## TeV Particle Astrophysics 2017 (TeVPA 2017)



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## **Enabling Forbidden Dark Matter**

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The thermal relic density of dark matter is conventionally set by two-body annihilations. We point out that in many simple models,  $3\rightarrow 2$  annihilations can play an important role in determining the relic density over a broad range of model parameters. This occurs when the two-body annihilation is kinematically forbidden, but the  $3\rightarrow 2$  process is allowed; we call this scenario "Not-Forbidden Dark Matter". We illustrate this mechanism for a vector portal dark matter model, showing that for a dark matter mass of m $\chi \sim MeV - 10$  GeV,  $3\rightarrow 2$  processes not only lead to the observed relic density, but also imply a self-interaction cross section that can solve the cusp/core problem. This can be accomplished while remaining consistent with stringent CMB constraints on light dark matter, and can potentially be discovered at future direct detection experiments.

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