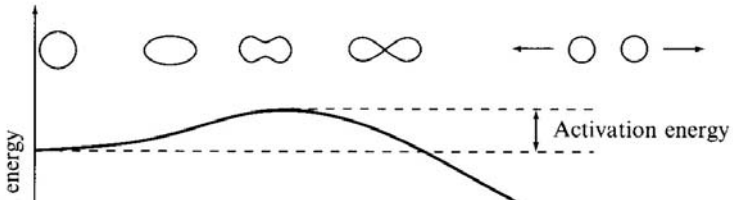
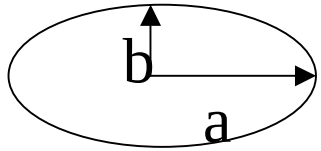
集団振動





$$a = R \cdot (1+\epsilon)$$
$$b = R \cdot (1+\epsilon)^{-1/2}$$

一般的に, $R(\theta,\phi) = R_0 \left(1 + \sum_{\lambda,\mu} \alpha_{\lambda\mu} Y^*_{\lambda\mu}\right)$

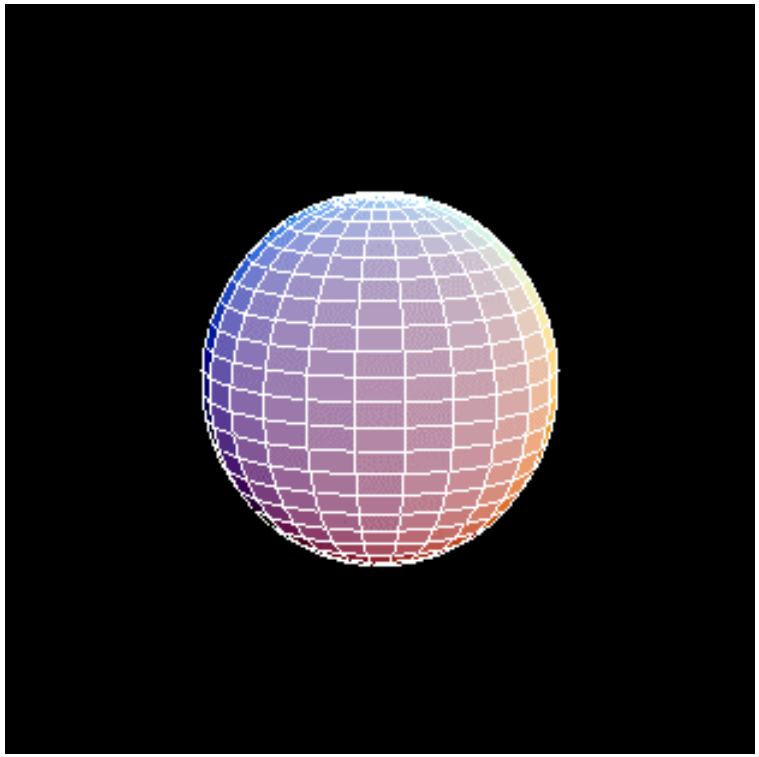
$$V = \frac{1}{2} \sum_{\lambda,\mu} C_\lambda \left|\alpha_{\lambda\mu}\right|^2$$

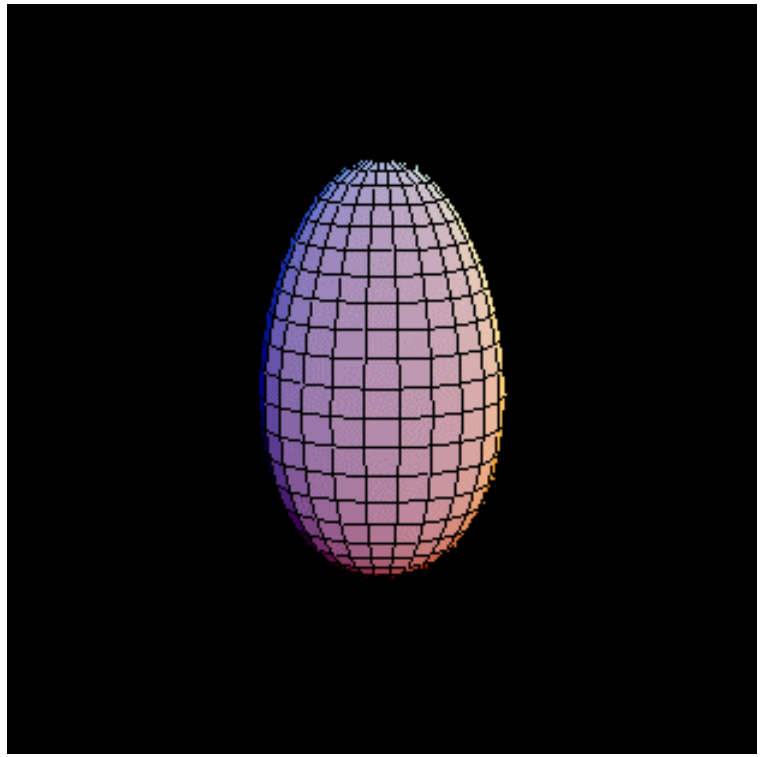
→ 量子化: 調和振動子

(note) 慣性能率 ⇦ 非圧縮性渦なし流体

$$R(\theta,\phi) = R_0\left(1+\sum_{\lambda,\mu}\alpha_{\lambda\mu}Y^*_{\lambda\mu}\right)$$

$$V = \frac{1}{2}\sum_{\lambda,\mu} C_\lambda \left|\alpha_{\lambda\mu}\right|^2$$



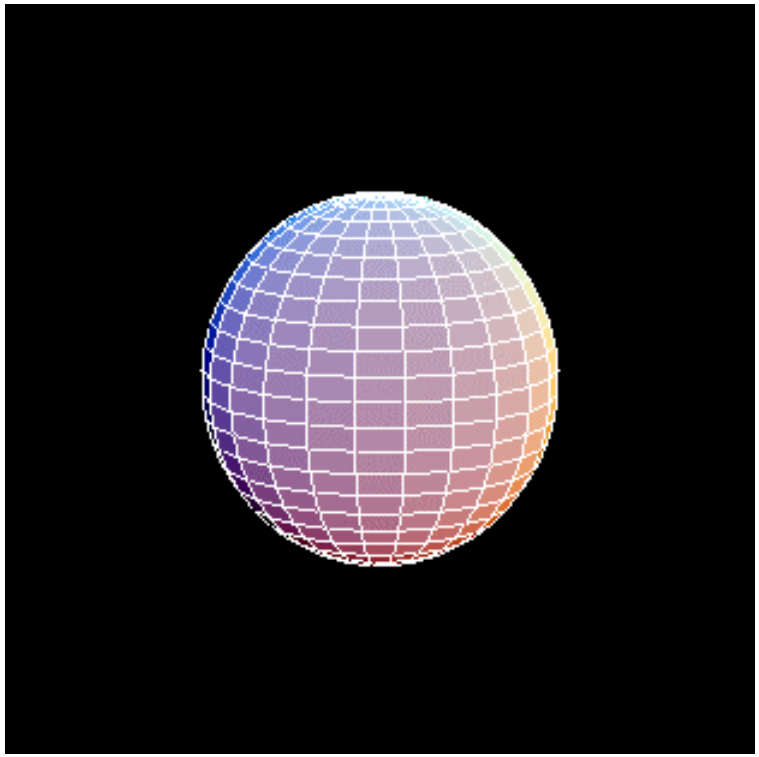


λ =2: 四重極型振動

λ =3: 八重極型振動

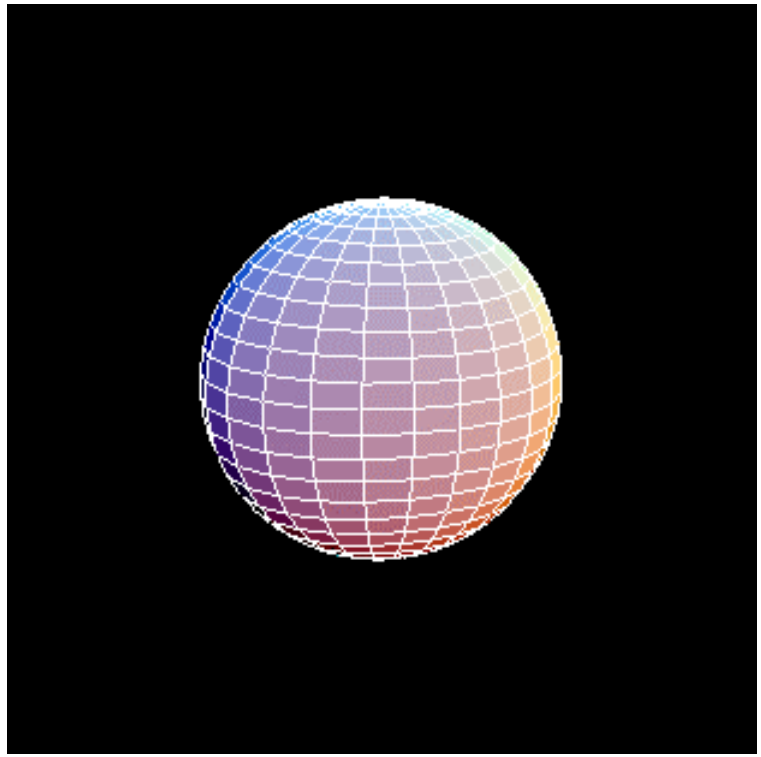
$$R(\theta,\phi) = R_0\left(1+\sum_{\lambda,\mu}\alpha_{\lambda\mu}Y^*_{\lambda\mu}\right)$$

$$V = \frac{1}{2}\sum_{\lambda,\mu} C_\lambda \left|\alpha_{\lambda\mu}\right|^2$$



Y_{20} 型振動

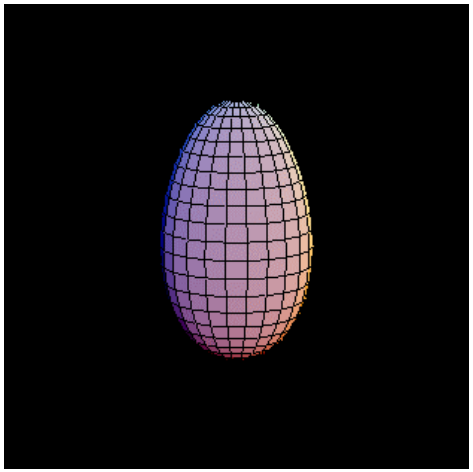
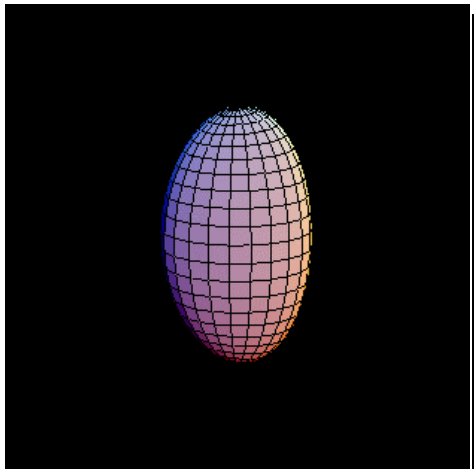
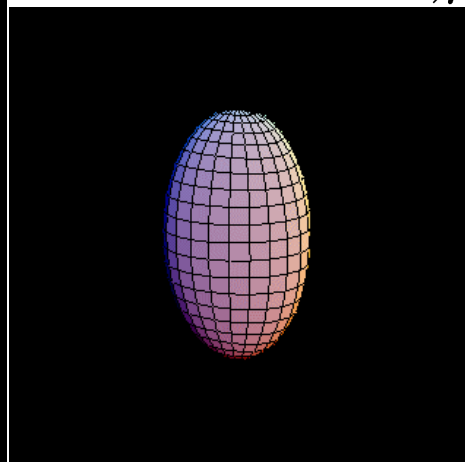
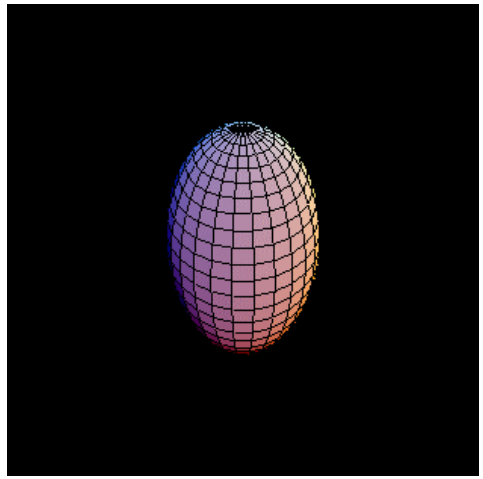
λ =2, μ = 0



Y_{22} 型振動

λ =2, μ = +/- 2

$$R(\theta,\phi) = R_0\left(1+\sum_{\lambda,\mu}\alpha_{\lambda\mu}Y^*_{\lambda\mu}\right) \qquad V = \frac{1}{2}\sum_{\lambda,\mu}C_\lambda\,|\alpha_{\lambda\mu}|^2$$

Y_{30} 型振動　　Y_{31} 型振動　　Y_{32} 型振動　　Y_{33} 型振動

λ =3, μ = 0　　λ =3, μ = +/- 1　　λ =3, μ = +/- 2　　λ =3, μ = +/- 3

どのくらいのエネルギーを与えれば原子核は振動しはじめるのか？

⟺ 振動の励起エネルギー

ムービー：在田謙一郎氏（名古屋工大）

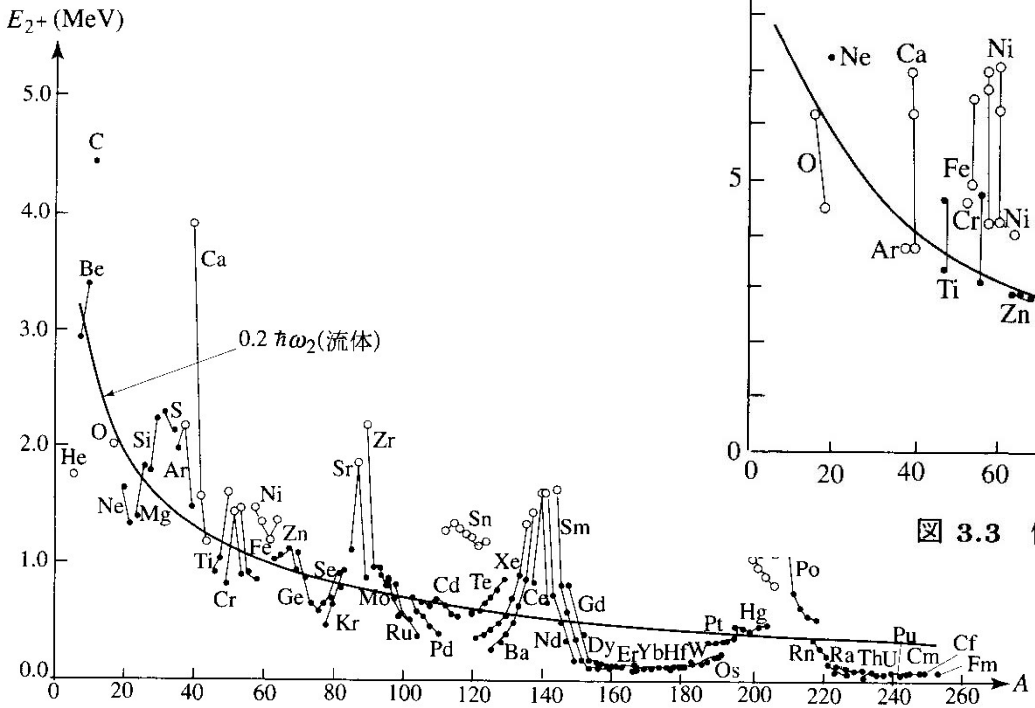


図 3.2　偶々核の第 1 励起 2^+ 状態の励起エネルギー

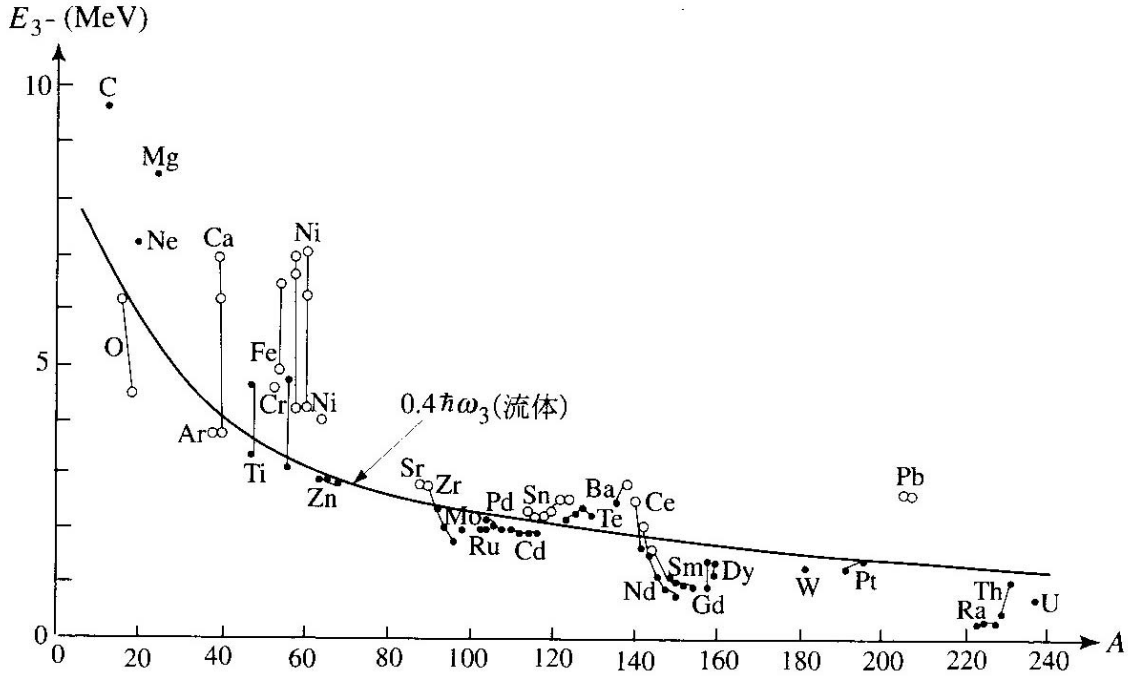


図 3.3　偶々核の第 1 励起 3^- 状態の励起エネルギー

2重フォノン状態

4^+ ——— 1.282 MeV
2^+ ——— 1.208 MeV
0^+ ——— 1.133 MeV

2^+ ——— 0.558 MeV

0^+ ———

^{114}Cd