



Contribution ID: 7

Type: **Oral**

Optical TPC track reconstruction - behind the scenes

Monday, 25 October 2021 14:45 (20 minutes)

The Optical Time Projection Chamber detector (OTPC) constructed at the University of Warsaw has been successfully used in recent years to study rare radioactive decays, like two proton radioactivity or beta-delayed multi-particle emission. One of the main advantages of the OTPC detector is a full 3D reconstruction of events - one can not only determine energies of individual particles, but also get directions and angles of particle tracks. Angular distribution of 2p decays proved to be an important probe for developing theoretical models of nuclear structure and for the understanding the mechanism of the decay itself.

At the core of the OTPC data analysis lies the track reconstruction algorithm - a procedure for finding energy and direction of a particle track. While the reconstruction is relatively straightforward for single-particle events, decays involving two or more particles pose more of a challenge.

In context of the recent OTPC experiment involving 2p radioactivity, the reconstruction algorithm has been revised. The author will present the reconstruction procedure step by step, discuss its advantages and drawbacks as well as show results for some simulated and real life events.

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Session Classification: Session 2