On the Shell Structure of Nuclear Bubbles ◇

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We investigate the shell structure of spherical nuclear bubbles in simple phenomenological shell model potentials. The bunching is produced by the energy gaps between single-particle states with a different number of radial nodes. The shell correction energies for doubly magic bubbles may be as large as $-40 MeV$ and probably imply a very long lifetime against spontaneous fission. β-stability occurs for ratios of the neutron number N to the proton number Z which differ markably from the β-stability valley of ordinary compact nuclei. The α-decay probability is shown to be very small for proton rich bubbles with a moderate large outer radius. Metastable islands of nuclear bubbles are shown to exist for nucleons in the range A = 450-3000.

published in Nucl. Phys. A 627 (1997) 175

◇ Supported in part by the Polish Committee of Scientific Research under contract No. 2P03B01112

Response and Correlation Functions for Heated Nuclei ◇

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Density-density response functions are studied for low temperatures within the collisional Landau Fermi-liquid theory in relaxation time approximation. Quasi-static properties like isothermal, isolated and adiabatic susceptibilities of nuclear matter are deduced, to examine the question of ergodicity. Temperature corrections to the response functions, viscosity and thermal conductivity coefficients are calculated. The contribution to the damping of surface modes from sound and heat pole modes are discussed. The results are compared to the zero frequency limit.

◇ Supported in part by the Deutsche Forschungsgemeinschaft

Effects of Pair Correlations on Nuclear Transport ◇

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The linear response description of average collective motion is extended to include the effects of pairing. The pairing gap is considered as another collective variable, beside the one for fission. Particle number conservation is taken into account on a time-dependent average. The friction and inertia tensors corresponding to these two collective parameters are computed along the fission path of ^{224}Th for temperatures $T \leq 1\,$MeV. It is shown that the friction coefficient decreases with decreasing temperature and increasing pairing gap.

◇ Supported in part by the Deutsche Forschungsgemeinschaft