*International Nuclear Physics Conference INPC2013: 2-7 June 2013, Firenze, Italy*

# In-Medium Effects and Low Density Nuclear Matter

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Thermal coalescence models were employed to extract densities and temperatures for evolving systems formed in collisions 47 MeV/u Ar projectiles on several targets using the 4π multi-detector, NIMROD. Yields of d, t, $^{3}$He, $^{4}$He were determined at densities ranging from 0.002 to 0.032 nucleon/fm$^{3}$. Equilibrium constants derived from the experimental data are compared with those predicted by a number of astrophysical equations of state. Experimental in-medium binding energies and Mott points for d, t, $^{3}$He and $^{4}$He clusters in low density nuclear matter formed in these collisions will be presented. The experimentally derived in-medium binding energies are in good agreement with theoretical predictions that implement Pauli blocking effects in a quantum statistical approach. Free symmetry energy coefficients derived from the experimental data as well as the corresponding symmetry energy coefficients will also be presented. In medium effects are shown to be an important ingredient in describing the data.