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Photon diagnosis for Shanghai high repetition rate XFEL and extreme light facility (SHINE)

SHINE is China's first Hard X-ray FEL and now is under construction. This facility has an 8-GeV CW superconducting linac accelerator. Using 3 phase-I undulator lines, the SHINE aims at generating X-rays between 0.4 and 25 keV at rates up to 1MHz for 10 experimental stations. We have finished the design concepts of photon diagnosis for different diagnosis purposes, including Photon Arrival Time Monitor (PAM), THz Streaking Pulse Length Monitor (PLM), X-ray pulse Energy and Position Monitor (EPM), Beam Position and Intensity Monitor (BPIM), Beam Loss Monitor (BLM), Soft X-ray Energy Resolution Measurement (SERM), Photoelectron Spectrometer (PES), Single Pulse Spectrometer (SPS), Hard X-ray Energy Resolution Measurement (HERM), Wavefront Sensor (WFS) and X-ray Imager (IMAGER). The major parameters as follows: the PAM sensitivity is better than 15 fs (rms), the PLM sensitivity is better than 20 fs (rms) when the pulse jitter is less than 40 fs (rms), the pulse energy and position measurement precisions for the EPM both approaches are better than 10%, the BPIM sensitivity is better than the 10% of beam size. The BLM response time is better than 10 us. The energy resolving power of SERM is better than 10^{-4} , the SPS is 0.1 eV and the HERM is 10^{-4} ($\Delta E/E$), respectively. The wavefront accuracy sensitivity for WFS is better than $\lambda/50$ at the wavelength of 0.177nm, and the sensitivity is better than $\lambda/50$ at the wavelengths of 0.6nm and 3nm.

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yes

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