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Track Reconstruction Techniques for the NIFFTE Time Projection Chamber SARVAGYA SHARMA, Abilene Christian University — The Time Projection Chamber (TPC), being constructed by the NIFFTE (Neutron Induced Fission Fragment Tracking Experiment) collaboration will be used for high-precision fission cross-section measurements. These measurements will aid in the design of future generation nuclear power plants. The track reconstruction effort has employed various machine-based image processing algorithms, some of which are borrowed from existing high-energy physics experiments. One of the methods investigated, the Hough Transform is a brute force attempt at finding tracks that isolates features in the TPC space by populating histograms. The dimensions of these histograms represent the unknown track parameters. The second, Binary Space Partitioning (BSP), recursively divides the TPC volume until all tracks are segregated. To determine track fit parameters, an iterative Kalman Filter has been implemented that accounts for multiple scattering and kinks in the track. The final tracks obtained from the reconstruction routines are traced back to the origin for vertex reconstruction. Comparing simulated and reconstructed tracks have shown the validity of these track reconstruction methods. This poster shall illustrate these techniques intended for intelligent track finding and track fitting.

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