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**Preforming molecules of Fermi-Bose light-heavy alkali mixtures to create dense dipolar matter: the strong coupling approach** ANZI HU, Joint Quantum Institute, University of Maryland and National Institute of Standard and Technology, JIM FREERICKS, Georgetown University, MACIEJ MASKA, University of Silesia, CARL WILLIAMS, Joint Quantum Institute, University of Maryland and National Institute of Standard and Technology — In this talk, we discuss our recent work on using the strong- coupling expansion (perturbation theory in the hopping) to calculate the efficiency of pre-forming molecules of Fermi-Bose light-heavy alkali mixtures (like K-Rb) in an optical lattice. In previous work [1], we have shown that loading the mixture onto a two-dimensional square lattice can dramatically improve the efficiency of pre-forming dipolar molecules. In this talk, we will show that within the strong interaction regime (and at high temperature), the SC expansion is a very economical way to study this problem. The SC approach also enables us to work with much larger system sizes, where boundary effects can be eliminated. This is particularly important at higher temperatures where the boundary effects can significantly affect the results.This approach could be useful for experimentalists to rapidly scan through parameter space to optimize the preforming of molecules on the lattice (by choosing the lattice depth and interspecies attraction) prior to the Feschbach sweep and STIRAP process used to make ground-state molecules. [1] J. K. Freericks, *et al*, arXiv:0908.1794v1

Anzi Hu
Joint Quantum Institute, University of Maryland and
National Institute of Standard and Technology

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