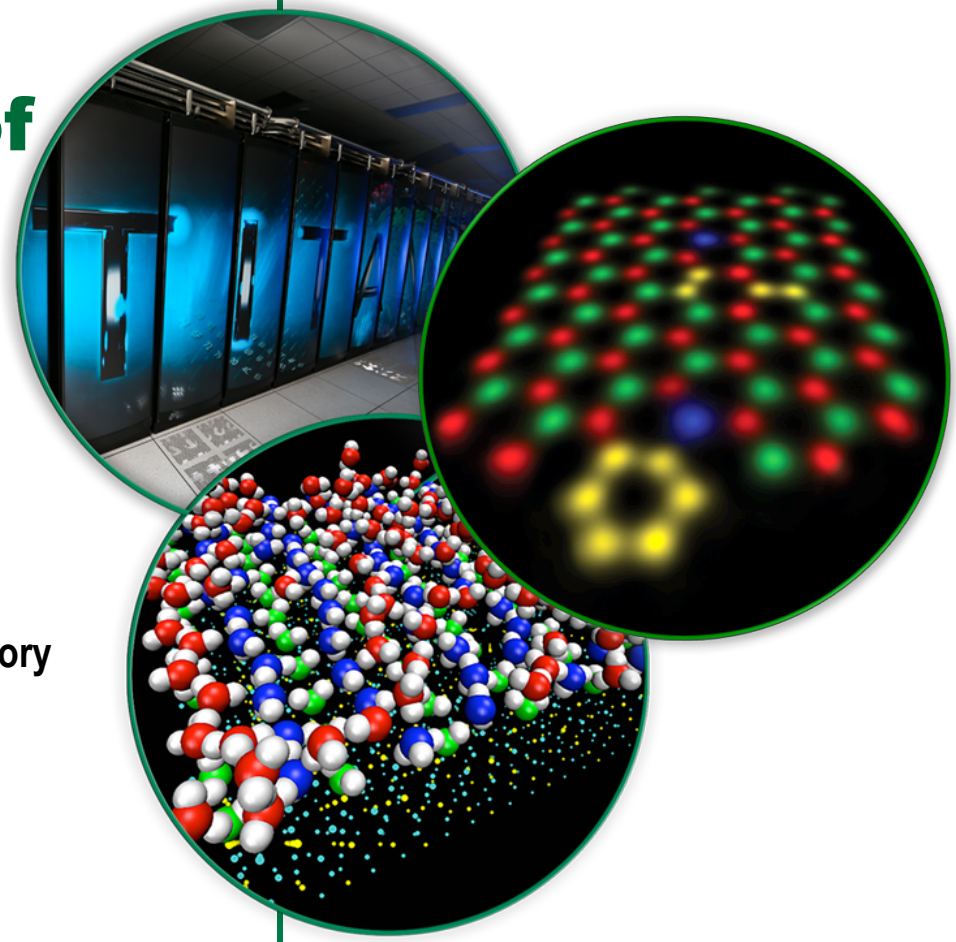
NS2016

Moments of Inertia of Axially Asymmetric Nuclei



James Mitchell Allmond
Physics Division – Oak Ridge National Laboratory

John L. Wood
School of Physics – Georgia Institute of Technology

July 25, 2016

U.S. DEPARTMENT OF ENERGY

OAK RIDGE NATIONAL LABORATORY
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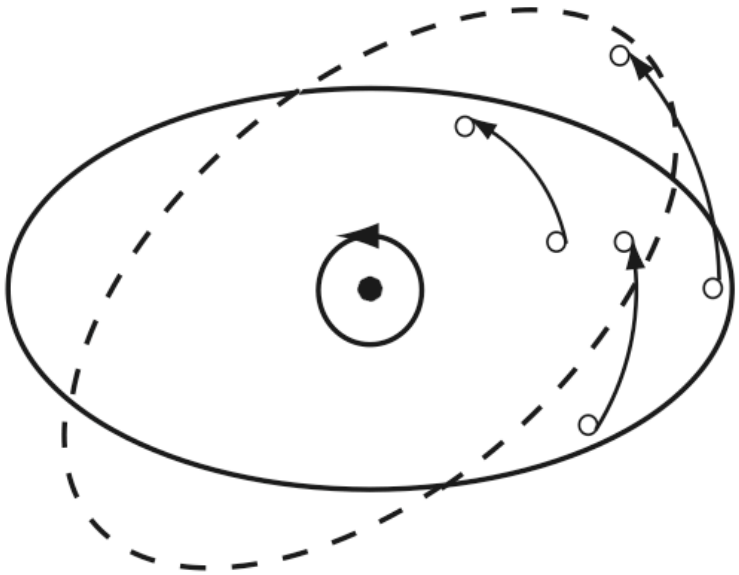
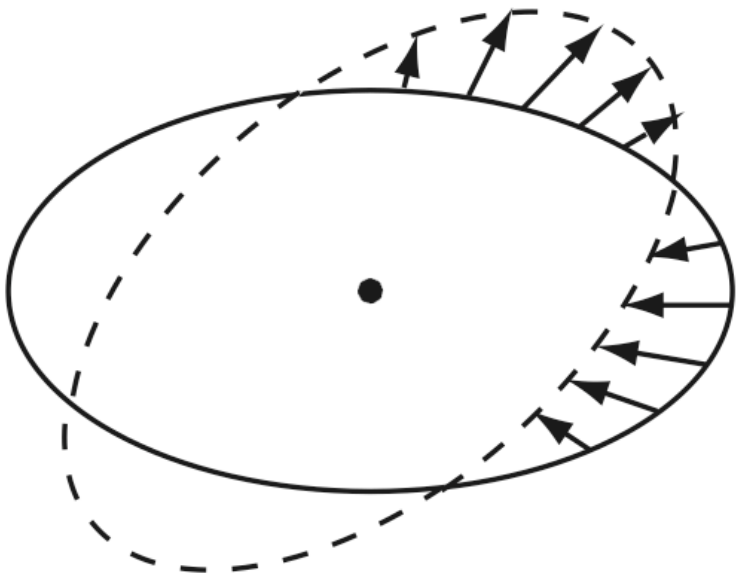
Inertial Flow

Perfect super fluids should exhibit irrotational flow (radial flow)

Rigid

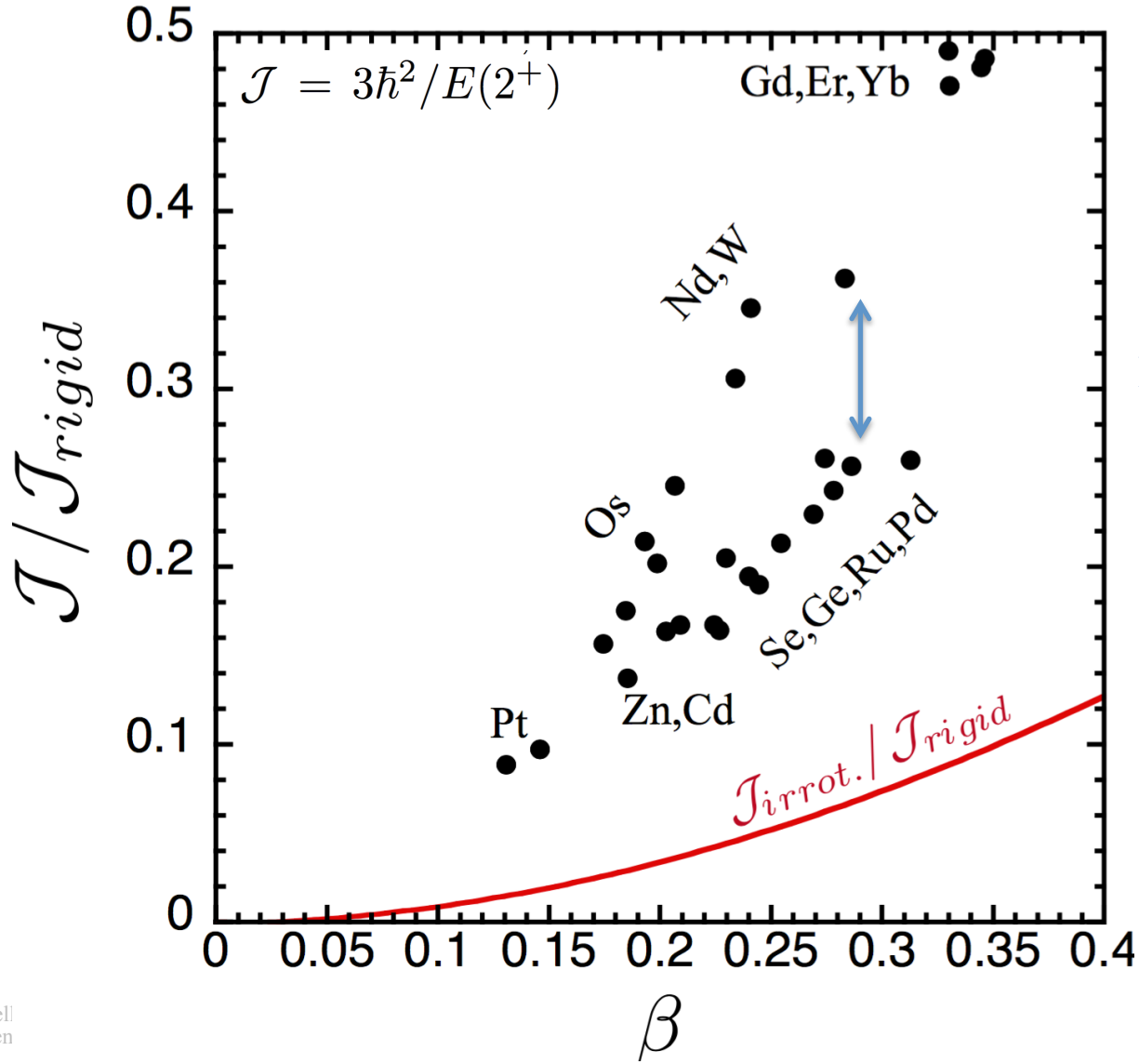


Irrotational



Moment of Inertia

Moment of Inertia shows bifurcation with axially symmetric assumption

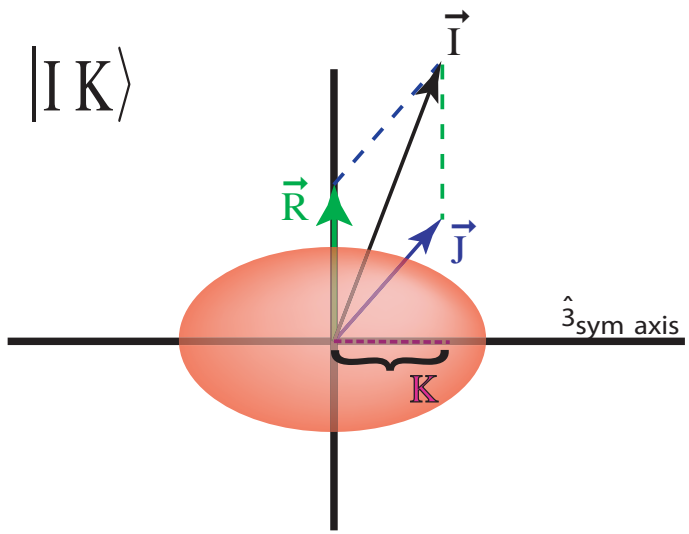


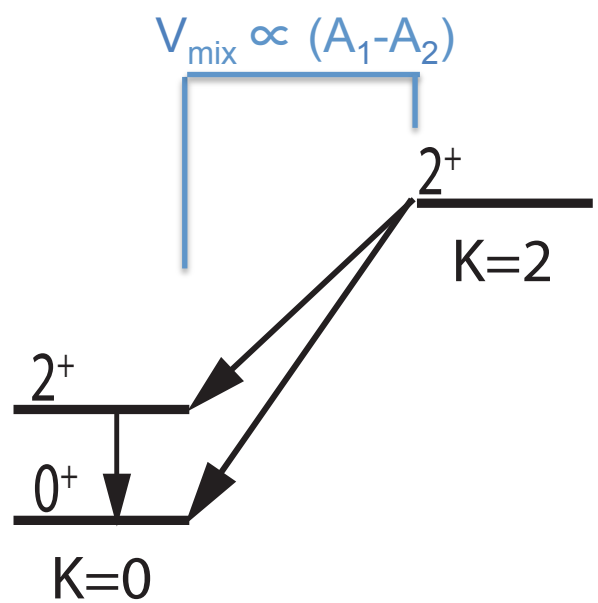
Kumar-Cline Sum Rules indicate that $\gamma_{bottom} > \gamma_{top}$

Axially Asymmetric Top

rotations about all three axes

$$H = A_1 \hat{I}_1^2 + A_2 \hat{I}_2^2 + A_3 \hat{I}_3^2$$

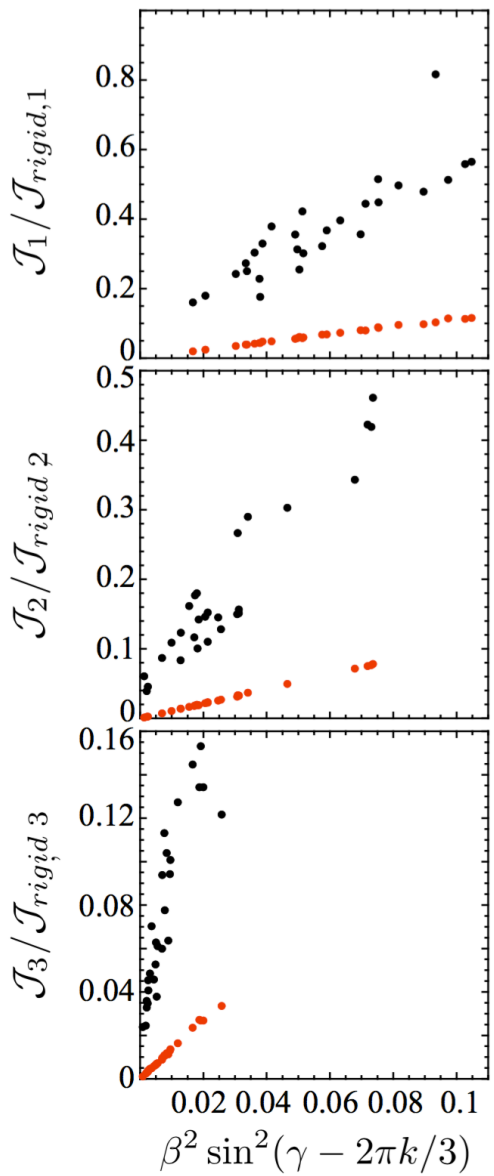




2^+ energies and E2 matrix elements (with signs) from Coulomb excitation permit a unique determination of all three moments of inertia.

Moments of Inertia

Moments of inertia show a $\beta^2\sin^2$ (irrotational-like) dependence



Inertia$_1$ is x 5.4 irrotational

Inertia$_2$ is x 5.8 irrotational

Inertia$_3$ is x 5.8 irrotational

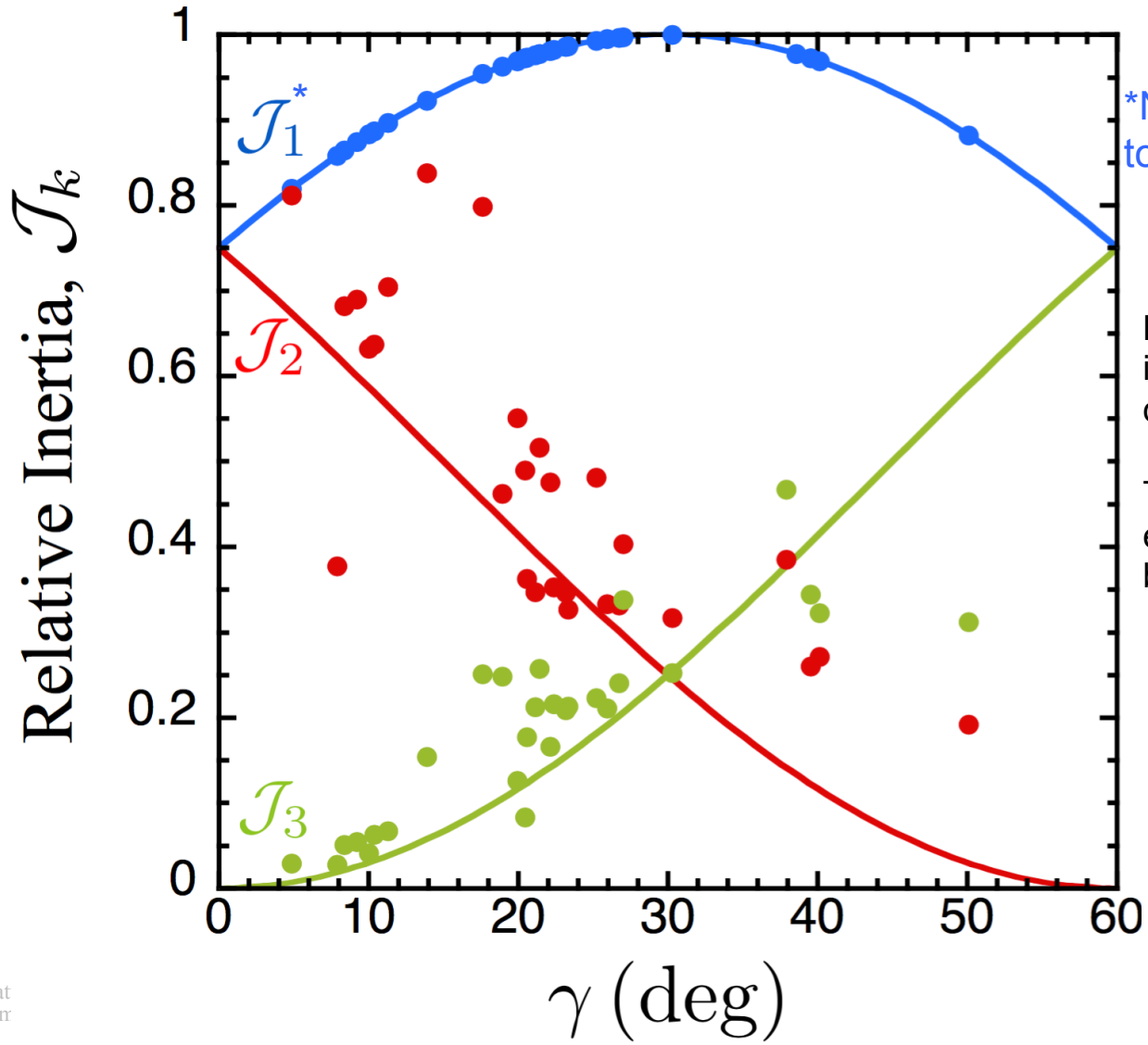
No evidence that 3-axis is any more coupled to the intrinsic motion than the other axes.

(see discussion in Bohr & Mottelson)

Relative Moments of Inertia

Most relative moments of Inertia for $\gamma < 30$ appear *qualitatively* irrotational

outliers for $\gamma < 30$ have low-lying K=0 bands



*Normalized to 1-axis

Better description of inertial flow needed for quantitative calculations!

To Be Continued ..... e.g., SP(3,R) description by D. Rowe