Contribution ID: **262** Type: **Oral Presentations**

Design and Prototype Testing of the Homogeneous Crystal Calorimeter for STCF

Tuesday, 5 September 2023 18:00 (20 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.

This talk summarizes the simulation and optimization of the calorimeter system, the prototype fabrication and the test results on the prototype are summarized. 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 authors: Mr SONG, Yong (University of Science and Technology of China); JIA, Zekun

Presenter: Mr SONG, Yong (University of Science and Technology of China)

Session Classification: C5