

A Portable Hard X Ray Measurement System for the EXL-50 Spherical Tokamak

Yubao Zhu, Lingling Dai, Shikui Cheng, Fang Ma, and Minsheng Liu

- 1) *Hebei Key Laboratory of Compact Fusion, Langfang 065001, China*
- 2) *ENN Science and Technology Development Co., Ltd., Langfang 065001, China*
E-mail : zhuyubaoa@enn.cn

A portable hard X ray measurement system has been designed and implemented on the newly constructed medium-sized ENN XuanLong-50 spherical tokamak. The system includes two identical units. Each unit is comprised of three main parts: 1) detector assembly, for maximum 6.62 MeV X ray detection; 2) stainless steel cylindrical container filled with 5 cm thick lead, for collimation and shielding; and 3) motorized supporting stage, for detector assembly and collimator mounting, with three dimensional positioning capability. The detector assembly consists 2" NaI(Tl) detector, photomultiplier, built-in high voltage power supply, preamplifier, low voltage DC power adaptor and cylinder housing. X ray intensity signal is transferred through shielded co-axial cable to photoelectric isolator before fed to data acquisition system, while individual pulse is registered by multi-channel analyser for spectral identification. The two portable systems have been commissioned in-time as a diagnostic forerunner and provide flexible measurement in a wide range of vertical, radial, and tangential positions. Vertical, radial and tangential angle scanning between shots makes this system powerful, complementing the later installed immobile tangential hard X ray diagnostic arrays [1]. Preliminary results from the typical EXL-50 experimental scenarios will be presented.

References

- [1] S. K. Cheng, Y. B. Zhu, Z. Y. Chen, Y. X. Li, R. H. Bai, B. Chen, X. L. Huang, L. L. Dai, and M. S. Liu. *Rev. Sci. Instrum.* **92**, 043513 (2021).