



Contribution ID: 303 Contribution code: MOAI16

Type: **Invited Oral Presentation**

## **Shenzhen Superconducting Soft X-ray Free Electron Laser(S3FEL)**

*Monday 19 August 2024 12:30 (10 minutes)*

Since FLASH first lasing at 2005, Free Electron Laser (FEL) has been proved a unique and essential EUV and X-ray source for basic research. However FEL could not serve as many users as Synchrotron Radiation source limited by total user beam time due to linear accelerator (LINAC) instead of storage ring. High repetition rate electron LINAC using superconducting cavity could increase the operation efficiency and benefit more users, for example FLASH and EXFEL at DESY. With better quality of superconducting cavity X ray FEL facilities based on continuous wave operation of superconducting cavity have been launched, such as LCLS II at SLAC and SHINE at ShanghaiTech University in hard X-ray. High repetition-rate X-ray FELs, with combination of high average power, ultrashort pulses and coherence, are revolutionary observational tools that will improve our understanding in diverse fields of science and technology. S3FEL is proposed in the city of Shenzhen and approved in 2023. Its superconducting LINAC consists of 25 sets of TESLA type 1.3 GHz module and 2 sets of 3.9 GHz module to produce evenly distributed electron pulses with 2.5 GeV at the maximum repetition rates of 1MHz. At the first stage three undulator lines with different FEL schemes will be built to deliver bright soft X-ray photon pulse from 40 to 1200 eV to users, which is complementary to SHINE project.

### **Footnotes**

### **Funding Agency**

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**Session Classification:** First Lasing, New FEL projects and Facility Reports

**Track Classification:** New FEL projects and Facility Reports