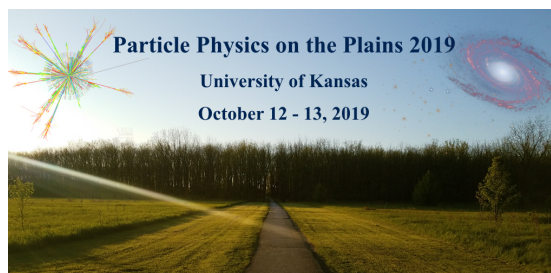


Particle Physics on the Plains 2019



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Probing the top Yukawa coupling at the LHC via associated production of single top and Higgs

Saturday 12 October 2019 17:10 (20 minutes)

The conjoined production at the LHC of single top and Higgs boson via t-channel weak boson exchange is ideal to probe the top-quark Yukawa coupling, due to a delicate cancellation between the amplitudes with the htt and the hWW couplings. We find that the top quark is produced with 100% polarization in the leading order, and its quantum state is determined by the spin-vector direction in the t-quark rest frame. We relate the spin direction to the four-momenta of the top, Higgs and a jet in the helicity amplitude framework. We identify a polarization asymmetry that is sensitive to CP violation, even after partial integration over the forward jet momentum. This CP violating asymmetry may be observed at the LHC via the component of the top-quark polarization that is perpendicular to the th scattering plane.

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