Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Heat Transfer Through Dipolar Coupling: Sympathetic cooling without contact[1] MEHMET OKTEL, BASAK RENKLIOGLU, BILAL TANATAR, Bilkent University, Ankara 06800 TURKEY — We consider two parallel layers of dipolar ultracold gases at different temperatures and calculate the heat transfer through dipolar coupling. As the simplest model we consider a system in which both of the layers contain two-dimensional spin-polarized Fermi gases. The effective interactions describing the correlation effects and screening between the dipoles are obtained by the Euler-Lagrange Fermi-hypernetted-chain approximation in a single layer. We use the random-phase approximation (RPA) for the interactions across the layers. We find that heat transfer through dipolar coupling becomes efficient when the layer separation is comparable to dipolar interaction length scale. We characterize the heat transfer by calculating the time constant for temperature equilibration between the layers and find that for the typical experimental parameter regime of dipolar molecules this is on the order of milliseconds. We generalize the initial model to Boson-Boson and Fermion-Boson layers and suggest that contactless sympathetic cooling may be used for ultracold dipolar molecules.

[1]Supported by TUBITAK 1002-116F030

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Date submitted: 09 Nov 2016 Electronic form version 1.4