APR15-2015-000180

Abstract for an Invited Paper
for the APR15 Meeting of
the American Physical Society

The nuclear contact and the photoabsorption cross section

NIR BARNEA, The Racah Institute of Physics, The Hebrew University, Jerusalem, Israel

A few years ago, S. Tan suggested that the properties of universal quantum gases depend on a new characteristic quantity. This quantity, the contact, describes the probability of two particles coming close to each other, i.e. it is a measure of the number of close particle pairs in the system. Utilizing the contact, this theory predicts the energy, pressure and other properties of the system. It was proven right in a series of ultracold atomic experiments. In my talk I will present a generalization of Tan's contact to nuclear systems, introducing the various nuclear contacts, taking into account all possible pair configurations. The leading neutron-proton contact is then evaluated from medium energy photodisintegration experiments. To this end, the Levinger quasi-deuteron model of nuclear photodisintegration is reformulated, and the bridge between the Levinger constant and the contact is established. Using experimental evaluations of Levinger's constant the value of the neutron-proton contact in finite nuclei and in symmetric nuclear matter is extracted, and compared to the universal theory. Assuming isospin symmetry it is proposed to evaluate the neutron-neutron contact through measurement of photonuclear spin correlated neutron-proton pairs.