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Laser Interactions with Atomic and Molecular Positronium
DAVID CASSIDY, University of California, Riverside — Positronium (Ps), the bound state between an electron and its antiparticle, the positron, may be efficiently created by bombarding certain porous materials with intense bursts of positrons obtained from a positron accumulator. Using a Surko-type buffer gas trap we have produced a high-density pulsed positron beam makes it possible to study interactions between Ps atoms, allowing for measurements of molecular Ps_2 formation and Ps-Ps scattering. Moreover, even at a low spatial density the ~ 1 ns wide pulses are well suited to laser spectroscopy of Ps atoms; numerous experiments are possible, including measurements of atomic energy intervals (e.g., the hyperfine interval), the effects of confinement on transition wavelengths, Ps cooling and the production of long-lived Rydberg Ps atoms. High density pulses used with lasers have also been used to perform optical spectroscopy on the Ps_2 system.

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