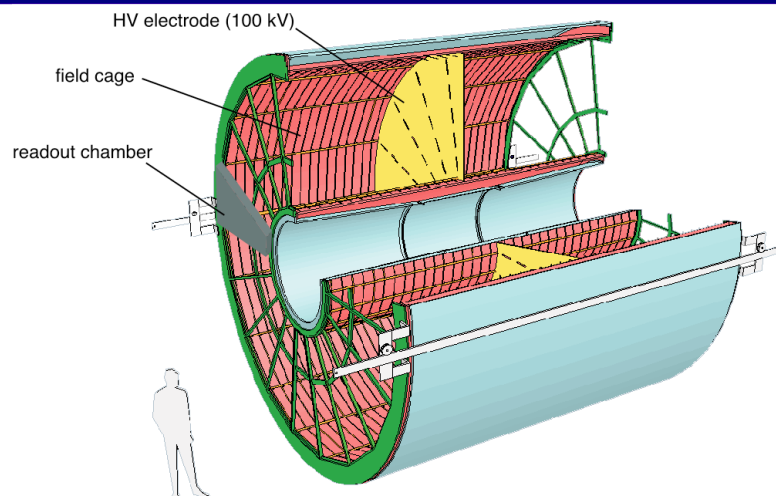


# Performance simulation studies for the ALICE TPC GEM Upgrade

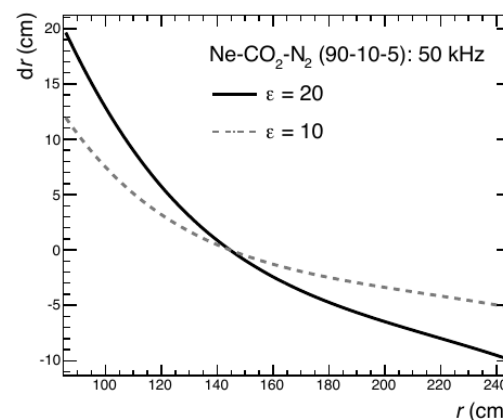
Martin Ljunggren on behalf of the ALICE Collaboration  
Lund University



- From run 3 of the LHC (2019) and on, an expected Pb-Pb collision rate of 50 kHz is foreseen
- The ALICE Time Projection Chamber (TPC) will be upgraded with Gas Electron Multiplier (GEM) readout to allow continuous operation
- The buildup of positive space charge will cause large distortions to the measured tracks.
- The goal of the simulations is to characterize these distortions.



The ALICE TPC

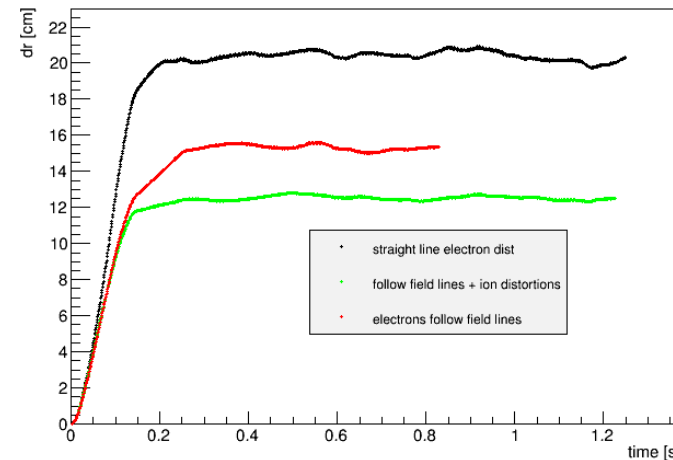


Distortion in measured r-coordinate for electrons drifting from the middle of the TPC ( $z=0$ )

# Simulation and results

- Simulation:

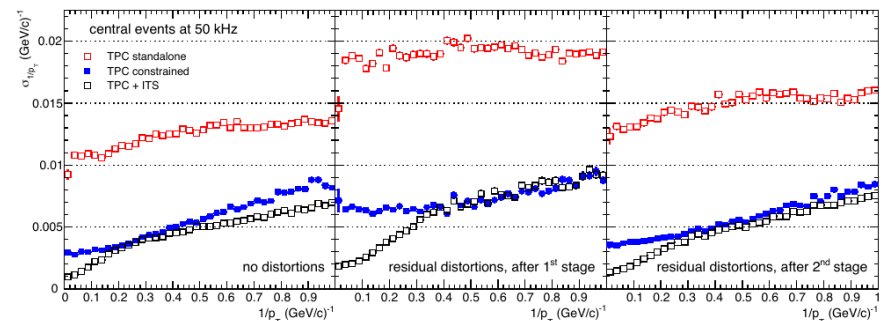
- Use HIJING to generate 5.5 TeV Pb-Pb events
- Simulate track propagation and electron + ion drift with distortions. Distortions are taken into account by solving Poisson's equation and the Langevin equation.
- The resulting ion distribution is binned in 3D
- Evolution of space point distortion in a specific point shown to the right:



Distortions in a point close to the inner field cage of the TPC ( $r=100\text{cm}$ ,  $z=0\text{cm}$ ) as a function of time

- Calibration

- Simulations show that the ideal momentum resolution (without space point distortions) is recovered after corrections



Momentum resolution in the ideal case (left), after a first reconstruction stage (middle) and after a second, more precise, reconstruction stage (right)