ABSTRACT

The aim of this work is to study the binding energy of the ^{3}He nuclei moving in a hot low-density vapor of symmetric nuclear matter of protons and neutrons. We are mainly interested in studying the effect of the inclusion of the CM momentum of the ^{3}He nuclei on their binding energy. The surrounding nucleons are in thermal and chemical equilibrium with the nuclei. We will try to find the Mott density, which is the density of the surrounding vapor at which the binding energy of the ^{3}He nuclei become zero and so they will dissolve into the surroundings due to the Pauli blocking effect, and how the Mott density will be affected by considering the CM momentum of ^{3}He nuclei. We found that the existence of protons and neutrons in the vapor surrounding the ^{3}He nuclei will decrease their binding energy and so they will dissolve into their components and become part of the surrounding vapor. We also found that this dissociation process depends on the temperature. The main conclusion of our work is that the assumption that the ^{3}He clusters are moving (inclusion of CM momentum) within the surrounding vapor will make them survive to higher densities at the same temperature.