8.5 Coupling of the giant dipole resonance to low lying octupole modes - generator coordinate method study

by P.-H.Heenen[1] and J.Skalski

The effect on the properties of low lying octupole modes of coupling with the giant dipole resonance is studied within the Generator Coordinate Method. Results are presented for ^{152}Sm which is deformed in its ground state and for the superdeformed state of ^{190}Hg. A basis is first generated by Hartree-Fock+BCS calculations with constraints on the octupole and dipole moments. The same Skyrme SkM* effective interaction used in the mean field is then diagonalised by GCM. For the octupole K=0 mode, the effect of the coupling is marginal and the dipole properties of low lying states are satisfactorily described by pure octupole calculations. For the K=1 mode, the dipole-octupole coupling slightly reduces the E1 transition strength.

[1] Service de Physique Nucléaire Théorique, U.L.B. CP229, 1050 Brussels, Belgium

PL9800697

8.6 The excitation of a quantum gas of independent fermions in a deforming cavity - periodicity of driving vs. Landau-Zener transitions

by J.Skalski

The numerically calculated excitation of a quantum gas of 112 non-interacting fermions in a hard-walled cavity changing its shape is analysed for one and half of the oscillation cycle. Spheroidal and Legendre polynomial distortions, P_2,P_3,P_4,P_5 and P_6, around the sphere and the octupole deformed shape are considered. Oscillations of the excitation energy as a function of the driving frequency, especially pronounced for low frequencies, are related to quantum interference between Landau-Zener transitions at successively traversed, avoided crossings. This irregular component of excitation may be linked to the periodicity of the driving motion since it is strongly suppressed for one-half of the oscillation period. It is argued that the wall formula has a better chance to describe properly the one-body dissipation in aperiodic processes in which at most half of the full cycle is performed.

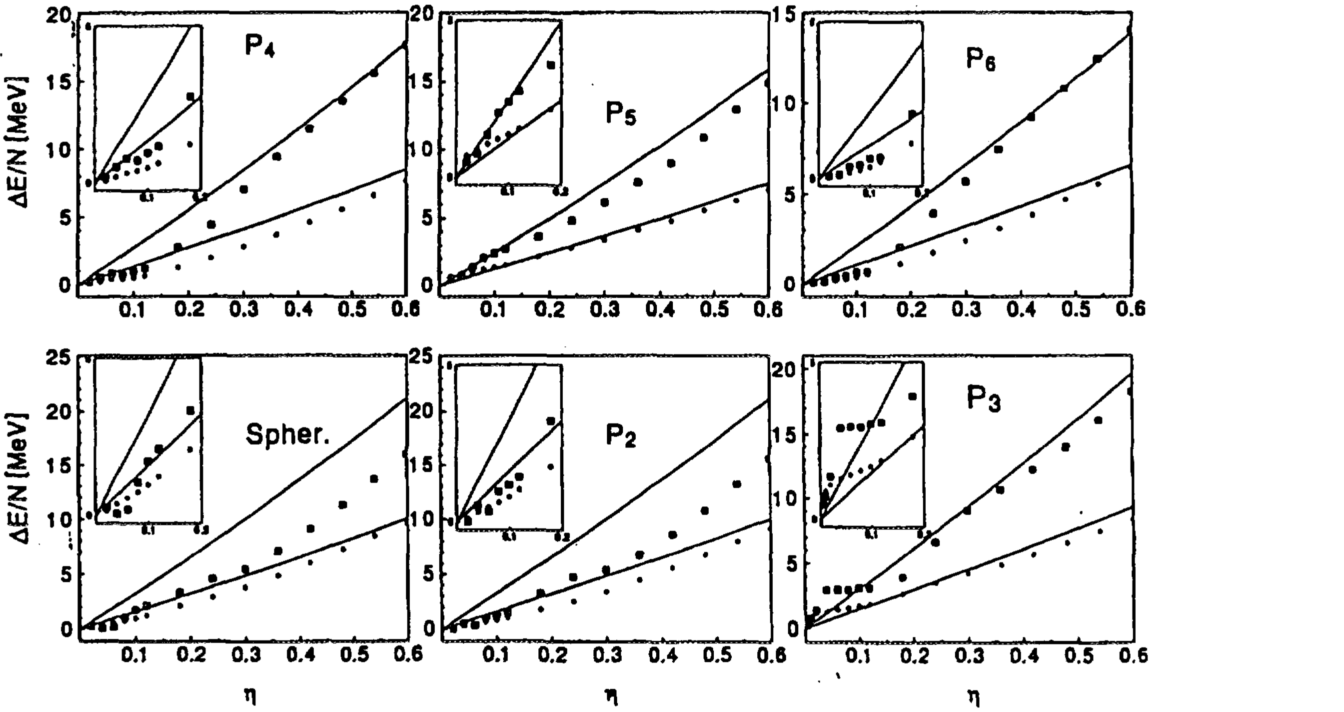

Fig.1 The excitation energy per particle, ΔE/N, after half-period T/2 (dots) and full period T (open squares) of shape oscillations around the sphere are shown as functions of the adiabacity parameter η (or the oscillation frequency $\hbar\omega$). Thin solid lines are the result of the wall formula with corrections. Six panels correspond to six types of shape oscillations (notice different scales on the ordinate). The detailed low-frequency part of each plot is shown in the inset.