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Shanghai Laser Electron Gamma Source in Shanghai Synchrotron Radiation Facility

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Quasi-monochromatic gamma-ray beams are produced in the laser Compton slant-scattering at the Shanghai Laser Electron Gamma Source (SLEGS) of the Shanghai Synchrotron Radiation Facility (SSRF) [1,2]. The laser Compton slant-scattering was pioneered to produce X rays as early as in 1996 [3] and has more recently been used to produce gamma rays in the MeV region at UVSOR [4]. The slant-scattering makes the usage of energy-tunable gamma-ray beams compatible with that of the synchrotron radiation in synchrotron radiation facilities operated at a fixed electron beam energy worldwide.

The SLEGS is designed to produce gamma rays in the energy range of 0.66 – 21.7 MeV with a flux of $1e+5 - 1e+7$ photons/s [2]. We have conducted test runs of the slant-scattering in the commissioning of the beamline to confirm the designed energy tunability and flux [5]. After a more careful measurement and data processing of the γ ray energy spectra in 2023, the newest experiment results of the quality of gamma-ray beams in flux and bandwidth is obtained and will be present in this report. The gamma-ray flux is in a range of $1e+4 - 3e+5$ cps in $60^\circ - 120^\circ$ and the energy-resolution is in the range of 6 - 18%.

Footnotes

- [1] H.H. Xu et al., submitted to Nuclear Inst. and Methods, Physics Research A.
- [2] Z.R. Hao et al., Nuclear Inst. and Methods, Physics Research A 1013, 165638 (2021).
- [3] R.W. Schoenlein et al., Science 274, 236-238 (1996).
- [4] Y. Taira et al., Nuclear Inst. Methods, Phys. Res. A 652, 696-700 (2011)
- [5] H.W. Wang, et al., Nuclear Science and Techniques 33(2022)

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