

The 238th seminar by Zhengchen Lian, Tsinghua University/INFN-Firenze, 15:00, December 11th

Title: Flow Measurements in Heavy-ion Collisions at LHCb

Abstract:

LHCb is not only a b-factory but also a general-purpose experiment in the forward direction including an ion physics and fixed target (IFT) program. This talk presents an overview LHCb's most recent public results on collective flow, which characterizes the collective medium response to the initial spatial anisotropy and serves as sensitive probes of both the medium properties and shape of nuclear initial states.

Elliptic and triangular flow coefficients of charged particles are measured via two-particle angular correlations in PbPb and pPb collisions in the forward region. The PbPb results are smaller than the central-pseudorapidity measurements at ALICE and ATLAS from the same collision system but share similar features. The flow measurements in pPb collisions reveal no significant differences between forward and backward regions, suggesting that final-state effects may dominate over initial-state effects in the origin of flow in small systems.

Flow coefficients in PbNe and PbAr fixed-target collisions are also measured using multi-particle cumulants, showing a significantly larger value of the elliptic flow coefficient v_2 in central PbNe with respect to PbAr collisions. This is qualitatively consistent with 3+1D hydrodynamic predictions including ab-initio descriptions of the nuclear structure. The results provide the first experimental confirmation of the distinctive bowling-pin shape of the ground-state ^{20}Ne nucleus, validating at the same time the hydrodynamic description of the hot medium formed in high-energy collisions involving light ions.

Brief introduction about the speaker:

Zhengchen Lian is a PhD student from Tsinghua University supervised by Prof. Xianglei Zhu. His research focuses on collective flow measurements at LHCb to probe the properties of the medium and the nuclear structure in heavy-ion collisions. Since 2025, he has been enrolled in a Joint PhD program in collaboration with Prof. Giacomo Graziani at INFN Firenze, Italy.

Summary