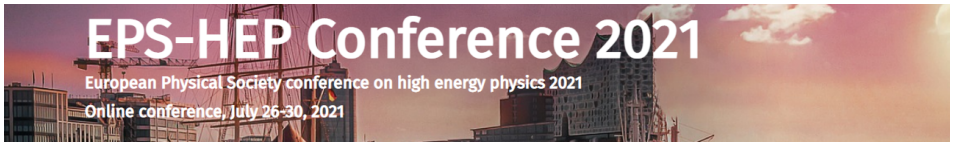

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Circular polarisation of gamma rays as a probe of dark matter-cosmic ray electron interactions

Wednesday, 28 July 2021 10:30 (20 minutes)

Dark Matter (DM) constitutes most of the matter in the presently accepted cosmological model for our Universe. However, despite the increased sensitivity of direct and indirect DM searches, and the latest LHC run at 13 TeV centre of mass energy, no signal from DM particles has been detected so far, leading to exclusion limits on the parameter space of DM models. Conventional indirect searches look for an excess in the electromagnetic emission from the sky that cannot be attributed to known astrophysical sources, but polarisation is so far not being explored.

In this talk, I will argue that the photon polarisation is an important feature to understand new physics interactions. In particular, circular polarisation can be generated from Beyond the Standard Model (BSM) interactions if they violate parity and there is an asymmetry in the number of particles which participate in the interaction. I will consider a simplified model for fermionic (Majorana) DM and study the circularly polarised gamma rays below 10 GeV from DM cosmic ray electron interactions. I will study the differential flux of positive and negative polarised photons from the Galactic Centre and show that the degree of circular polarization can reach up to 90%. Finally, I will discuss the detection prospects of this signal in future experiments.

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Collaboration / Activity

Article

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