

New Opportunities for the Time Projection Chamber in its Fourth Decade

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Now in its fourth decade, the Time Projection Chamber (TPC) idea continues to find new and novel applications in nuclear and particle physics, rare longevity in the arsenal of experimental techniques. I examine some of the recent implementations as exemplars of the scientific aspirations, with focus on a bizarre idea to exploit single molecule fluorescent imaging as a means to identify the birth of the barium daughter in double-beta decays of ^{136}Xe . Efficient 'tagging' of the barium daughter would eliminate essentially all backgrounds due to radioactivity, opening a path to the realization of a true ton-scale 'Discovery Class' experiment based on a modular high-pressure xenon gas TPC concept.

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