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Cosmic Ray Anomalies, Gamma Ray Constraints and Subhalos in Models of Dark Matter Annihilation

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We consider Sommerfeld-enhanced annihilation of dark matter into leptons to explain PAMELA and Fermi electron and positron observations, in light of possible new effects from sub-structure. There is strong tension between getting a large enough lepton signal while respecting constraints on the fluxes of associated gamma rays; we show how DM annihilations within subhalos can get around these constraints. And we demonstrate that this can be achieved in a simple class of particle physics models in which the DM annihilates via a hidden leptophilic U(1) vector boson.

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