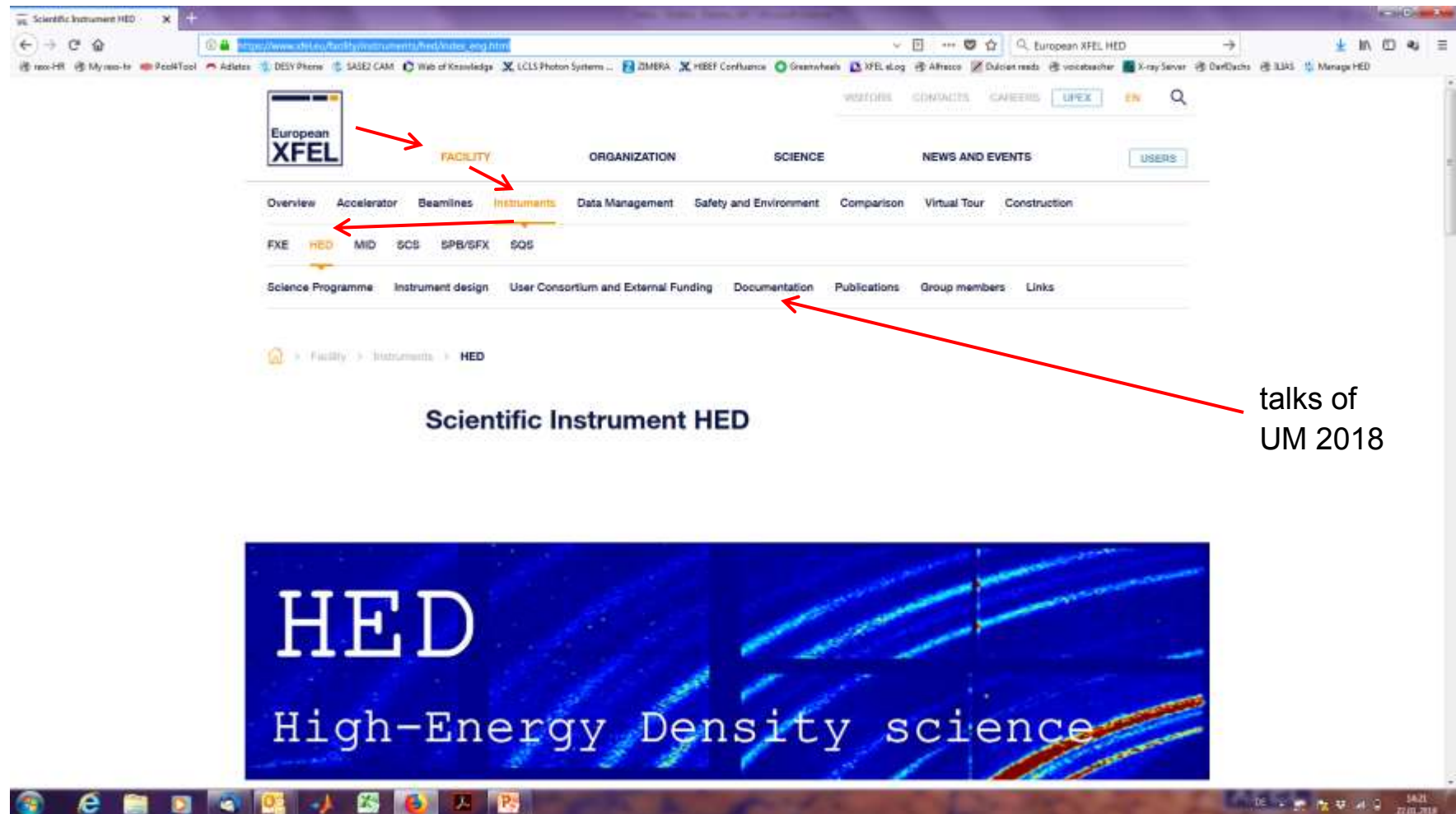
3rd call for proposals (~Nov '18 – June '19): to be published in February 2018

Early user experiments at HED in Q2 2019

- Amplitude TW laser, DAC, SDL potentially available at HED
- Pump-probe and DIPOLE laser not available for user experiments in 3rd call
- X-ray energy around 9 keV, awaiting undulator commissioning...
- 1-30 ... 300 pulses/train, MHz rate, pulse on demand

HED web site

<https://www.xfel.eu/facility/instruments/hed/>








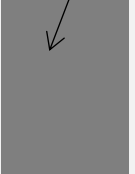
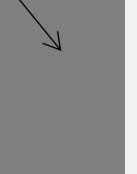



talks of
UM 2018

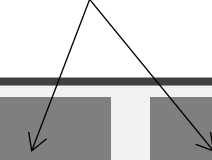
The HED group at European XFEL

Group Leader HED Scientists

Laser Group

									
Ulf Zastrau	Motoaki Nakatsutsumi	Karen Appel	Sebastian Göde	Zuzana Konôpková	Mikako Makita	Thomas Preston	N.N.	N.N.	Erik Brambrink (May 2018)






open soon



Engineers

Technicians/Mech's

Externally funded PostDocs / Ph.D.s / Guest Scientists

				
Ian Thorpe	Andreas Schmidt	Konstantin Sukharnikov	Thomas Feldmann	Eike Martens

				
Emma McBride	Wolfgang Morgenroth	Lennart Wollenweber	Nicole Biedermann	Markus Schölmerich

Volkswagen Foundation

BMBF

DFG

DFG

Coordinator HIBEF UC staff at European XFEL

									HIBEF at HZDR: Klaus Knöfel Wolfgang Seidel Jörn Dreyer, ...
Carsten Bähz	Alexander Pelka	Cornelius Strohm	Toma Toncian (HIBEF lasers)	Hauke Höppner	Monika Toncian	Dominik Möller	Samuele Di Dio Casifo	Mohamed Hassan	



The joint HED and HIBEF team at European XFEL

