TPC tracking software for NIFFTE: the Neutron Induced Fission Fragment Tracking Experiment

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Ever since the scientific community started analyzing and filtering data using computers, programming has become a crucial part for the success of many projects. The NIFFTE Collaboration, which is building a Time Projection Chamber (TPC) to study neutron-induced fission of the major actinides, naturally requires a comprehensive software framework to analyze the high volume of data it will collect. Following the traditional TPC reconstruction model, we have written a set of offline analysis algorithms to reconstruct tracks left by the fission fragments in the TPC and determine their (A,Z). We accomplish this by organizing the raw TPC voxel data into 2 dimensional planes, performing cluster and hit-finding within those planes and then connecting the hits to create 3-D tracks. Finally, track fitting and error correction are performed and the fragment A,Z are determined from the distribution of specific ionization along the track. Since one of the goals of this project is to create a re-usable library of TPC reconstruction code that can be adapted to other TPC projects, the software uses open source tools and is built as an object-oriented package in C++. This poster will present the current status of the TPC reconstruction algorithms and discuss the motivations behind our specific programming choices.

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