

A Muon Detector Design for STCF Based on Mixed Structure of RPC and Plastic Scintillator

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Abstract: The STCF is designed as one of the viable successor of the BEPC II, with 100 times higher luminosity promotion. The increased luminosity benefits the τ -Charm physical research, however asking for an advanced high-performance detector system. To get an optimal performance, a new MUC design with 3 layers of bakelite-RPC and 7 layers of scintillator detector is proposed. This design makes a compromise between particle detection, background tolerance and cost. The Geant4 simulations indicate that, under the background interference predicted for STCF, the muon detection efficiency can be higher than 95%@pion fake rate=0.03 with momentum above 0.8 GeV/c, and the detection efficiency for the neutron that cannot be detected by ECAL could be above 95%@fake rate=0.03. These results illustrate that this new MUC design can meet the demand of STCF, achieving a proper performance in the high luminosity electron-positron collider detector systems.

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