

SMARTHEP

REAL-TIME ANALYSIS FOR
SCIENCE AND INDUSTRY

ESR10: Real-time calibration of ALICE Time Projection Chamber and ML traffic predictions

Joachim Carlo Kristian Hansen
joachim.hansen@cern.ch



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Background Information

- Joachim Carlo Kristian Hansen
- Birthday: 10th May 1993
- Origin: Bornholm, Denmark
- PhD student at Lund University, Sweden since August 2022
- ALICE experiment

- Main supervisor: Alice Ohlson

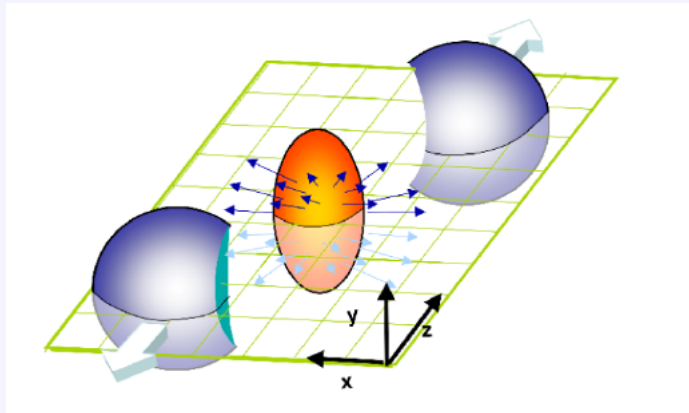
Experience:

- Bachelor's Degree in Quantum Physics, 2015-2018, Niels Bohr Institute
- Master's Degree in Experimental High Energy Physics 2018-2020, Niels Bohr Institute
- Worked at Danish Technological Institute in R&D with Computer Vision and Deep Learning, 2021-2022

Current Work

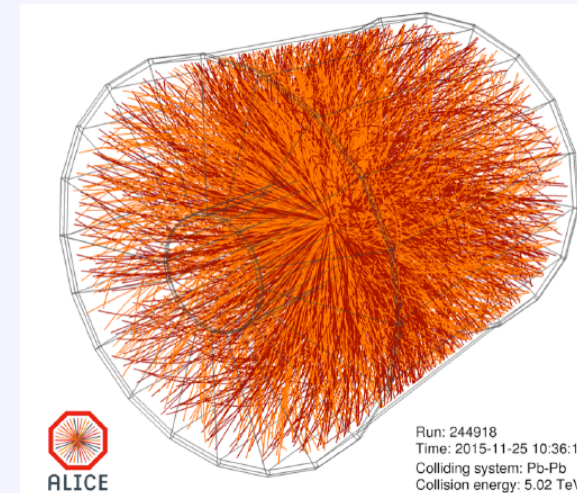
Currently working on two separate projects:

- Anisotropic Flow Analysis



<http://dx.doi.org/10.1088/1751-8113/42/21/214003>

- Track Calibration in the Time Projection Chamber



SMARTHEP Anisotropic Flow

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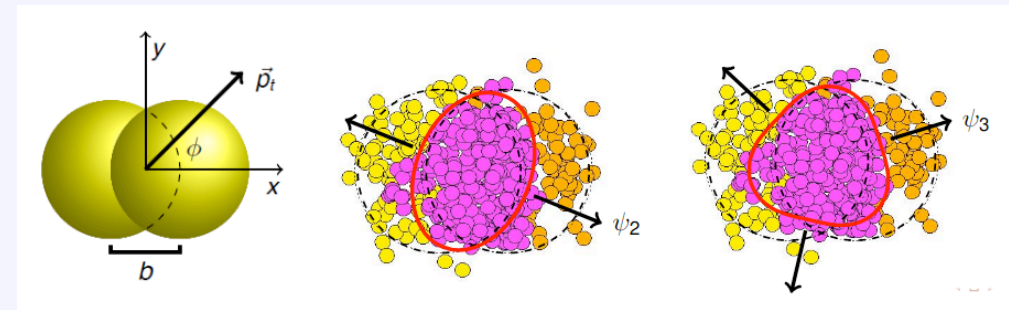
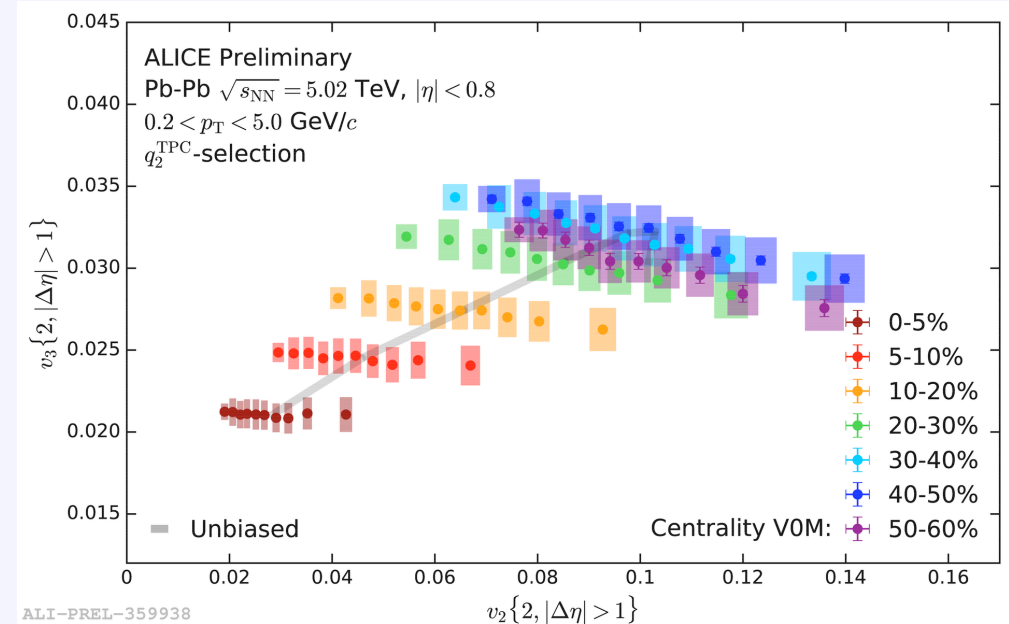
Continued and updated analysis from my Master's project

Investigating anisotropic flow using Event Shape Engineering, a technique that allows one to explore the relationship between different order harmonics (flow coefficients) within the same centrality regions

More specifically it will help us understand collectivity and constrain key transport coefficients of the Quark Gluon Plasma

Aiming for publication of the (almost) finished results this year

- Running Analysis on 2018 data combining statistics with 2015
 - Includes running detector corrections etc
- Exploring smaller systems in: Xe—Xe collisions

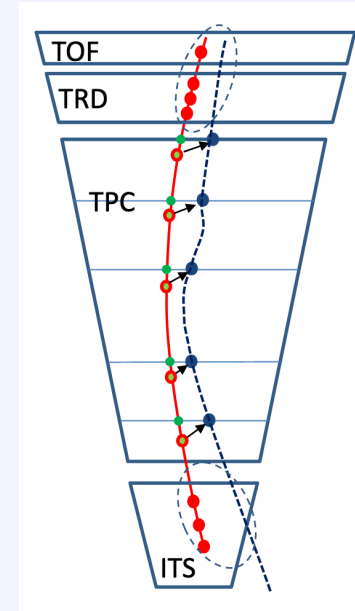


1205.0579 [hep-ph].

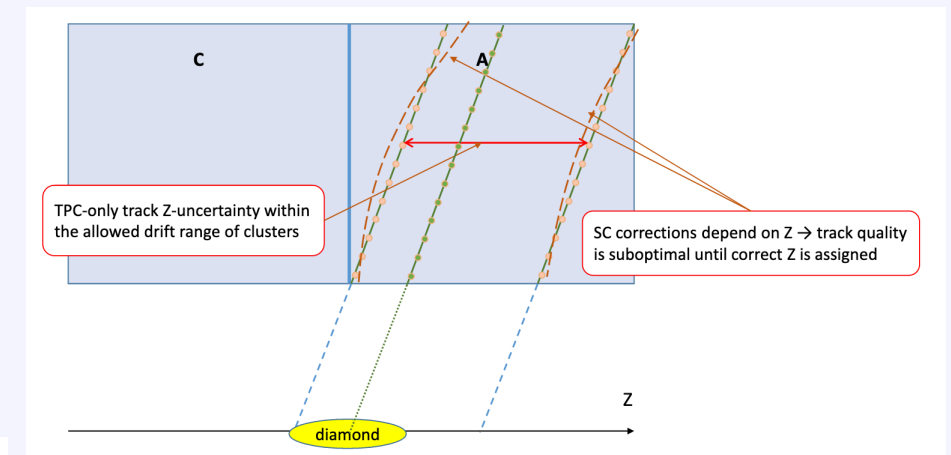


Track Calibration using Machine Learning

- Working on simulations from the new ALICE software O2 of the TPC
 - Simulations of pp or AA collisions and the track distortions from space-charge distortions of the detector
- Currently we have the raw tracks, as well as the tracks corrected by distortion maps
 - Will serve as input and targets to increase the speed of the correction algorithm currently in place



[arXiv:2003.03174](https://arxiv.org/abs/2003.03174)



Training, secondments & outreach

- Stationed at CERN from February until May working with the TPC workforce
- Secondments at Ximantis
 - Traffic light predictions

During our stay in CERN, Kaare (SMARTHEP associate from Lund) and I will show around a high school class visiting from Sweden, talking about our day-to-day work at CERN



Career expectations

- Continuing my work in Particle Physics i.e. a Post-doc or a CERN fellowship
- Also interested in research in AI/ML



Thanks for your attention!

