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Model-independent WIMP Characterisation at the ILC

We investigate the prospects for detecting and measuring the parameters of WIMP dark matter in a model-independent way at the International Linear Collider. The signal under study is direct WIMP pair production with associated initial state radiation e+e− -> chi chi gamma. The analysis accounts for the beam energy spectrum of the ILC and the dominant machine-induced backgrounds. The influence of the detector parameters are incorporated by full simulation and event reconstruction within the framework of the ILD detector concept. We show that, by using polarised beams, the detection potential is significantly increased by the reduction of the dominant SM background of radiative neutrino production e+e− -> nu nu gamma. The dominant sources of systematic uncertainty are the precision of the polarisation measurement and the shape of the beam energy spectrum. With an integrated luminosity of 500 fb-1 the helicity structure of the interaction involved can be inferred, and the masses and cross sections can be measured with a relative accuracy on the order of 1%.

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