

Atsuya Niki "Indirect search for the WIMP at $\mu^+\mu^+$ collider"

Wednesday, 8 November 2023 17:00 (25 minutes)

Weakly interacting massive particles (WIMPs) with electroweak charges, such as the wino and the Higgsino, are one of the most natural candidates of the dark matter in the universe. In this paper, we study the search for WIMPs at future multi-TeV $\mu^+\mu^+$ colliders. We examine the direct production search of WIMPs through the mono-muon channel and the indirect search through the quantum correction on the elastic $\mu^+\mu^+ M\{\text{o}\}$ ller scattering. We find that the indirect search has an advantage over the direct search with sufficient luminosities, $\mathcal{O}(\text{ab}^{-1})$, and low systematic uncertainties, *less* 0.3 %, because the mass dependence of the indirect search is weaker than the direct production search. If the initial muon beams are polarized, the advantage becomes more evident. In particular, we show that the thermal mass target for the wino and the higgsino is detectable by the indirect search method for $\sqrt{s} = 6$ TeV and 2 TeV, respectively, with 80 % polarized beam and 0.1 % accuracy.

Session Classification: Short talks