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Caustics for High-Precision Mass Measurement and its application to W & Higgs[1] WON SANG CHO, KONSTANTIN MATCHEV, University of Florida — We introduce a mixed events variable called "Mass Caustics" $\tilde{M}$ for measuring the masses of resonant particles. By its construction, the mass caustics $\tilde{M}$ has a super-sharp singular peak structure which generalizes the ordinary invariant and transverse masses while preserving the Lorentz boost invariance of resonance mass peak positions. In result, the information on the mass peak position is statistically amplified in compared to the variables at present, and high precision mass measurement can be achieved. Such precision of mass spectrometry opens the door to numerous applications in the fields dealing with relativistic particles, in particular when parts of the relic particles are invisible with limited event statistics. We demonstrate this technique for mass measurement of the W and Higgs bosons which decay with missing neutrino.

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