

**ID: 1891 - WEPSO64 Grating Monochromator for Soft X-ray Self-seeding the European XFEL**

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**Abstract** Self-seeding implementation in the soft X-ray wavelength range involves gratings as dispersive elements. We study a very compact self-seeding scheme with a grating monochromator originally designed at SLAC, which can be straightforwardly installed in the SASE3 undulator beamline at the European XFEL. The design is based on a toroidal VLS grating at a fixed incidence angle, and without entrance slit. It covers the spectral range from 300 eV to 1000 eV. The performance was evaluated using wave optics method vs ray tracing methods. Wave optics analysis takes into account the actual beam wavefront of the radiation from the FEL source, third order aberrations, and errors from optical elements. We show that, without exit slit, the self-seeding scheme gives the same resolving power (about 7000) as with an exit slit. Wave optics is also naturally applicable to calculations of the scheme efficiency, which include the monochromator transmittance and the effect of the mismatching between seed beam and electron beam. Simulations show that the FEL power reaches 1 TW, with a spectral density about two orders of magnitude higher than that for the SASE pulse at saturation.

**Type of Presentation** Poster

**Main Classification** Seeding FELs