Abstract Submitted
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Crystallization in mass-asymmetric electron-hole bilayers[1] P. LUDWIG, University Kiel, University Rostock, A. FILINOV, M. BONITZ, University Kiel, H. STOLZ, University Rostock, YU. E. LOZOVIK, Inst. Spectroscopy, Troitsk, Russia — We analyze hole crystallization [1] in an electron-hole bilayer system and specifically study the effect of the hole to electron mass ratio M. Varying M between 1 and 100 at a fixed layer separation at low temperature and high density, we demonstrate that the hole behavior can be tuned from delocalized (liquid-like) to localized (crystal-like), while the electrons remain delocalized all the time. As was recently demonstrated [1] in bulk systems holes undergo a crystallization transition if M exceeds a critical value of 83. Here we extend this analysis to bilayer systems and demonstrate that the critical mass ratio can be drastically reduced by properly choosing the layer separation. The complicated interplay between Coulomb correlations and quantum effects of electrons and holes is fully taken into account by performing first principle path integral Monte Carlo simulations. [1] M. Bonitz, V.S. Filinov, V.E. Fortov, P.R. Levashov, and H. Fehske, Phys. Rev. Lett. 95, 235006 (2005) and J. Phys. A: Math. Gen. 39, 4717 (2006); Phys. Rev. Focus, December 2 2005 [2] P. Ludwig, A. Filinov, Yu. Lozovik, H. Stolz, and M. Bonitz, Contrib. Plasma Phys. (2007)

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