

## Fast 3D track reconstruction for antiproton annihilation analysis using GPUs

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Fast 4pi solid angle particle track recognition has been a challenge in particle physics for a long time, especially in using nuclear emulsion detectors. In particular, the data rate from emulsion detectors, i.e. from a scanning microscope, is about 10-100 TB/day. Real-time 3D volume processing and track reconstruction of such a quantity of data without limiting the angular acceptance need a large amount of computation, in which the GPU technology plays an essential role. In order to reconstruct annihilations of antiprotons, a fast 4pi solid angle particle track reconstruction based on GPU technology combined with a multithread programming has been developed. By employing 3 state-of-the-art GPUs with a multithread programming, a 60 times faster processing, at least, of 3D emulsion detector data has been achieved with an excellent tracking performance in comparison with a single-thread CPU processing. This tracking framework will be used in a wide range of applications like analyses of antiproton annihilations and neutron dosimetry.

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