Contribution ID: **24**   Type: **Poster**

Dark Matter models implemented in PYTHIA8

We studied the four models implemented in PYTHIA8 for the production of dark matter or associated particles at the LHC based on the simplest extensions of the Standard Model. The first model includes dark matter production via s-channel mediators. This includes production in association with a jet for a vector boson or scalar mediator. Aside from the standard simplified models where the dark matter is accompanied by a new s-channel mediator, two other models were also studied where the dark matter particle is accompanied by charged partners that may be produced via Drell Yan production. The fourth model is a generalized model of mixed dark matter where the dark matter is a mixture of an SU(2) singlet and N-plet. We find that the last two models are also ideally suited to study the production of a range of long-lived particle signatures.

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Session Classification: Poster session