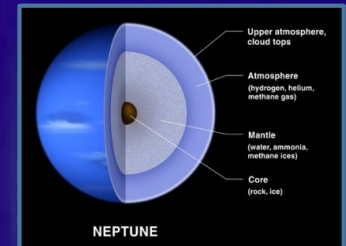
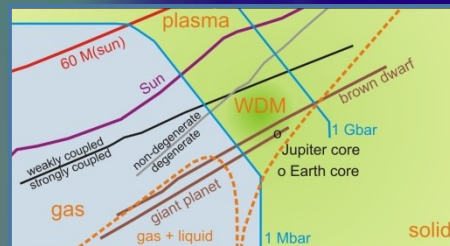


Welcome - Status of the High Energy-Density (HED) instrument and the HiBEF UC contributions

Ulf Zastra
High Energy-Density (HED) science group
European XFEL, Schenefeld, Germany

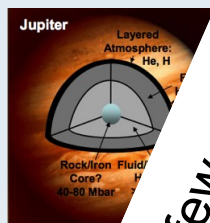
EuXFEL UM HED Satellite, Hamburg, DESY – January 22, 2019



HED – research at extremes

Laser Compression

Shock & ramp compression

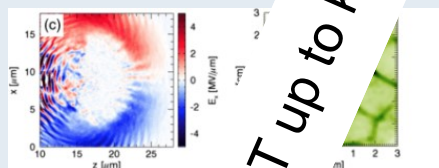


XRD, IXS, XPS

Long-pulse laser

Relativistic Laser-Plasmas

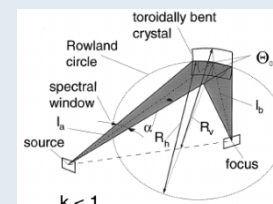
Electron transport
Instabilities and filamentation
Particle acceleration
High EM fields



Multi-100 fs laser

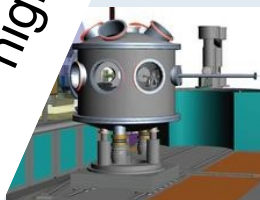
Advanced methods

Spectrometers
Advanced focusing
IXS, SAXS
Phase contrast imaging



Diamond Anvil Cells

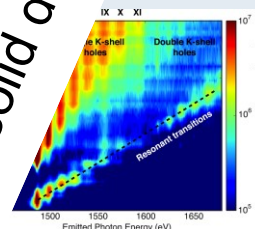
Fast compression piezo DAC
Pulsed laser heated DAC
Stage DAC



18 to 25 keV

Isochoric excitation

Transport properties,
Heat conduction, rates



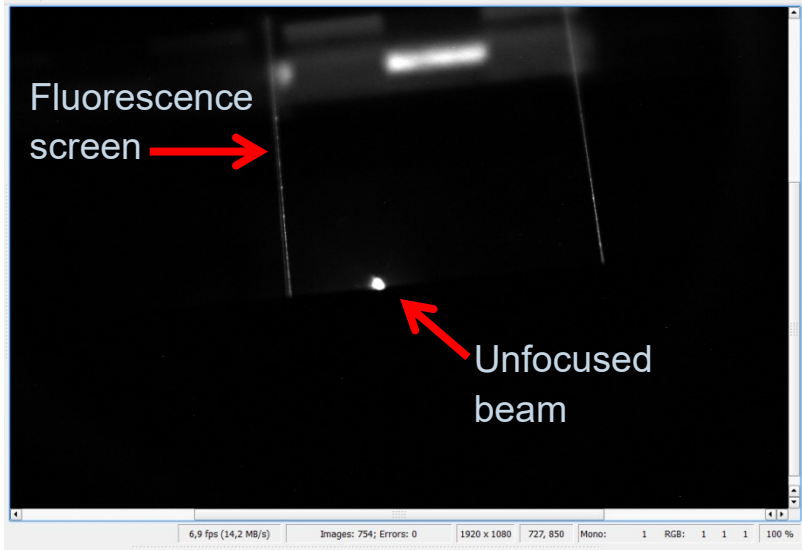
XES, IXS, XRD
Tight focusing

Further projects

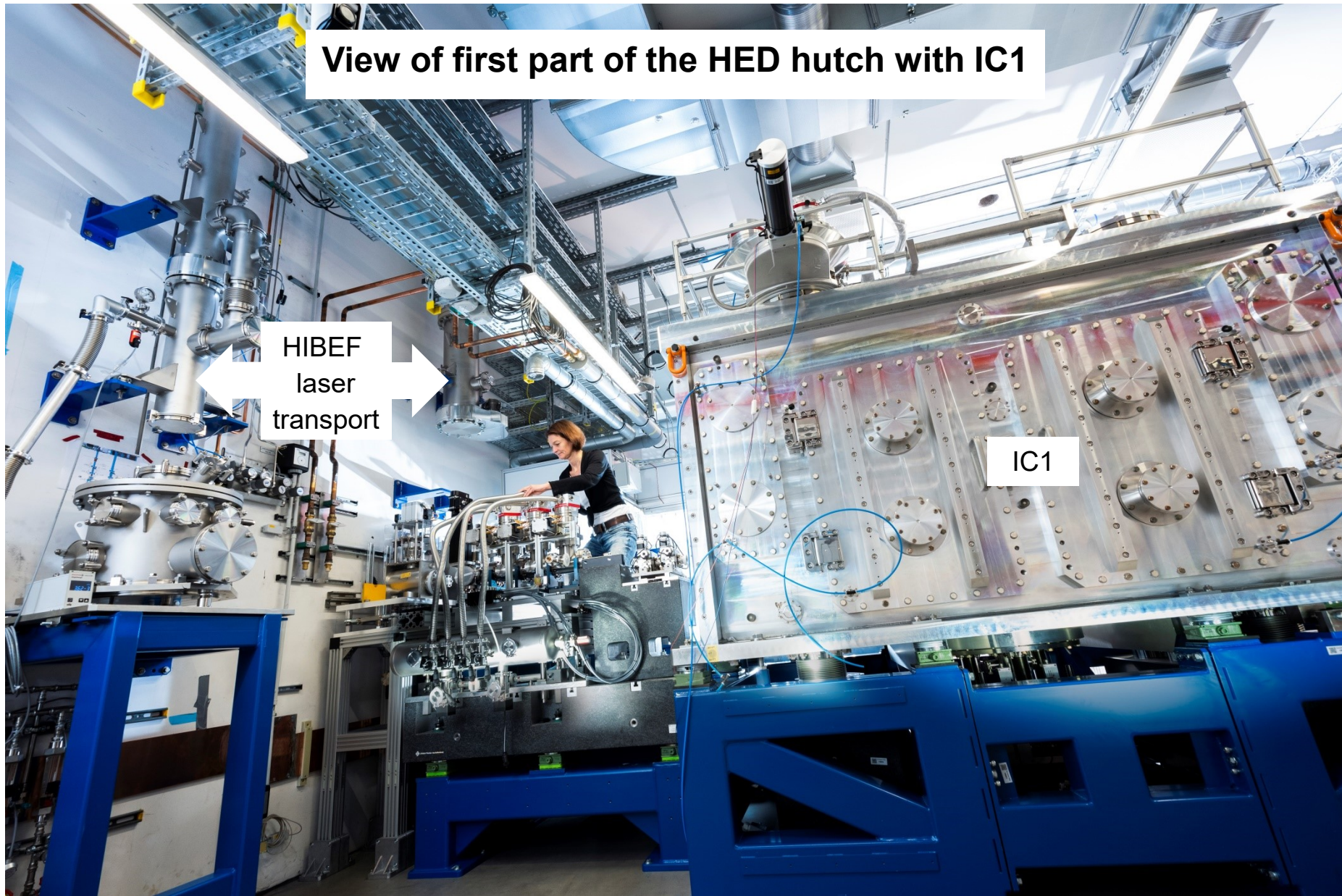
Isobaric heating
Cryogenic jet targets
High-rep solids targets
EMP-hard X-ray detectors
High-purity polarimetry

...

First x-ray beam in the HED optics hutch: Dec 5, 2018



View of first part of the HED hutch with IC1



Status of the large HiBEF lasers

Multi-100 TW laser (Amplitude)

Installation complete

SAT of laser: February 2019

laser transport to IC1: Aug 2019

Focusing, timing: until end-2019

X-ray commissioning: 1st half of 2020

Available for Users: 2nd half of 2020



DiPOLE 100-X laser (CLF, UK)

Currently still in UK

Delivery foreseen in 2019

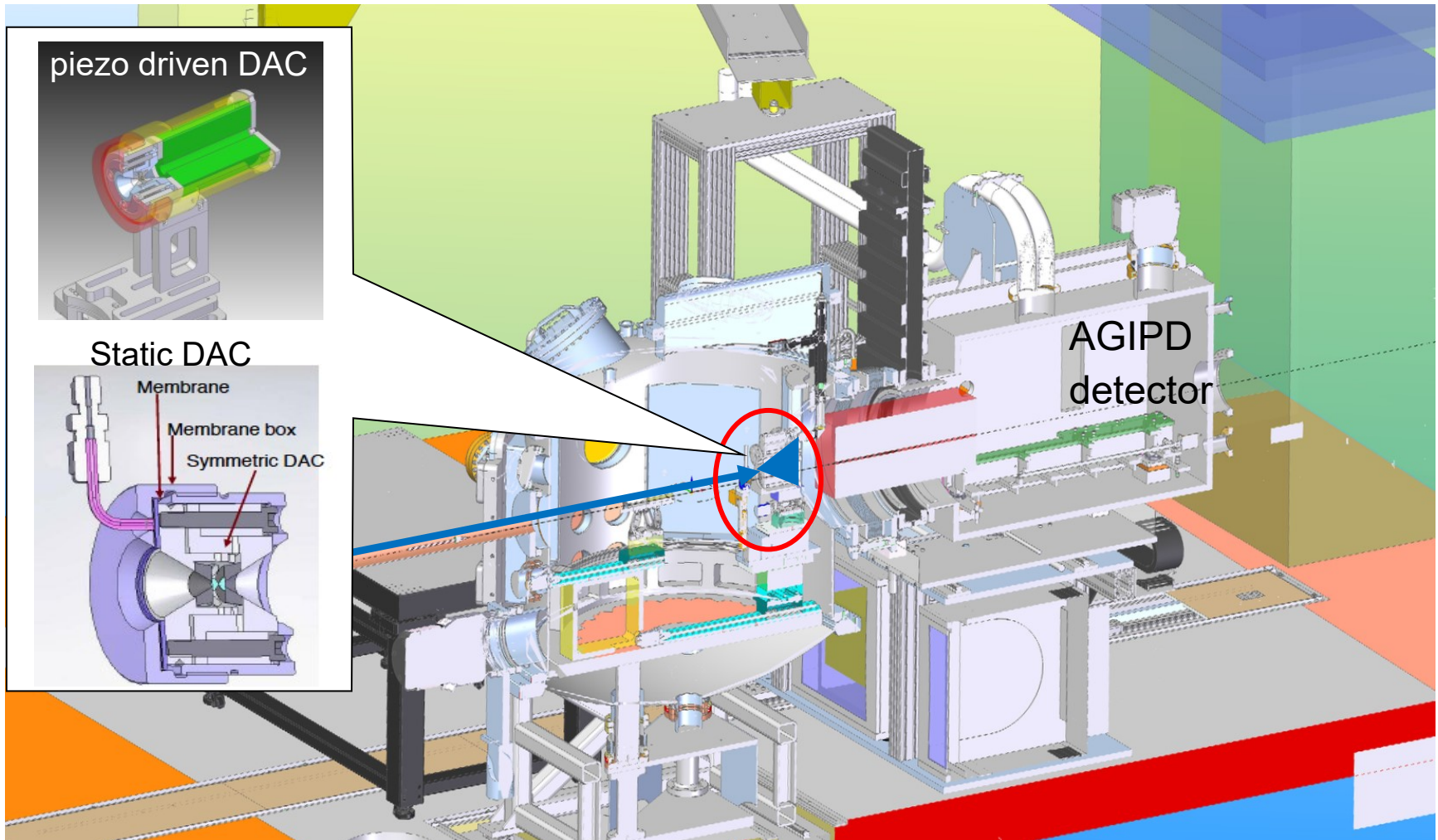
transport to IC1 & IC2: 2020

X-ray commissioning, VISAR: 2021

Available for Users: 2nd half of 2021



IC2 - First XFEL instrument capable of high pressure research using Diamond Anvil Cells (DACs)



News from HED

- We offer 4 experiments in 1.5 months in 2019-I. (MID: 5).
We have only one (!) week of commissioning with x-rays beam before the users arrive.
3 experiments are community, advanced commissioning proposals.
Please be patient and keep your expectations reasonable.
- New Call for Proposals each 6 months (~June, ~December)
- Technical feasibility of proposals evaluated by senior researchers from HED and HED/HiBEF Coordination Board (Strohm, Baehtz, Toncian, Zastrau). Followed by PRP review.
- Amount of beam time for users competing with ongoing commissioning of new devices:
We bring the drivers up slowly
- HED group is now complete
- In this year HED will face 2 user runs.

Agenda

compiled by
CB and me

HED inhouse science

prep for TW laser
experiments

X-ray heating talk
reflects possibilities
for this and also
upcoming call.

Tuesday, 22 January 2019

| time | | | |
|---|--|-----------------|----------------------|
| 13:00 | Welcome | U. Zastrau | European XFEL |
| 13:10 | Status of the HED instrument in 2019 | K. Appel | European XFEL |
| 13:35 | Experimental environment with optical lasers in 2020 | M. Nakatsutsumi | European XFEL |
| 14:00 | HED science: Experiments using x-ray heating | T. Preston | European XFEL |
| 14:30 | HED science: Surface dynamics of solids upon high-intensity laser irradiation investigated by grazing incidence X-ray scattering | L. Randolph | Univ. Siegen |
| 15:00 – 15:30 Coffee break | | | |
| 15:30 – 18:30 Status of the HIBEF UC | | | |
| 15:30 | Introduction and overview of the HIBEF project | T. Cowan | HZDR |
| 16:00 | News from Interaction Area 2 | C. Strohm | DESY |
| 16:30 | Current status of the HIBEF optical lasers | T. Toncian | HZDR |
| 17:00 | Road map to first day short-pulse laser experiments | A. Pelka | HZDR |
| 17:30 | The High Power Laser Facility at ESRF: an update on the commissioning of the 15 J Front End laser | S. Pascarelli | ESRF |
| 17:50 | Road map to first day DIPOLE experiments | J. Wark | University of Oxford |
| 18:30 Light dinner | | | |
| 20:00 Closed HIBEF SAC-TAC meeting | | | |

The joint HED and HIBEF team at European XFEL



Great thanks to

HP Liermann & team at ECB, DESY

HED group at HZDR