

## Dark matter characterization at high energy $e^+e^-$ colliders

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Once any new particle indicating new physics beyond the SM is discovered at colliders, one of the first crucial steps is to experimentally determine its spin as well as its mass. The future  $e^+e^-$  colliders provide perfect tools for studying such properties as long as kinematically accessible, because of the well-constrained event topology and the very clean experimental environment. In this talk, I will demonstrate the strong physics potential of future  $e^+e^-$  colliders in mass and spin determination for invisible particles through single-photon processes and antler-topology processes. I will discuss how a set of observables can be designed for determining the spins and chiral structures of the new particles in a rather model-independent way. By exploiting energy- and angular-dependent observables with the help of polarized beams, one can unambiguously determine the spins of invisible particles.

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