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Impurity-doped Bose-Einstein Condensates in Multi-mode Cavities SHAHRIAR SHADKHOO, ROBIJN BRUINSMA, Univ of California - Los Angeles — We study impurities in a Bose-Einstein Condensate (BEC), trapped in a multi-mode cavity which is transversely laser-pumped. The pure system has been proposed to exhibit emergent crystallinity for sufficiently strong pumping, and is therefore described by the quantum version of the fluctuation-induced first order phase transitions. We address the ground state of a quantum impurity coupled to the BEC, away from and near the phase transition. We show that this model system supports various perturbative and non-perturbative excitations around the particle. Light impurities form large and small polarons, whereas solitonic solutions may appear around heavier impurities. The effects of quantum and thermal fluctuations are also investigated.

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