Dynamics of Bloch State Positronium Emission from MOF Targets Studied via Rydberg TOF Spectroscopy

ALINA PIÑEIRO ES- CALERA, ADRIC JONES, ALLEN MILLS, Dept of Physics and Astronomy, University of California, Riverside — Recent advances in the efficient production and detection of Rydberg positronium (Ps) have made it possible to perform energy- and angle- resolved time-of-flight (TOF) spectroscopy with Ps. We report here TOF measurements of Ps emission from the metal-oxide framework (MOF) targets, MOF-5 and ZIF-8. MOFs are a recently synthesized class of chemical structures, characterized by high long-range order and large surface area to volume ratios (i.e., they are highly porous and uniform, crystalline materials). Ps is found to be emitted predominantly in a series of monoenergetic peaks, providing clear evidence of Ps Bloch states. Measuring the relative populations of the monoenergetic peaks, as a function of implantation energy and target temperature, provides insight into the target-dependent dynamics of Bloch state Ps.

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