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A New Method for the Spin Determination of Dark Matter

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We will describe the construction of a new kinematical variable that can fully reconstruct the absolute value and partially reconstruct the sign of the angular distribution in the center of momentum system of a decaying mother particle. This will then be used to illustrate a method by which the spin of a pair produced dark matter candidate at the International Linear Collider (ILC) can be tested. We show that for a small intermediate width, perfect agreement between the true angular distribution and our method is found in the absence of initial state radiation. In the presence of initial state radiation, the effects are small and still permit one to distinguish between the various spin combinations in some cases.

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