Recent years, the geometrical Bohr-Mottelson description of the collective behaviour of atomic nuclei [1] has witnessed renewed interest. This is mainly due to the discovery of analytically solvable potentials [2], intended as an approximative description of the critical points in phase shape transitions throughout the nuclear chart.

The geometrical model treats the nucleus as a vibrating and rotating liquid drop. Up to lowest orders in a multipole expansion, the intrinsic surface can be considered as an ellipsoid described by the variables $\beta$ and $\gamma$, corresponding respectively to the degree of deformation and the triaxiality of the nucleus [3].

By means of a potential of the Wilets and Jean type [4], an exact decoupling of the $\beta$ and $\gamma$ excitations can be established, enabling a treatment of triaxiality, independently from deformation. Making use of a judicious choice of potentials (Pöschl-Teller or Harmonic Oscillator), the $\gamma$-rotational part of the Hamiltonian can approximately be solved through analytical [5] or algebraic [6] techniques. These solutions are confronted with experimental data in the chain of Os isotopes. Next to energy spectra and quadrupole moments, a theoretical estimate of triaxiality can be obtained and compared to experimentally extracted numbers [7].

References