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【111】 Spin-Orbital Excitations in Ca_2RuO_4 revealed by Resonant Inelastic X-Ray Scattering

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Here, we have studied the magnetically ordered phase of Ca_2RuO_4 at $T = 16$ K, using O-K edge Resonant Inelastic X-ray Scattering technique. Four excitations have been identified- 2 low energy excitations at 80 meV and 400 meV respectively and two high energy excitations at energies 1.3 eV and 2.2 eV . The low energy peaks are interpreted to be arising from composite spin- orbital excitations due to spin orbit coupling and the high energy excitations arise from singlet-triplet excitations at the Ruthenium site set by Hund's coupling. With the light polarisation analysis of the x-ray absorption and the RIXS spectra, we were able to characterise the mott active Ruthenium orbitals involved in the absorption processes.

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