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## Sensitivity of the CTA to Dark Matter induced emission from the Perseus galaxy cluster

*Thursday 21 July 2022 15:00 (10 minutes)*

We estimate the sensitivity of the Cherenkov Telescope Array (CTA) to detect diffuse gamma-ray emission from the Perseus galaxy cluster, both from interactions of cosmic rays (CR) with the intra-cluster medium, and as a product of annihilation or decay of dark matter (DM) particles in case they are weakly interactive massive particles (WIMPs). The observation of Perseus constitutes one of the Key Science Projects proposed by the CTA Consortium for the first years of operation of the CTA Observatory. In this talk, we will focus on the DM-induced component of the flux. Our DM modeling includes the substructures we expect in the main halo of Perseus, as predicted within the standard cosmological model hierarchical structure formation scenario, which will “boost” the annihilation signal significantly. We compute the expected CTA sensitivity using a likelihood maximization analysis using the most recent CTA instrument response functions. We also model the expected CR-induced gamma-ray flux in the cluster, and both DM- and CR-related uncertainties via nuisance parameters. We will show the sensitivity of CTA to discover diffuse gamma-rays in a galaxy clusters for the first time. Even in absence of a signal, we show that CTA will allow us to provide stringent and competitive constraints on TeV DM, that will rely on state-of-the-art modeling of the cluster’s DM distribution. Finally, we will discuss the optimal strategy for CTA observations of Perseus.

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