

A Photon Line From Decaying Goldstini Dark Matter

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When multiple sectors break supersymmetry, there is a corresponding multiplicity of goldstini, which may comprise some or all of the dark matter in our universe. In this talk, we identify a previously overlooked goldstino decay channel which leads to a smoking gun photon line signature. This new contribution can be interpreted as arising either from a supersymmetry-breaking Fayet-Iliopoulos term or from supersymmetric kinetic mixing between standard model hypercharge and a (real or effective) hidden sector $U(1)$. In generic scenarios of supersymmetry breaking and mediation, goldstini decay on cosmologically relevant timescales and the photon line is the dominant decay mode even if other channels are kinematically accessible. We discuss the prospects for detecting goldstini dark matter in current and upcoming indirect detection searches.

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