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Reconstructing particle masses from pairs of decay chains

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A method is proposed for determining the masses of the new particles in collider events containing a pair of effectively identical decay chains. By first determining the upper edge of the dilepton invariant mass spectrum, we reduce the problem to a curve for each event in the 3-dimensional space of mass-squared differences. A statistical approach is applied to take account of mismeasurement of jet and missing momenta. The method is easily visualized and rather robust against combinatorial ambiguities and finite detector resolution. It can be successful even for small event samples, since it makes full use of the kinematical information from every event.

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