



Contribution ID: 41

Type: **Recorded Presentation**

Development of compact TPC for future Super Charm-Tau Factory detector

Currently, the Budker INP together with Novosibirsk State University are developing the detector for the future Super Charm-Tau Factory (SCTF) to be built in Russia. SCTF is an electron-positron collider with 3.5 GeV per beam and a luminosity of $10^{35} \text{ cm}^{-2} \cdot \text{s}^{-1}$. SCTF will be instrumented with a general-purpose detector (SCTD). The innermost part of the SCTD will contain the inner tracker (IT). The main task of the IT is an extension of the lever arm of the central drift chamber, efficient detection of soft hadrons and reconstruction of secondary vertices of particles that decay in the IT volume (like K_s , Λ_0 , etc). The most attractive candidate for the IT is the compact time-projection chamber (CTPC). It can be made with a very thin inner wall allowing to reduce significantly the threshold for soft hadrons. In addition, CTPC can provide the dE/dx information for the discrimination of electrons from hadrons. We present recent results on the simulation of spatial resolution and drift time of CTPC as well as space charge effects induced by positive ions. The construction of the prototype of the CTPC is ongoing. The first results from the IT prototype will be reported at the Conference.

Primary experiment

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Track Classification: Gaseous Detectors