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**Nuclear properties associated with the unitary limit** DAN FU, ARAM MEKJIAN, Rutgers University — The unitary limit occurs when scattering lengths become very large compared to inter-particle spacings. In this limit properties of the system become independent of the details of the underlying force. Various features acquire a behavior that is universal which therefore manifest themselves in other systems under the unitary limit. Cold atoms and Fermi and Bose quantum gases are studied in the unitary limit. The nuclear case has an S-wave spin 0 scattering length for two neutrons which is -17.4fm (virtual state). The S-wave spin 0 neutron –proton scattering length is -23.7fm (virtual state) while the spin 1 bound state (the deuteron) is weakly bound. The unitary limit is approximately realized in a nuclear system. Some departures from the unitary limit exist and the effective range of the nuclear force appears in expressions. A square well potential adjusted to give experimentally observed properties is used. Our study focusses on the finite temperature thermodynamic properties of nuclei. These properties include the nuclear equation of state and associated compressibility, the nuclear viscosity and the entropy. The issue of near perfect fluid behavior is remarked on. Dan Fu research was supported by the Aresty undergraduate research program at Rutgers. This work was also supported by a DOE grant- DOE FG02-96Er40987.

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