

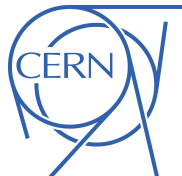
Identification of Low Pt Electrons In the TPC Using The Circle Hough Transform

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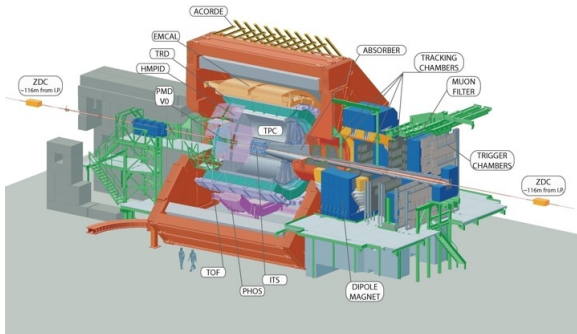
High Level Trigger Group, ALICE

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The ALICE DETECTOR

- The ALICE detector is a heavy ion collider located at point 2 of the Large Hadron Collider in France.



- Its main objective is to study Quark Gluon Plasma.

The Time Projection Chamber (TPC)

- The TPC is the largest component of the ALICE detector.
- Charged particles ionize the neon gas in the TPC and the emerging electrons are drifted towards read out.
- Some electrons from the ionization process acquire enough energy to leave a visible track on their own, forming a helical path which appears circular in the transverse plane.
- This tends to be noisy as it adds additional data volume to the event data and could be discarded in the future.

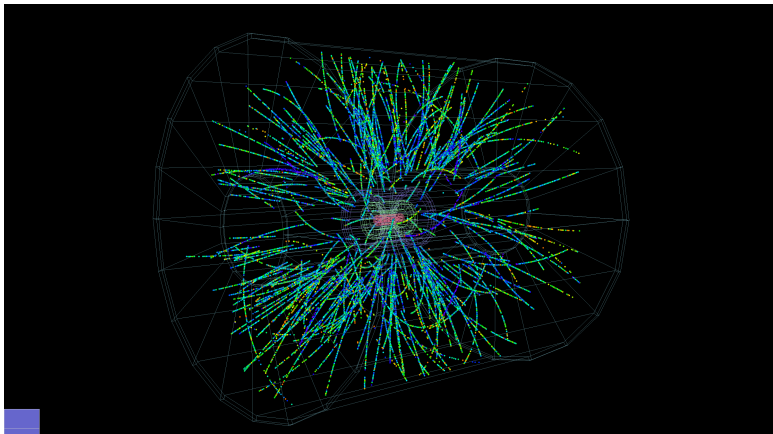


Figure: Clean tracks

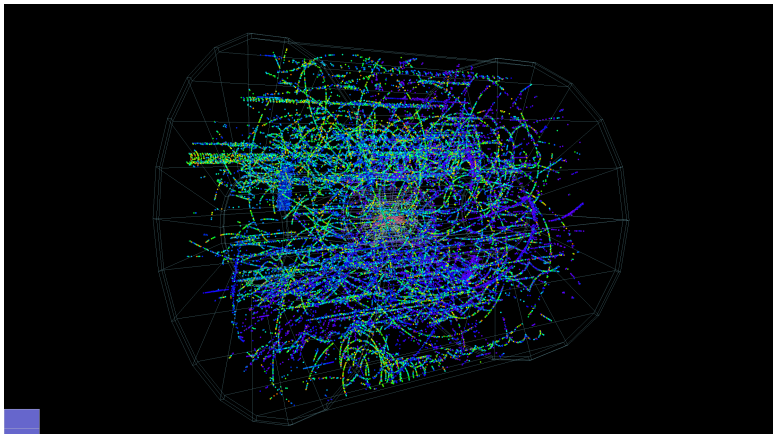


Figure: Tracks with noise

TPC Track Simulation

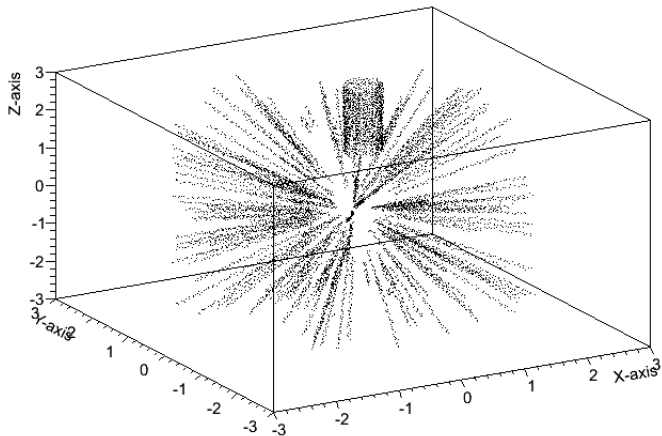


Figure: 3-D View

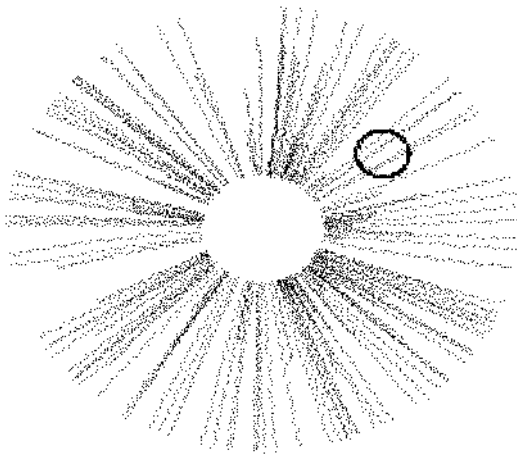
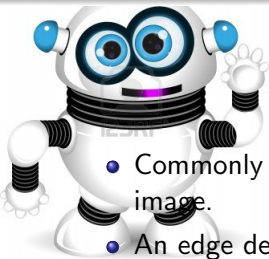
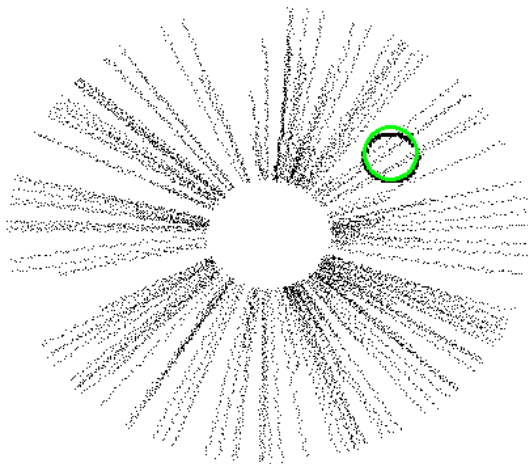


Figure: Transverse View

The Circle Hough Transform



- Commonly used in computer vision to identify circles in an image.
- An edge detector is first applied to the image to detect the edges. Thereafter, for every pixel at each point (x,y) on the detected edges, the circle Hough transform algorithm determines if there's enough evidence for a circle.
- In this study, the circle Hough Transform was applied to the simulated data.



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array([[[[302., 120., 20.39607811]]]])
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(1)

- This study showed that the paths taken by noisy electrons in the TPC can be identified.
- The algorithm used needs to be improved in further studies in order to give better and precise results.
- This method would be implemented in a few years time if it proves to work effectively well.



THANK YOU