Linear accelerator will consist of 4, and in the later stage 5, Rossendorf-R-like cryomodules (CM). ItSplit in low and high energy branches begins the second OA. High energy branch guides electron beam through succeeding OMs, boosts their energy up to 187 MeV and supplies the VUV undulator chain. Low energy branch delivers 72 MV to IR undulator chain or passing by on the way towards TRX undulator. Behind undulators the beam is bent and delivered to the Inverse Compton Scattering (ICS) interaction point.

**Accelerator Layout**

VUV and IR radiation will be generated in SASE process, while TRX radiation will be emitted within superradiant regime by the bunches compressed below the wake length already along the linear chicanes. The sum of particular undulators wavelength range extends from 700 μm down to 65 nm. The shortest will be emitted as the 3rd harmonic. This limited with the saturation length or undulator harmonic. This limited with the saturation length or undulator

**Cryogenic system**

The Cryogenic system will provide cooling power generated at the cryoplant at three temperature levels:

- 40 K for the thermal shielding of the cryomodules and the cryogenic distribution system;
- 10 K for the power copper thermal interlays;
- 2 K for the SRF cavities.

Cryogenic system will be capable to dissipate 320 kW, 120 W and 560 W of heat loads at those temperatures, respectively. Apart from a dedicated liquefier, the system will accommodate a refurbished setup given by the Daresbury Laboratory and those cavities will be cooled with the same cryocooling power needed for last generation of standard size superconducting FEL cryomodules. Parallel test stand operation. Each cryomodule represents an individual cryogenic unit and is cooled in parallel. The overall heat volume equals to 200 m³ at 20 bars.

**Injector and Cryomodules**

Polfel will be furnished with All Superconducting Electron Gun which adopts sub- microampere Pb film deposited onto a head of Nb dismountable plug. 257 nm light will be used to its initialization. The gun structure will be installed at home designed and will be manufactured at NCBJ workshop and measured in THz laboratory. Further development toward experiments in magnetic fields is planned. Additionally, metamaterials research will be carried using sub-micro and THz radiation ranges respectively. VUV and IR chains will consist of 6 and 3 cryomodules, respectively. Cryomodules will be settled in the experimental hall in order to enable accompanying experiments.

**Light parameters**

VUV and IR radiation will be generated in SASE process, while TRX radiation will be emitted within superradiant regime by the bunches compressed below the wake length already along the linear chicanes. The sum of particular undulators wavelength range extends from 700 μm down to 65 nm. The shortest will be emitted as the 3rd harmonic. This limited with the saturation length or undulator harmonic. This limited with the saturation length or undulator harmonic.

**Experiments**

Multifarious instrumentation setups making use of outstandingly wide range of coherent electromagnetic radiation will be settled in the experimental hall. VUV beamline will be used for photoelectron spectroscopy including dump and probe measurements combining FEL with auxiliary UV source. Absorption, dispersion and surface modification studies will be as well enabled thanks to light beam focusing. Biological observation will use UV radiation for fluorescence spectroscopy in particular used for stopped flow technique. Biosensing studies will be applied using TRX γ-rays. Mainly time resolved spectroscopy technique will be available in THz laboratory. Further development toward experiments in magnetic fields is planned.

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