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Dark Matter Annihilation into Four-Body Final States and Implications for the AMS Antiproton Excess STEVEN CLARK, Texas AM — We consider dark matter annihilation into a general set of final states of Standard Model particles, including two-body and four-body final states that result from the decay of intermediate states. For dark matter masses $\sim 10 - 10^5$ GeV, we use updated data from Planck and from high gamma-ray experiments such as Fermi-LAT, MAGIC, and VERITAS to constrain the annihilation cross section for each final state. The Planck constraints are the most stringent over the entire mass range for annihilation into light leptons, and the Fermi-LAT constraints are the most stringent for four-body final states up to masses $\sim 10^4$ GeV. We consider these constraints in light of the recent AMS antiproton results, and show that for light mediators it is possible to explain the AMS data with dark matter, and remain consistent with Fermi-LAT Inner Galaxy measurements, for $m_\chi \sim 60 - 100$ GeV mass dark matter and mediator masses $m_\phi/m_\chi \sim 1$.

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