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A phase-space analysis of cavity assisted photoassociation of quantum degenerate molecules MARKKU JAASKELAINEN, CHRISTOPHER SEARCH, JAEYOON JEONG, IVANA DJURIC, Stevens Institute of Technology — We study the photo-association of Bose-Einstein condensed atoms into molecules using a quantized cavity field. The semiclassical stationary solutions for the three nonlinearly coupled bosonic fields are found and their stability and scaling properties in terms of physical parameters are determined. The full quantum dynamics are simulated using the positive-P distribution and a reduced dynamics in terms of molecule fraction and relative phase between atoms and molecules, which can be mapped onto a Bloch-sphere. Quantum effects at the cross over from stable steady state behavior to large amplitude nonlinear Rabi-oscillations as a function of particle number and inter-particle interaction strengths are investigated.

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