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【426】Observation of the narrow inner-shell orbital transition in atomic erbium at 1299nm

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Ultra-narrow atomic transitions have been extensively used for high-precision measurements and for the manipulation of quantum systems.
Here, we report on the observation of a narrow inner-shell orbital transition of erbium at 1299.21nm, and, for the first time, on coherent control of the atomic state with this optical transition. High-resolution spectroscopy is performed on five erbium isotopes and we determine the natural linewidth of the transition, which reaches a sub-Hertz level of 0.9(1)Hz, by coherently populating the atoms on the excited state and monitoring the decay rate. The atomic polarizability of the excited state relative to the ground state is measured and a near magic wavelength condition is realized.

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