

Abstract Submitted  
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**Study of impurities immersed in a trapped Bose-Einstein condensate\*** KWANGSIK NHO, D. P. LANDAU, Center for Simulational Physics, University of Georgia — Using path integral Monte Carlo simulation methods[1], we have studied properties of impurities immersed in Bose-Einstein Condensates harmonically trapped in low dimension. For two-body interactions, we use a hard-sphere potential whose core radius equals its corresponding scattering length. We assume that the impurities experience the external trapping potential. We have tightly confined the motion of trapped particles in one or more direction by increasing the trap anisotropy in order to simulate lower dimensional atomic gases. By varying the strength of the boson-impurity interactions and the number of impurities, we have investigated the effect of impurities on the energetics and structural properties such as the total energy, the density profile, and the superfluid fraction. Our results show that for impurities with larger two-body interactions than the boson-boson interactions, the impurities move away from the trap center and surround the trapped bosons, and the density profile is found to get narrower, with the peak density getting larger. The total superfluid fraction decreases due to the impurities, although the difference becomes smaller and smaller by increasing the trap anisotropy.

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[1] K. Nho and D. P. Landau, Phys. Rev. A. **72**, 023615 (2005).

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