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**The Galactic Positron Annihilation Medium: Is Ionized Helium A Viable Candidate?** MATTHEW FRANKING, BENJAMIN BROWN, JENNIFER CHAPIN, Principia College — We consider the possibility that the 511 keV electron-positron annihilation line coming from the direction of the galactic center could be the result of thermal positrons annihilating via Ps formation from charge exchange with singly ionized helium.[Fatuzzo:2000] We present an analysis of the galactic line profiles, comparing the observed line shape to the expected line shape for the proposed annihilation mechanism at various temperatures. We calculate the FWHM by both Monte Carlo and analytical techniques, using empirically derived Ps formation, ionization, and excitation cross sections for the  $e^+$ - $He^+$  interactions. It is found that the FWHM of the annihilation spectrum for this process shows a logarithmic temperature dependence. We conclude that ionized helium is an unlikely annihilation medium for a reasonable ambient electron temperature, given that the calculated FWHM exceeds the upper maximum of the error bars of the weighted average of the line widths of all observations known to the authors.

[Fatuzzo:2000] M. Fatuzzo, F. Melia, and J. Rafelski, *Astrophys. J.* 549, 293 (2000)

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