

Feasibility study of ultra-intense magnetic field detection via virtual photon derived dimuon polarization in ALICE Run 3

Tuesday 25 April 2023 16:40 (20 minutes)

In non-central high-energy nuclear collision, very strong magnetic field is produced. High intensity magnetic field have never been directly detected experimentally, and we propose to measure virtual photon polarization as direct evidence. Since anisotropy appears in the lepton pair decay plane of a virtual photon polarized by a magnetic field, we aim to detect virtual photon polarization by quantifying and measuring it.

The purpose of this study is to evaluate, using simulations, whether virtual photon polarization can be detected in lead nucleus collisions in ALICE Run 3. The data were produced separately for the underlying event and for polarized μ -particle pairs, which were then combined into the single data set.

The polarization is observed with a good significance in the current simulation setting. I am currently in the process of running simulations to match the estimated statistics and the signal to background ratio at ALICE Run 3. I will show the latest result of the study.

Theory / experiment

Experiment

Group or collaboration name

ALICE Collaboration

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Session Classification: Poster Session

Track Classification: Intense field and vorticity