Abstract Submitted
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Effects of Fermion Flavor on Excitonic Condensation in Double Layer Systems[1] ZACHARY ESTRADA, Department of Electrical and Computer Engineering, University of Illinois, Urbana IL 61801, JOHN SHUMWAY, Department of Physics, Arizona State University,Tempe, AZ 85287, MATTHEW GILBERT, Department of Electrical and Computer Engineering, University of Illinois, Urbana IL 61801 — We perform fermionic path integral quantum Monte Carlo (PIMC) simulations to study the physical properties of dipolar exciton condensates in symmetric double layer systems. Recently, the role of screening of additional fermion flavors has been a source of contention in exciton condensates. A room temperature superfluid state has been predicted in bilayer graphene assuming that the condensate screens out additional fermion flavors.[2] On the other hand, large-N calculations have resulted in much weaker screening of fermion flavors and have placed the transition temperature far lower, around one millikelvin.[3] We demonstrate the effect of added fermion flavor on the Kosterlitz-Thouless transition temperature (T_{KT}) in symmetric electron-hole bilayers by collecting static and dynamic response functions.[4] We find that the addition of fermion flavors decreases T_{KT}, however, due to strong exciton binding, the decrease we observe is not as drastic as is predicted in the earlier large-N calculations.

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[2]H. K. Min, R. Bistritzer, J. J. Su and A. H. MacDonald.*Phys. Rev.* B **78**, 121401 (2008)
[3]M. Y. Kharitonov and K. B. Efetov, *Semicond. Sci. Technol.* **25**, 034004 (2010)
[4]J. Shumway and M. J. Gilbert, *arXiv:1108.6107* (2011)

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