Quantum and thermal fluctuations in the BCS-BEC crossover with unequal mass fermions ROBERTO DIENER, QI ZHOU, MOHIT RANDERIA, The Ohio State University — A lot of progress has been done in the study of the BCS-BEC crossover for equal-mass fermions in recent years by both theory and experimental groups. An extension of this problem which is starting to receive more attention is the study of mixtures of fermions with different masses, such as a mixture of ^{40}K and ^{6}Li. Using our functional integral method, which we have previously used to study the equal-mass case and which includes the effect of collective excitations (see R. B. Diener et al, cond-mat/0709.2653), we have studied the properties of a fermionic gas with unequal masses across the BCS-BEC crossover. We will present results for different thermodynamical quantities as a function of mass ratio and interaction strength: e.g. the beta parameter at unitarity, the ground state energy as a function of $1/(k_F a_s)$, as well as the dimer scattering in the BEC limit as a function of mass ratio which agrees to within 20% with the exact four-body calculation of D. Petrov et al., J. Phys. B At. Mol. Opt. Phys. **38**, S645 (2005).

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