

# Preliminary design of Transverse deflecting structure systems for Shenzhen Superconducting Soft-X-ray Free Electron Laser

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Transverse Deflecting Structures (TDS) are commonly used in Free Electron Laser (FEL) facilities for the measurement of longitudinal information of electron beam, including bunch length, temporal distribution, slice emittance, etc. Shenzhen Superconducting Soft-X-ray Free Electron Laser (S3FEL) is a high-repetition-rate FEL recently proposed for scientific research and applications. In S3FEL, TDSs that work at S-band (2997.222 MHz) and X-band (11988.889 MHz) will be utilized for the diagnosis and analysis of longitudinal phase space of electron bunches along the beamline. In this manuscript, we present the preliminary design of both S-band and X-band TDS systems of S3FEL, including system layout, deflecting structures, pulse compressors, RF distribution networks, etc. Additionally, we introduce a new parallel-coupled TDS cavity with variable polarization for multi-dimensional phase space diagnostics.

## Footnotes

## Funding Agency

**Primary author:** LI, Zongbin (Institute of Advanced Science Facilities)

**Co-authors:** SHAO, Jiahang (Institute of Advanced Science Facilities); QIZHANG, Huang (Institute of Advanced Science Facilities); YANG, Jia (Dalian Institute of Chemical Physics); ZHANG, Weiqing (Institute of Advanced Science Facilities)

**Presenter:** LI, Zongbin (Institute of Advanced Science Facilities)

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