Control of the Angular Coordinates of Atomic Electrons

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Atomic Rydberg states are highly degenerate with n^2 angular momentum states associated with the principal quantum number n. For modestly excited Rydberg states this means that there are thousands of degenerate levels. In spite of the fact that most of the Hilbert space is occupied by high angular momentum states, the overwhelming majority of experimental and theoretical studies of Rydberg wave packets have been confined to radial wave packets, a superposition of states all with the same angular momentum quantum numbers. In this lecture we will explore ways of producing and detecting angular wave packets, and possible applications of them to studies of correlated multi-electron systems, information storage, quantum computing, and other areas.