Online Workshop: Planning for an Inertial Fusion Research Instrument at European XFEL

16 July 2025

Online via Zoom

Time zone CET (Hamburg, DE)

The concept for IFE research at European XFEL

14:00 – 14:15   Introduction to IFE research at European XFEL   Sakura Pascarelli (EuXFEL)

- General aspects
- 3-phase concept (phase 1 HED-HiBEF, phase 2 ME/HE, phase3)
- What is currently possible in phase 1
- What will phase 2 ME enable

14:15 – 14:30   Capabilities of phase-1: IFE-relevant X-ray probing and recent results   Ulf Zastrau (EuXFEL)

- Imaging and Radiography: Absorption and phase contrast, Talbot imaging
- Small Angle X-ray scattering
- Resonant absorption by specific ionization states
- X-ray diffraction

14:30 – 14:45   Conceptual IFE-facility layout   Toma Toncian (HZDR, HiBEF)

- Floorplan
- Laser and X-ray beam transport
- Tunnel (XTD8) as experiment hutch for interaction chambers
- Laser hutch

14:45 – 15:00   Q&A about IFE phases 1 and 2

Technical specifications

15:00 – 15:15   Relevant parameters of a suitable laser system   Erik Brambrink (EuXFEL)

- Long-pulse, short pulse, wavelength and bandwidth (fundamental, SH, TH)
- Pulse energy
- Pulse duration
- Beam diameter
- Focusing optics

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15:15 – 15:30   Relevant X-ray parameters   Harald Sinn (EuXFEL)

- Concept – use of SASE2 beam, beam transport
- Photon energy choices, multilayer, coherence
- Pulse energy, Pulse duration

15:30 – 15:45   Example for instrumentation and Interaction chambers   Karen Appel (EuXFEL)

- Minimum focal spot size (NA), proposal for diamond lenses
- X-ray passing through the center of the chamber; laser at shallow angle; X-ray imaging and SAXS setup
- Additional X-ray diagnostics with potential applications in IFE research, detectors

15:45 – 16:00   Q&A session: technical details of specifications and implementation

30 min break

Discussion of the received input by participants

16:30 – 18:00   Round-table discussion /Moderated presentations

18:00 – 18:15   Summary and next steps

End of meeting