DESCRIPTION OF THE WOBBLING MOTION THROUGH A BOSON METHOD

Robert Poenaru

DFT, IFIN-HH
Doctoral School of Physics, UB

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Outline

Nuclear Deformation

Nuclear Radius

The **shape** of the nucleus is most generally described in terms of the *nuclear radius*:

$$R(\theta,\varphi;t)=R_0\left(1+\sum_{\lambda=0}^{\infty}\sum_{\mu=-\lambda}^{\lambda}\alpha_{\lambda\mu}(t)Y_\lambda^\mu(\theta,\varphi)\right) \tag{1}$$

- The $\alpha_{\lambda\mu}$ are collective coordinates $\Longrightarrow$ *vibrations of the nucleus*.
- Y_λ^μ are the spherical harmonics.

Nuclear shapes

Most nuclei are spherical or axially symmetric in the ground state.

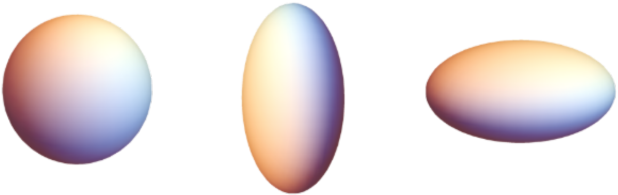

Figure 1: **Spherical:** $\beta_2 = 0$; **Prolate:** $\beta_2 > 0$; **Oblate:** $\beta_2 < 0$

Quadrupole deformations

- Most relevant vibrational degrees of freedom in nuclei.
- Play a crucial role in the rotational spectra of nuclei.

Quadrupole radius

For pure quadrupole deformations:

$$R(\theta,\varphi) = R_0\left(1+\sum_{\mu}\alpha_{2\mu}Y_2^{\mu}(\theta,\varphi)\right)\ , \tag{2}$$

Using A. Bohr's description, the coordinates $\alpha_{2\mu}$ can be reduced to only two *deformation parameters*: β_2 (*eccentricity*) and γ (**triaxiality**).

Tables and Figures

nice

Item	Quantity
Widgets	42
Gadgets	13

Table 1: An example table.