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Synchronization System Overview for the Polish Free-Electron Laser (PoFEL)

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The PoFEL is a Polish Free-Electron Laser project under construction at National Centre for Nuclear Research in Świerk. An essential requirement for the PoFEL is to assure a precise phase synchronization of LLRF and Beam Diagnostics systems operating at 1300 MHz.

The synchronization system consists of a phase synchronization system and the timing system. The phase synchronization system contains a Master Oscillator (MO) with a power amplifier, a power distribution module, and a coaxial cable distribution over the machine in the star topology. MO reference signal is amplified to a power level of about +32 dBm. The power distribution module with coaxial cables provides 20 reference signals of a minimum +10 dBm power level to LLRF, timing, and Master Laser Oscillator systems.

This paper shows the PoFEL synchronization system design overview, MO phase noise results, power level measurements at the power distribution module prototype, and the phase drift considerations.

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