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Projected physics and detector performances for a future fixed target programme at ALICE

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It was recently proposed that a Fixed Target (FT) program in the ALICE experiment can give access to the far backward rapidity region for p-A and Pb-A collision systems at an intermediate center of mass energy ($\sqrt{s_{\mathrm{NN}}}$ = 115 and 72 GeV for the proton and Pb beam respectively) between RHIC and SPS [1]. The structure of the nuclei can be studied at large x and as a function of the mass number, thanks to the versatility of the target. Moreover, the FT experiment with heavy ion beams at ALICE allows us to make precise studies of quarkonium states, heavy-quark energy loss, transport properties of QGP in new energy and rapidity domains - complementary to the existing LHCb FT setup. The detailed physics motivation, projected performance and possible implementation of a fixed target programme at the LHC can be found in [1,2].

The success of this proposal depends on the integration of the FT setup with the main collider program of ALICE. One of the main concerns is whether the central barrel detectors, namely the TPC can track and reconstruct the fixed target events with sufficient efficiency and resolution. This study uses the ALICE Run 3 software framework (O^2) to estimate the tracking performance of the TPC for FT events with a solid target placed a few meters upstream to the nominal interaction point of the ALICE detector. In this poster we present the inclusive charged particle tracking efficiency and transverse momentum resolution for inclined tracks (-2 $\leq \eta \leq$ -1) from the simulated FT collisions. Two different target positions have been considered for this study. We also present a fast simulation study of some general physics observables (*e.g.* collective flow) as well as the reconstruction efficiency of strange (Λ) and heavy quark (D^0) hadrons.

[1] C. Hadjidakis *et. al.*, arXiv:1807.00603 [hep-ex].
[2] Galluccio, Francesca *et. al.*, CERN-PBC-Notes-2019-004 (https://cds.cern.ch/record/2671944})

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