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An XFELO Demonstrator Setup at the European XFEL

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An X-ray free-electron laser oscillator (XFELO) is a next generation X-ray source promising radiation with full three-dimensional coherence, nearly constant pulse to pulse stability and more than an order of magnitude higher spectral flux compared to SASE FELs. In this contribution, the concept of an R&D project for installation of an XFELO demonstrator experiment at the European XFEL facility is conceptually presented. It is composed of an X-ray cavity design in backscattering geometry of 133 m round trip length with four undulator sections of 20 m total length producing the FEL radiation. It uses cryocooled diamond crystals and employs the concept of retroreflection to reduce the sensitivity to vibrations. Start to end simulations, various possible errors of the X-ray optics as well as the impact of heat load on the diamond crystals. The estimated performance and stability derived from these simulations shall be reported and foreseen issues shall be discussed.

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