EVAPORATIVE COOLING OF HELIUM NANODROPLETS

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It is now well established experimentally that ^{4}He nanodroplets undergo evaporative cooling to temperatures near 0.38 K under conditions that apply to most experiments. While this is close to the temperatures predicted by previous classical and quantum statistical evaporation calculations, these have ignored angular momentum constraints. In this talk we will present the results of phase space theory calculation of evaporative cooling that rigorously includes angular momentum conservation and has a "heat bath" provided by the low energy surface capillary wave excitations (Ripplons) that dominate the low energy density of states of helium nanodroplets. It is found that while temperatures near that of previous calculations and experiment are found, that the droplets are quenched into states with a much broader distribution of both energy and total angular momentum than for a canonical distribution at the same temperature. Further, it is found that the alignment of the total angular momentum is highly conserved in the evaporation process and that a significant fraction of this alignment is transferred to a solvated molecular rotor.