Contribution ID: **273** Type: **Oral report**

The Study of High Counting Rate and High Precision Electromagnetic Calorimeter for STCF

Friday, 16 August 2024 09:00 (15 minutes)

The Super Tau-Charm Facility (STCF) is the next generation high luminosity e^+e^- collider focusing on the tau-charm physics. STCF will achieve a luminosity of over $0.5 \times 10^{35} cm^{-2} s^{-1}$ at 4 GeV, resulting in a high event rate and a high beam background for the detector system. The background count rate of over 1 MHz per module places new demands on the electromagnetic calorimeter (EMC): maintaining good energy and position resolution under severe pileup conditions. Meanwhile, the development of event timing and particle identification capability is also an important aspect of calorimeter R&D, where a time resolution of better than hundreds of picoseconds is expected.

The STCF EMC is based on a fast pure CsI crystal and is read out by avalanche photodiodes (APD). By considering the effect of crystal and electronics response, as well as the pileup condition, a complete chain of simulation and reconstruction is implemented in the Offline Software of Super Tau-Charm Facility (OSCAR). The architecture and module geometry of EMC are designed by optimizing the physical performance under OSCAR. Based on the module design, a novel wavelength shifter (WLS)-enhanced prototype is fabricated, which features fast time response and good signal-to-noise ratio at a reasonable cost. The comprehensive test results on the prototype, especially on the radiation hardness of the prototype, the uniformity of the light collection and the cosmic ray-timing performance of the prototype, are also presented.

Primary author: 王, 博 (University of Science and Technology of China)

Presenter: 王, 博 (University of Science and Technology of China)

Session Classification: 分会场五

Track Classification: 粒子物理实验技术