Sensitivity of the γ-decay of the Pygmy Dipole Resonance to nuclear deformation

10th QPT Workshop

TECHNISCHE UNIVERSITÄT DARMSTADT

O. Papst[1], J. Isaak[1], N. Pietralla[1], D. Savran[2], V. Werner[1].

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Nuclear Photonics

DFG Deutsche Forschungsgemeinschaft German Research Foundation

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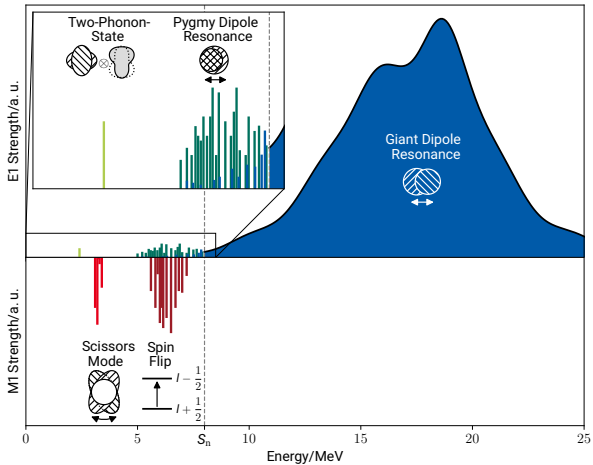
Dipole excitations in nuclei



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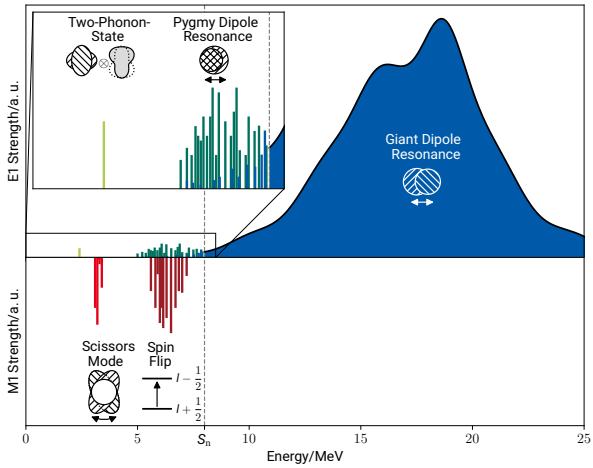

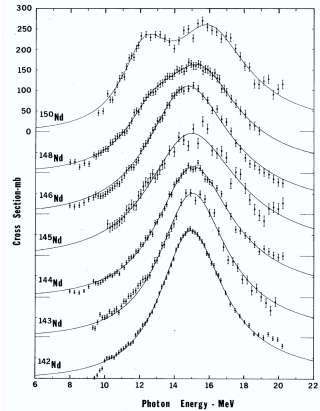

B. L. Berman and S. C. Fultz, Rev. Mod. Phys. **47**, 713 (1975)

Experimental data on the Pygmy Dipole Resonance

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Experiments: (γ, γ'), i. e. Nuclear Resonance Fluorescence (NRF) using

- bremsstrahlung (S-DALINAC, gELBE),
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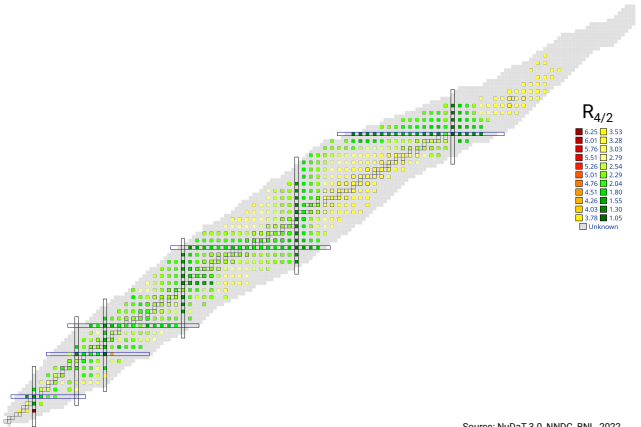

Source: NuDaT 3.0, NNDC, BNL, 2022

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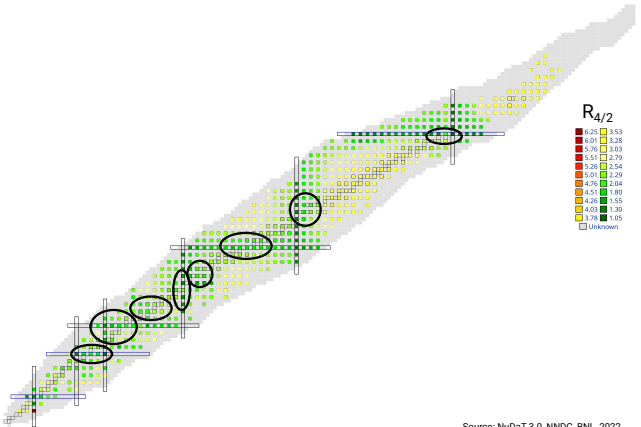

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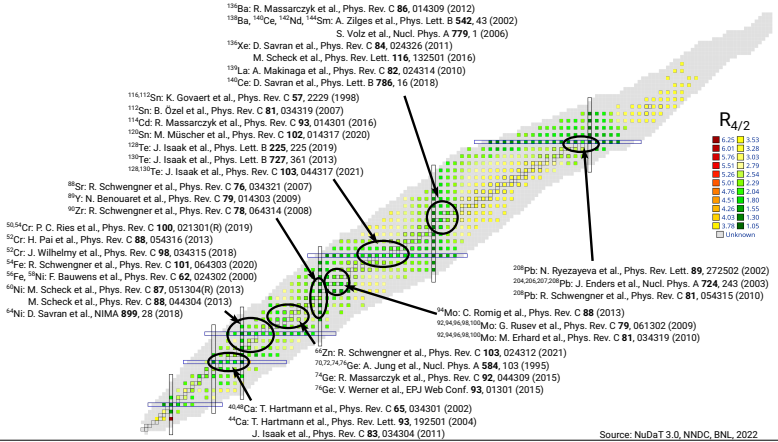

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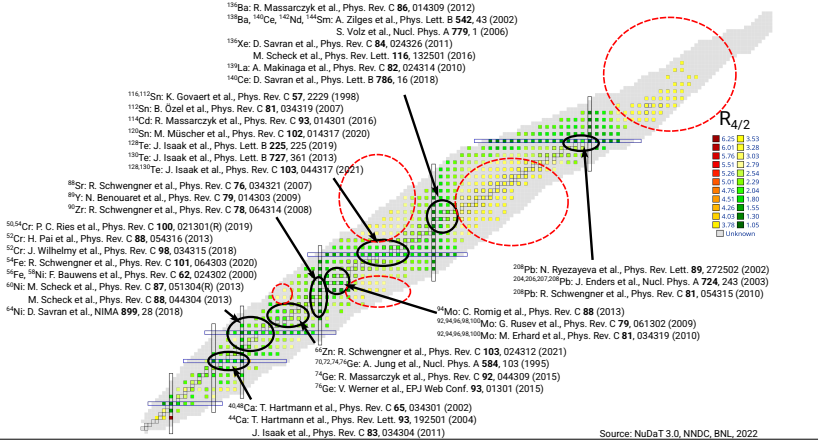

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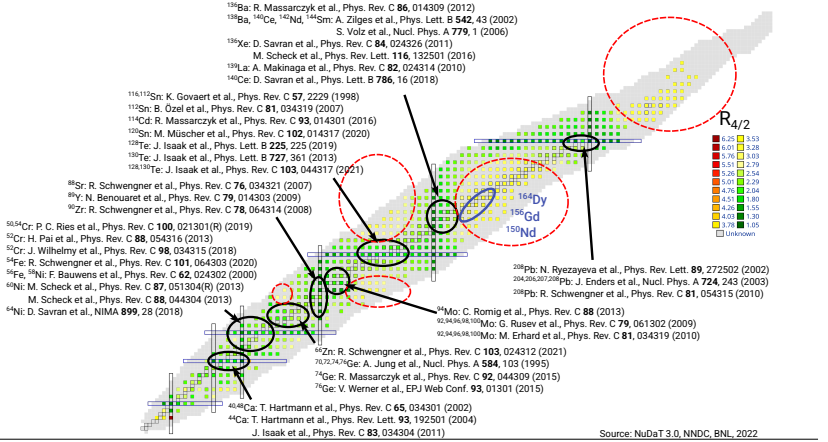

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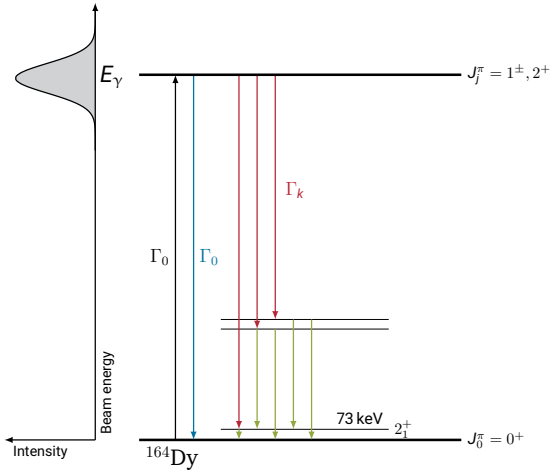
Nuclear Resonance Fluorescence (NRF)



Nuclear Resonance Fluorescence (NRF)

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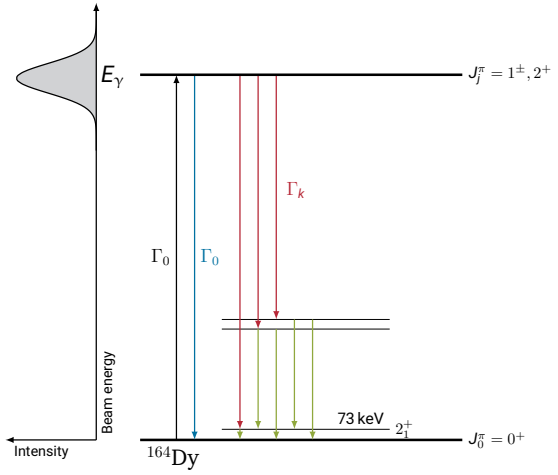

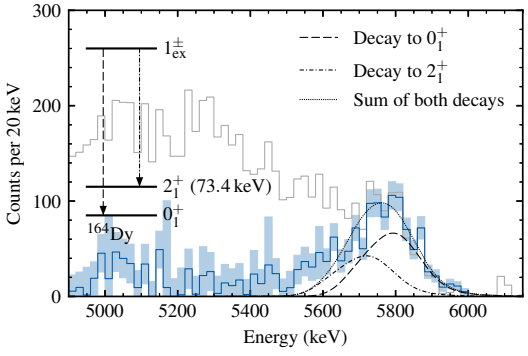

Figure: O. Papst et al., Phys. Rev. C **102**, 034323 (2020)

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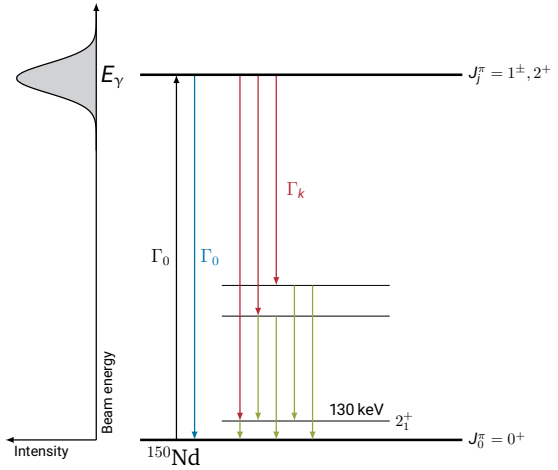
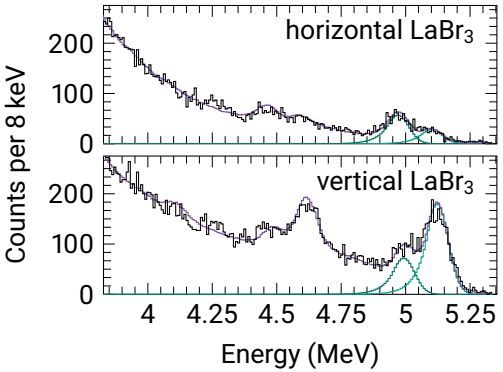
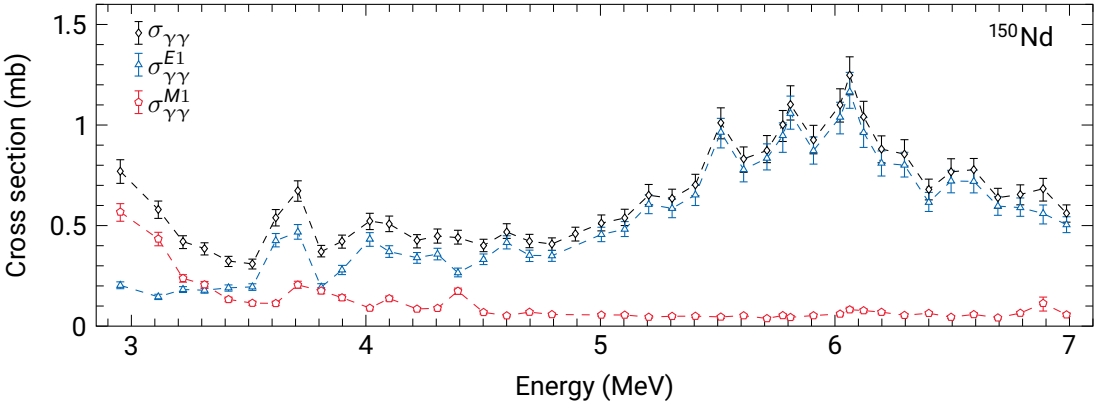
Nuclear Resonance Fluorescence (NRF)





High-resolution HIγS γ-ray beam: ^{150}Nd

Cross sections for ^{150}Nd



$\sigma_{\gamma\gamma}$ for $E > 3$ MeV predominantly $E1$.

Average branching ratios R_{exp} for ^{150}Nd

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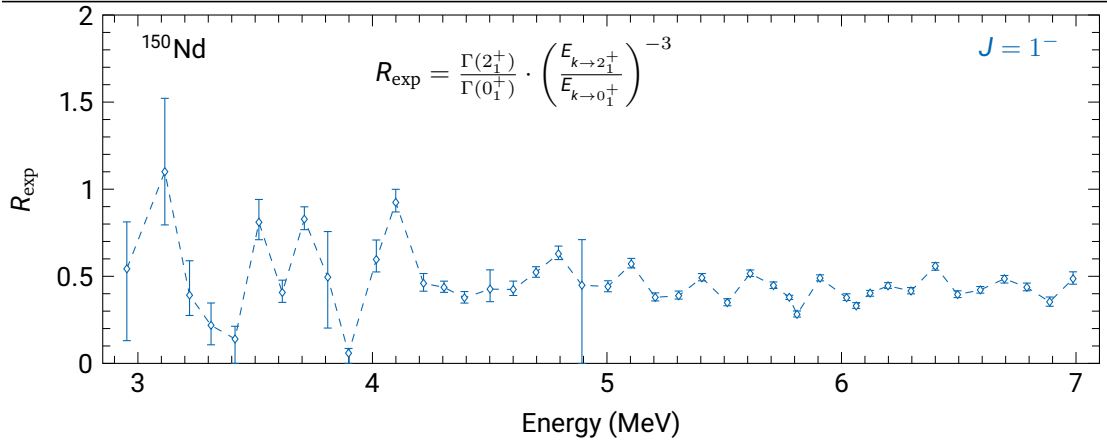

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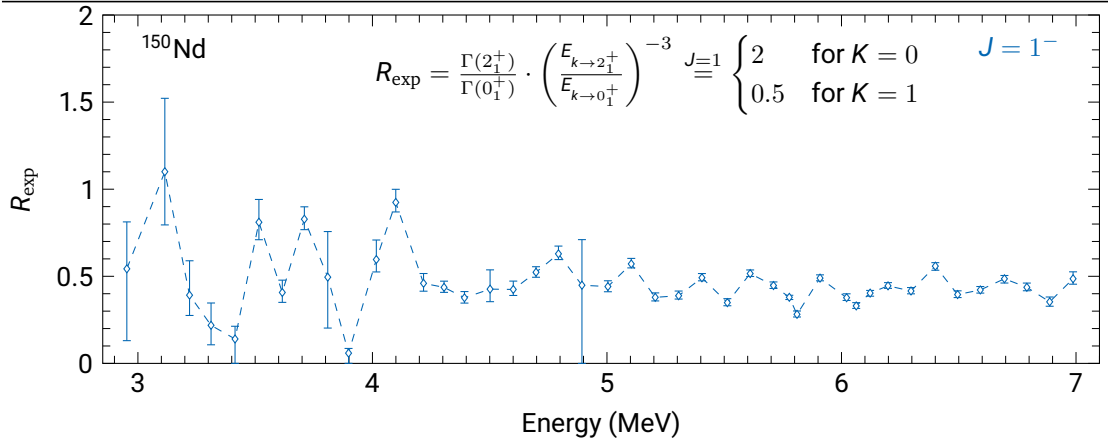

Average branching ratios R_{exp} for different isotopes

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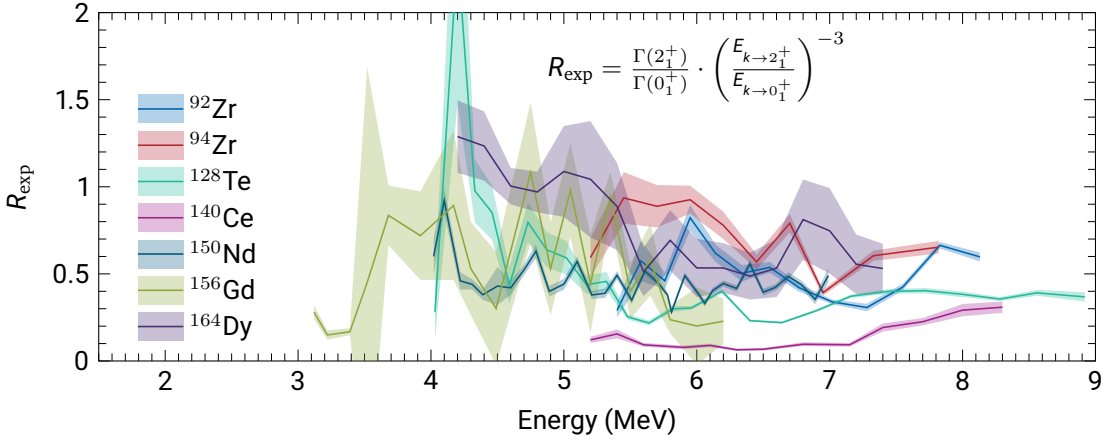

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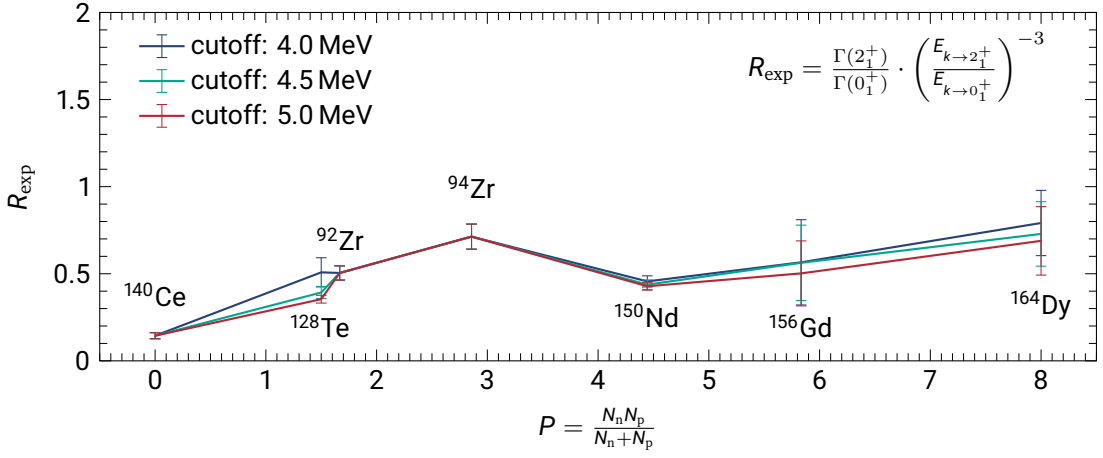
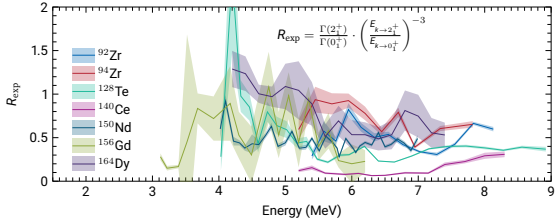
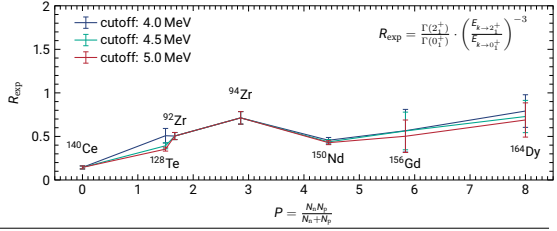
R_{exp} vs P-factor for different isotopes



Discussion points

- Development of average branching ratios R_{exp}
  - vs. excitation energy
  - vs. P-factor
- $R_{\mathrm{exp}} \approx 0.5$ constant?
- Tail of GDR? ($K = 1$?)
- Expected signature of nuclear deformation?
  - Splitting of the PDR?
- Is K a good quantum number?





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