

Supplementary Information for

Experimental evaluation of the stabilization of the COT orbitals by 4f orbitals in COT₂Ce using a Hubbard model

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Table S1: $|J, m_J\rangle$ states in terms of $|m_L, m_S\rangle$ states

$$|7/2, 7/2\rangle = |3, 1/2\rangle$$

$$|7/2, 5/2\rangle = \sqrt{1/7} |3, -1/2\rangle + \sqrt{6/7} |2, 1/2\rangle$$

$$|7/2, 3/2\rangle = \sqrt{2/7} |2, -1/2\rangle + \sqrt{5/7} |1, 1/2\rangle$$

$$|7/2, 1/2\rangle = \sqrt{3/7} |1, -1/2\rangle + \sqrt{4/7} |0, 1/2\rangle$$

$$|7/2, -1/2\rangle = \sqrt{3/7} |-1, 1/2\rangle + \sqrt{4/7} |0, -1/2\rangle$$

$$|7/2, -3/2\rangle = \sqrt{2/7} |-2, 1/2\rangle + \sqrt{5/7} |1, -1/2\rangle$$

$$|7/2, -5/2\rangle = \sqrt{1/7} |-3, 1/2\rangle + \sqrt{6/7} |2, -1/2\rangle$$

$$|7/2, -7/2\rangle = |-3, -1/2\rangle$$

$$|5/2, 5/2\rangle = \sqrt{6/7} |3, -1/2\rangle - \sqrt{1/7} |2, 1/2\rangle$$

$$|5/2, 3/2\rangle = \sqrt{5/7} |2, -1/2\rangle - \sqrt{2/7} |1, 1/2\rangle$$

$$|5/2, 1/2\rangle = \sqrt{4/7} |1, -1/2\rangle - \sqrt{3/7} |0, 1/2\rangle$$

$$|5/2, -1/2\rangle = -\sqrt{4/7} |-1, 1/2\rangle + \sqrt{3/7} |0, -1/2\rangle$$

$$|5/2, -3/2\rangle = -\sqrt{5/7} |-2, 1/2\rangle + \sqrt{2/7} |1, -1/2\rangle$$

$$|5/2, -5/2\rangle = -\sqrt{6/7} |-3, 1/2\rangle + \sqrt{1/7} |2, -1/2\rangle$$