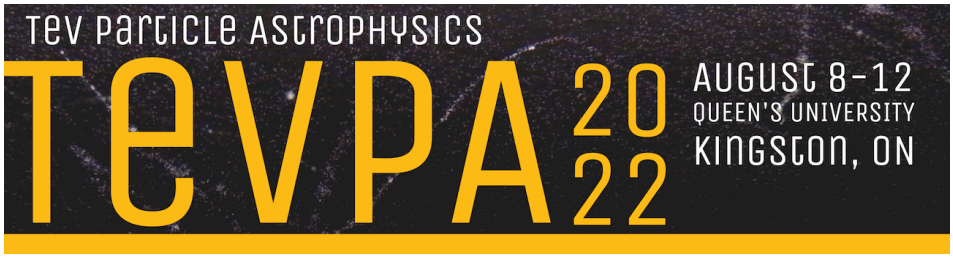

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Simulation and Indirect Detection of Dark Glueball Showers

Wednesday 10 August 2022 14:20 (20 minutes)

Parton showers are part and parcel of particle phenomenology, but what in the case of a confining dark sector with no light quarks below the confinement scale? Then the only available hadronic states are 'glueballs', composite gluon states. To date, there have been very few quantitative studies of dark shower signatures with glueball final states, despite the fact they commonly appear in motivated BSM theories such as neutral naturalness, and are prominent LLP candidates. This is due to the fact that commonly used hadronisation models, such as the Lund model, are no longer valid. We found that significant progress can be made despite the non-perturbative uncertainties. In this talk I will outline a method of simulating the formation of glueballs from a perturbative gluon shower, and how we handle the hadronisation process. This simulation has allowed us to study a variety of dark glueball phenomena quantitatively for the first time, including the indirect detection of DM annihilating into dark glueballs that then decay into the SM. Additionally, since the glueball decays depend on a range of operators, information on the UV completion of the sector may be able to be determined from multimessenger analysis of a potential signal. The `GlueShower` simulation code is additionally publicly available for use by the BSM community.

Collaboration name

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