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## Fast wire scanner design for Shenzhen Superconducting Soft X-Ray FEL

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In the Shenzhen Superconducting Soft X-Ray FEL project (S3FEL), it is planned to use a fast wire scanner for online measurement of beam transverse dimensions. The repetition frequency of the beam pulse is 1 MHz, the charge of a single bundle is about 100 pC. According to the different installation positions of the fast wire scanner, the bundle length will vary between 5 ps and 50 fs. The scanning wire adopts tungsten filament with a diameter less than 30  $\mu\text{m}$ , and the motor adopts a linear motor with a designed motion speed of 1 m/s. The position feedback would use two grating rulers, one of which is an absolute grating ruler connected to a PLC controller for motion controlment, and the other incremental grating ruler can directly output TTL signals to trigger the signal acquisition electronics. The grating ruler has a resolution of 50 ns and an overall structural accuracy better than 10  $\mu\text{m}$ . Using the wire position of the incremental grating ruler as the x-axis and the plastic scintillator combined with a photomultiplier tube to detect the beam loss signal as the y-axis, the transverse distribution of the beam is reconstructed.

### Footnotes

### Funding Agency

### I have read and accept the Privacy Policy Statement

Yes

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