

Abstract Submitted  
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**Position reconstruction with the XENON100 TPC based on least-squares fitting**<sup>1</sup> YUAN MEI, Rice University, XENON100 COLLABORATION  
— The determination of interaction locations is a key feature of dual-phase Time Projection Chambers (TPCs) for Dark Matter search. XENON100 is a liquid/gas xenon TPC, searching for Weakly Interacting Massive Particles at the Gran Sasso National Laboratory. While the z-coordinate of an event is determined by the drift time of electrons with regard to a scintillation light trigger, the x/y position is reconstructed using the distribution of proportional light on the top PMT array. Previously for the relatively small TPC of Xenon10, an exhaustive search procedure was developed to perform the least-squares fitting. However, for the larger TPC of current detector Xenon100, the very procedure becomes unpractically slow. In this work, we present the development of a new procedure which searches the minimum of  $\chi^2$  between real signal and simulated data efficiently. The procedure performed on a Monte Carlo generated data-set yields millimeter resolution of x-y position. The performance on real signals employing proper uncertainties from various sources is also discussed.

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