Abstract Submitted
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Ortho- and Para-Positronium Formation Measurements for Positron Scattering by N_2 and CO* ERIK MILLER, DAO DUONG, JESSICA EDWARDS, WALTER KAUPPILA, TALBERT STEIN, EUGENE SURDUTOVICH, Wayne State University — We are investigating ortho- and para-positronium formation for positrons interacting with N_2 and CO in a gas scattering cell. These measurements involve the detection of two gamma rays in coincidence for energy windows (1) centered at 511 keV resulting from the decay of short-lived (0.1 ns) para-Ps and the destruction of longer-lived (0.1 ms) ortho-Ps at the scattering cell walls, and (2) from 300 to 460 keV resulting from the three gamma decay of ortho-Ps.[1] By comparing our $3\gamma/2\gamma$ ratios to those for other target gases[1] we find a strikingly anomalous behavior at the Ps formation threshold for N_2 where there is an unexpected enhancement of the 2γ signal compared to the 3γ signal, while for CO (isoelectronic with N2) the behavior is consistent with the other gases. The anomalous behavior for N_2 is consistent with an enhancement of annihilation at the threshold, which is as if Ps is forming and remaining bound to the N_2^+ ion until annihilation occurs.

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[1]W.E. Kauppila et al. Phys. Rev. Lett. 93, 113401 (2004).

Walter Kauppila
Wayne State University

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