Simulations of ^{254}No

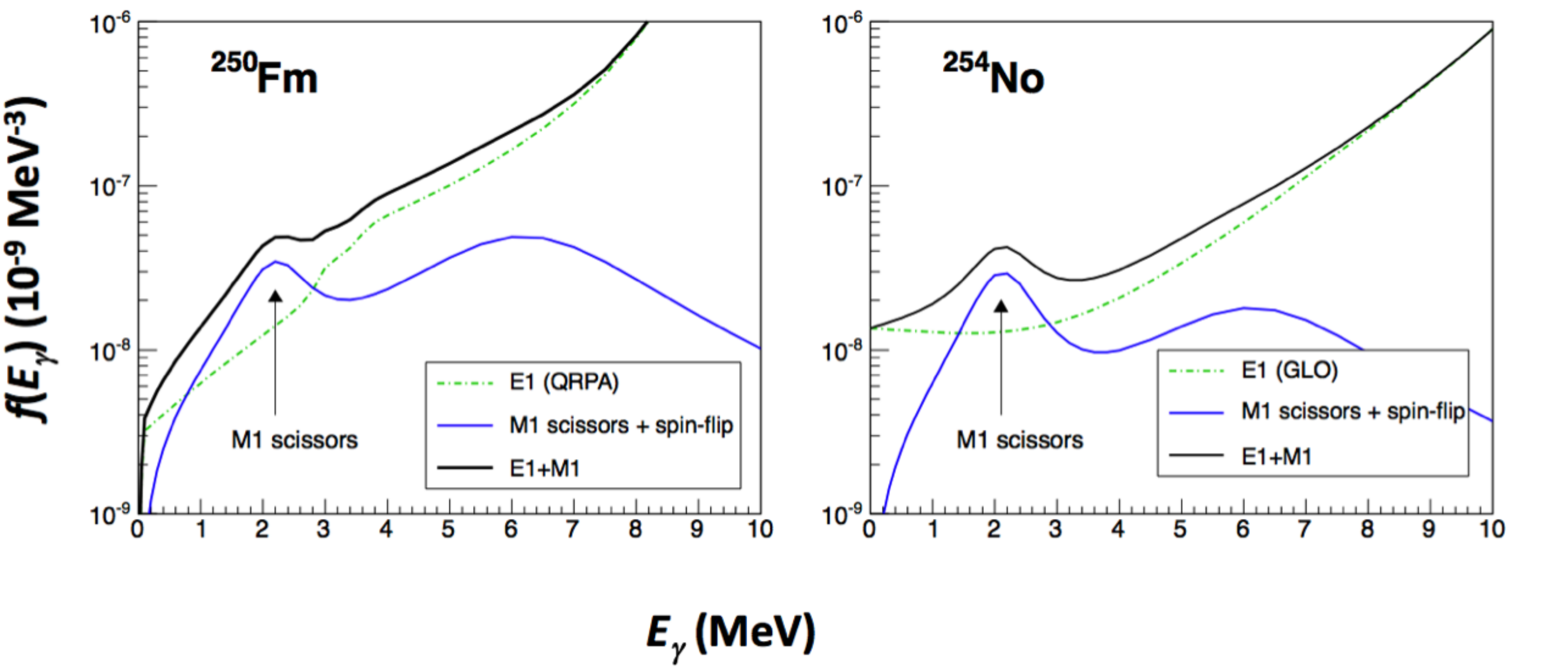
A. Lopez-Martens

(for the AGATA White book)

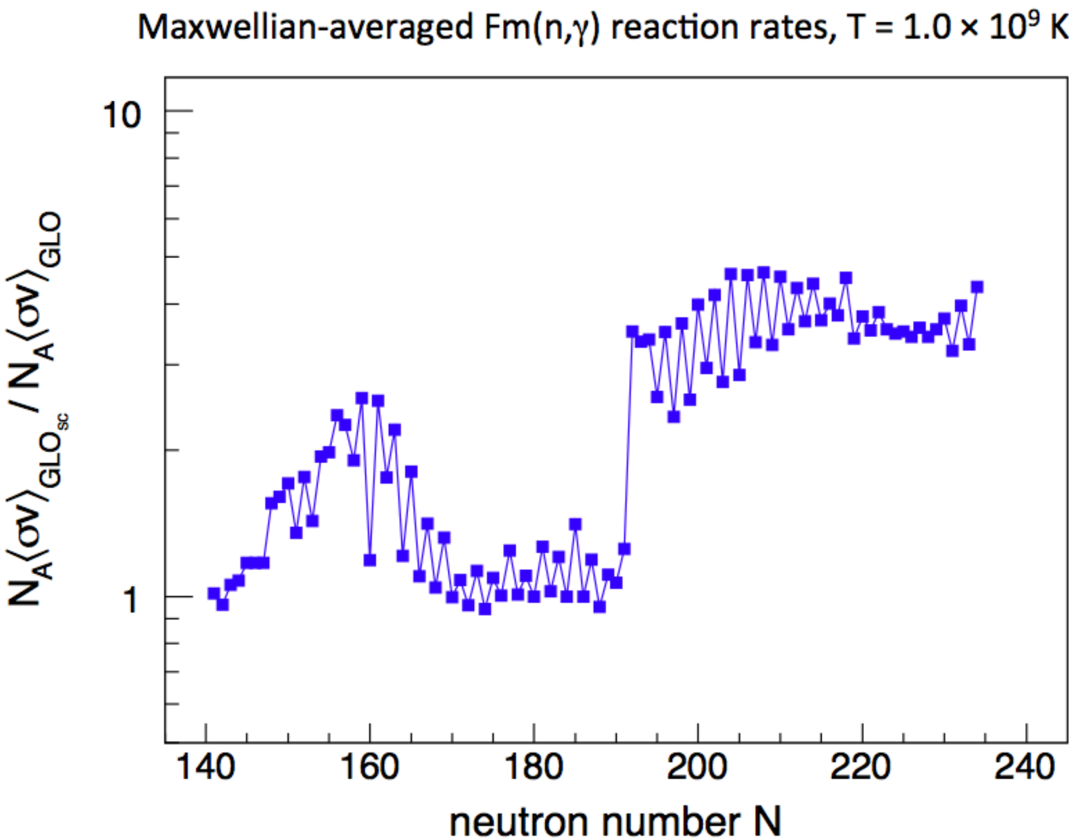
Outline

- Motivations
- Ingredients
- Results
- AGATA as a calorimeter ?

Predicted transition strengths

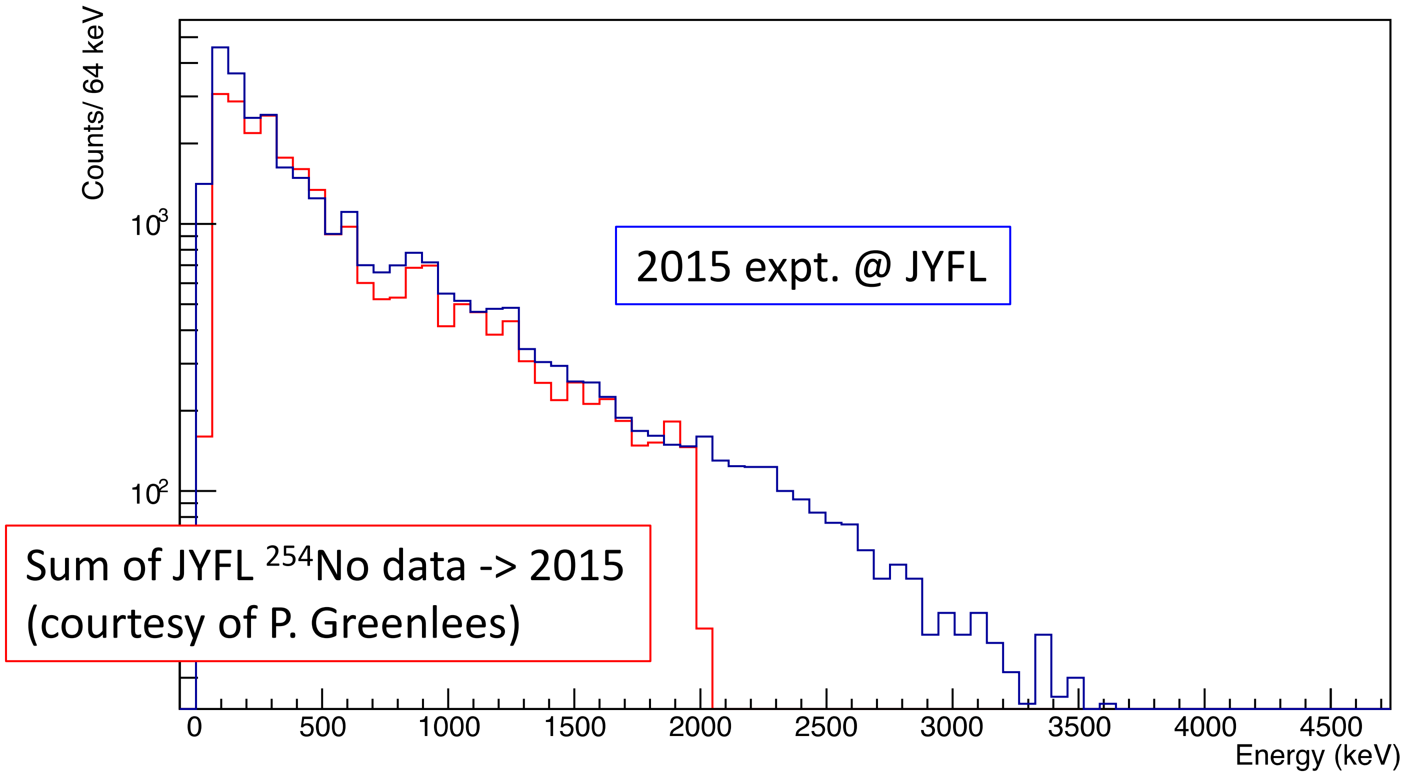


Consequences

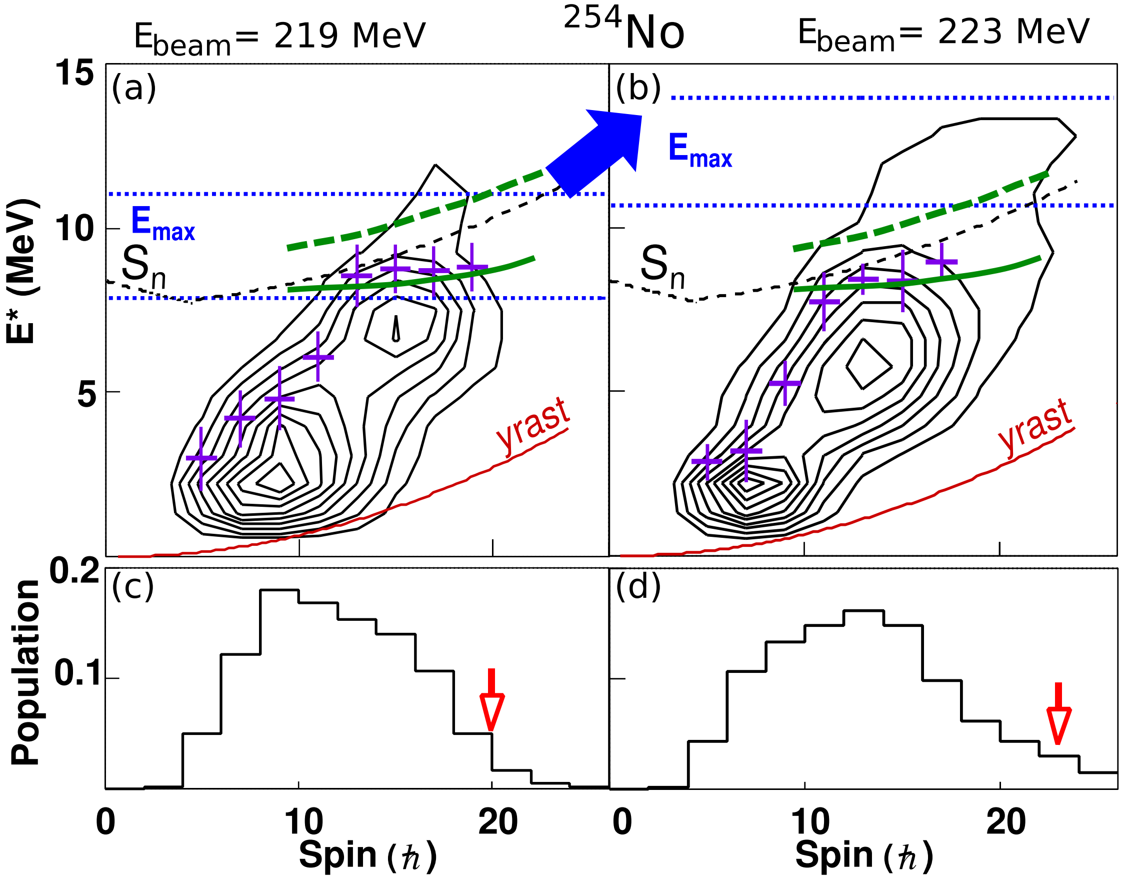


Enhanced survival against fission in fusion-evaporation reactions ?

Effect of enhanced strength in the experimental spectra ?



Entry distribution (I,E)



G. Henning et al., Phys. Rev. Lett. 113 (2014) 262505

Strength function & level density

Standard Lorentzian M1 scissors mode:
sigma(M1) = 0.675 mb
E(M1) = 2.199 MeV
Gamma(M1) = 1.200 MeV

Generalised Lorentzian E1:
sigma(E1) = 789.003 mb
E(E1) = 13.112 MeV
Gamma(E1) = 3.546 MeV

$$r(I) = \frac{\sqrt{p}}{12}\left(aU(I)\right)^{-1/4} U(I)^{-1} e^{2\sqrt{a\left(U(I)-D\right)}}$$

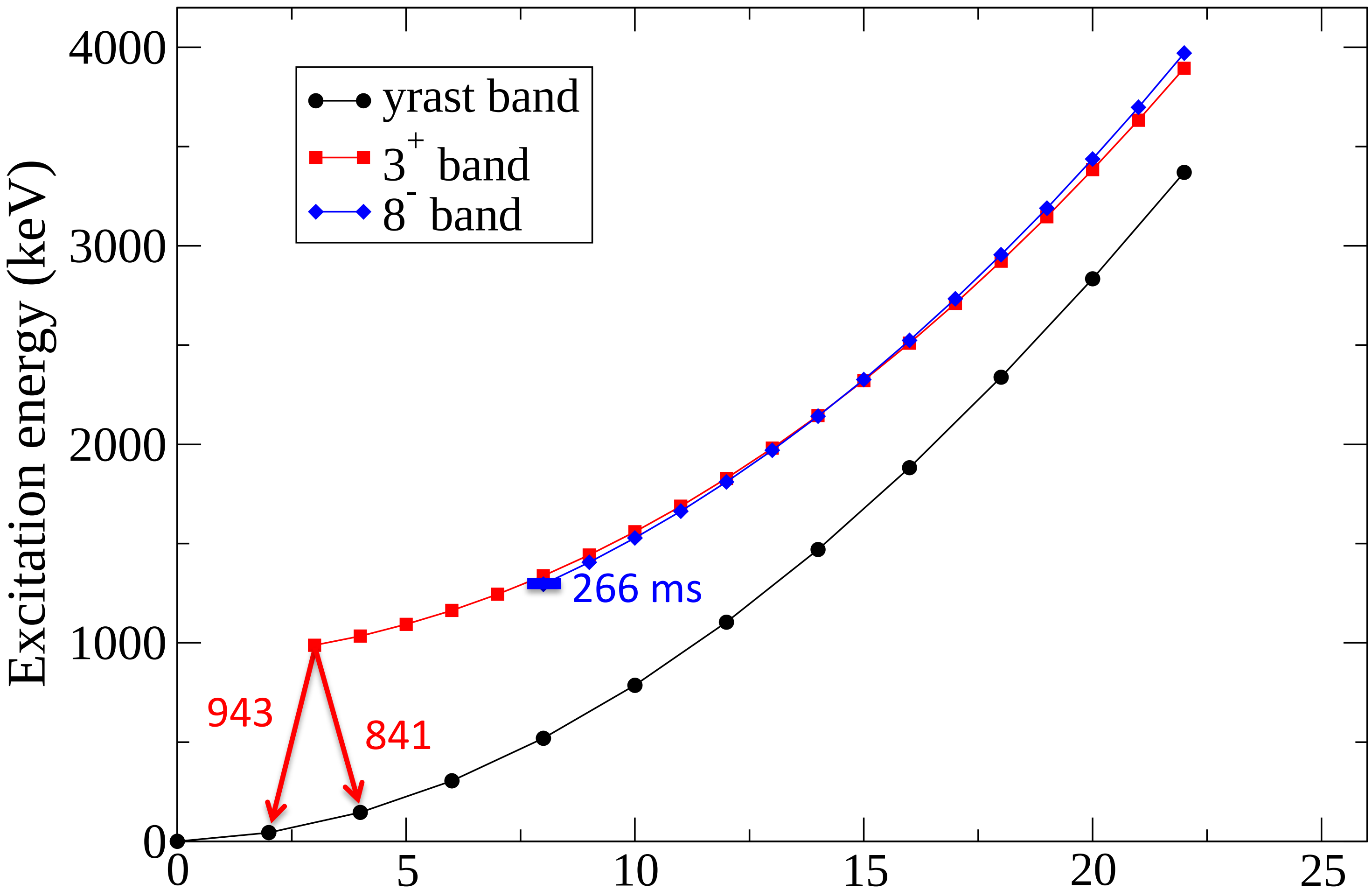
T. Dossing et al., Phys. Rep. 268 (1996) 1

$$D = \frac{24}{\sqrt{A}}$$

$$a = \frac{A}{10}$$

$$U(I) = E(I) - E_{yrast}(I)$$

254No level scheme



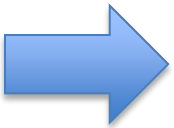
If the statistical decay leads to a point with U<U0, the decay proceeds via the discrete bands

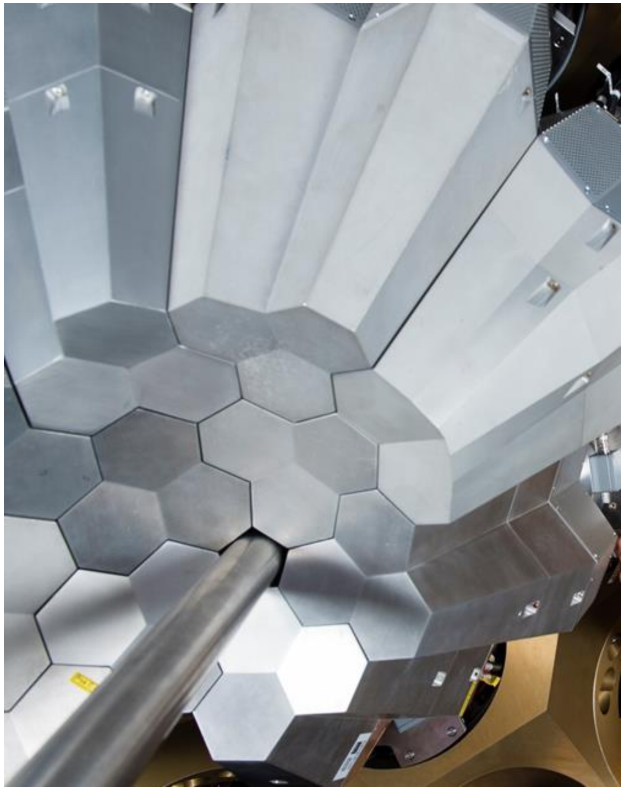
Calculated E2/M1 intensity ratios for the 3^+ and 8^- bands

Conversion coefficients for all transitions taken from BriCC

Externally generated event file

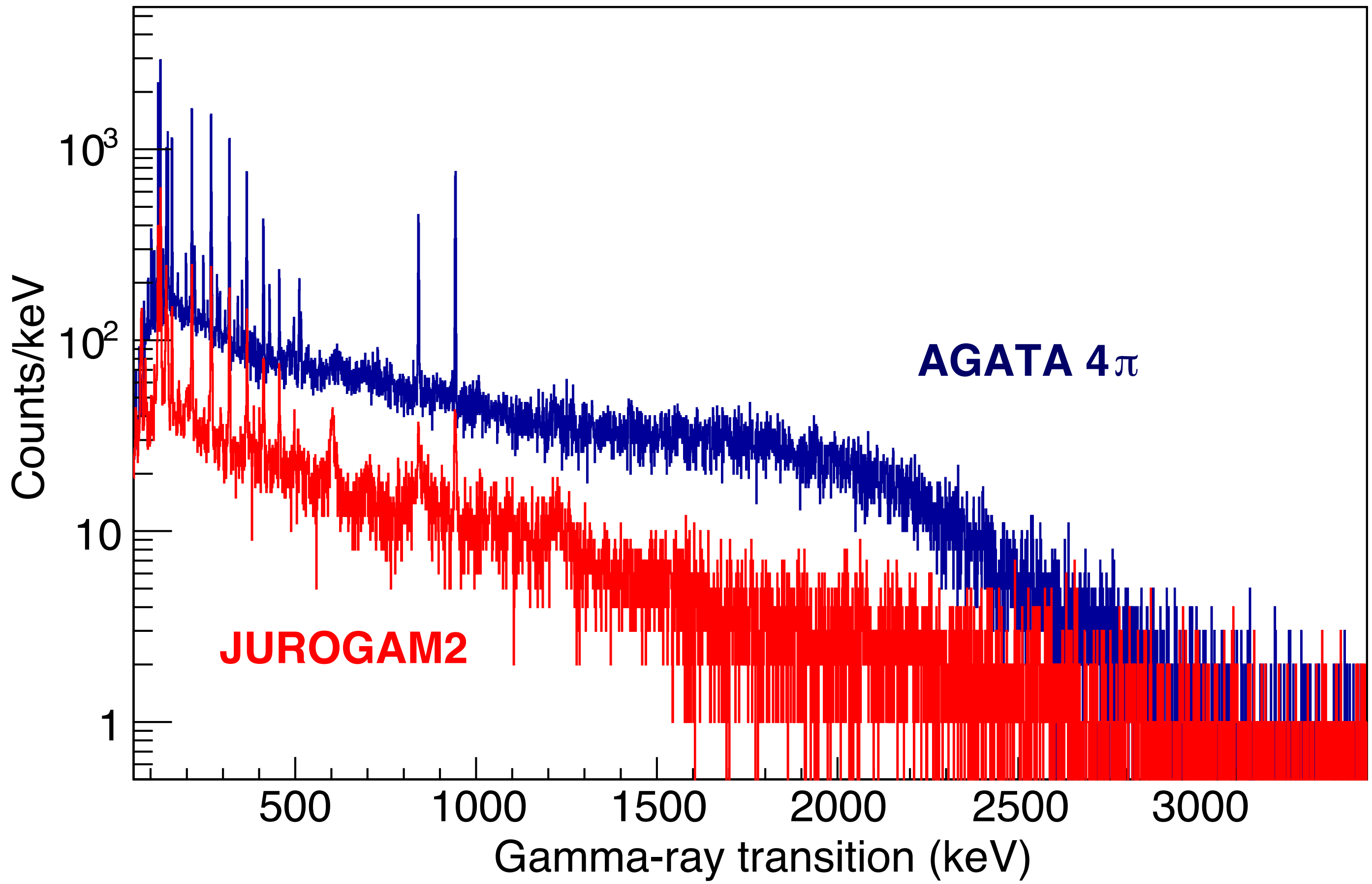
- FORMAT 0 2
- #
- REACTION 20 48 82 208 0
- #
- EMITTED 1 1
- #
- $
- -101 102 254 40 0 0 1 0 0 0
- 1 849.464000 -0.770698 -0.440876 -0.460058
- 1 1264.929120 -0.235567 0.842331 0.484755
- 1 1383.844954 0.873258 0.448673 -0.190035
- 1 151.000000 -0.970124 0.233685 0.065192
- 1 943.000000 -0.634519 -0.516352 -0.575122
- $
- -101 102 254 40 0 0 1 0 0 0
- 1 699.624000 0.910301 -0.318901 -0.263920
- 1 1814.336160 0.998360 0.046630 0.033200
- 1 181.039840 0.971509 0.149490 0.183909
- $
- ….





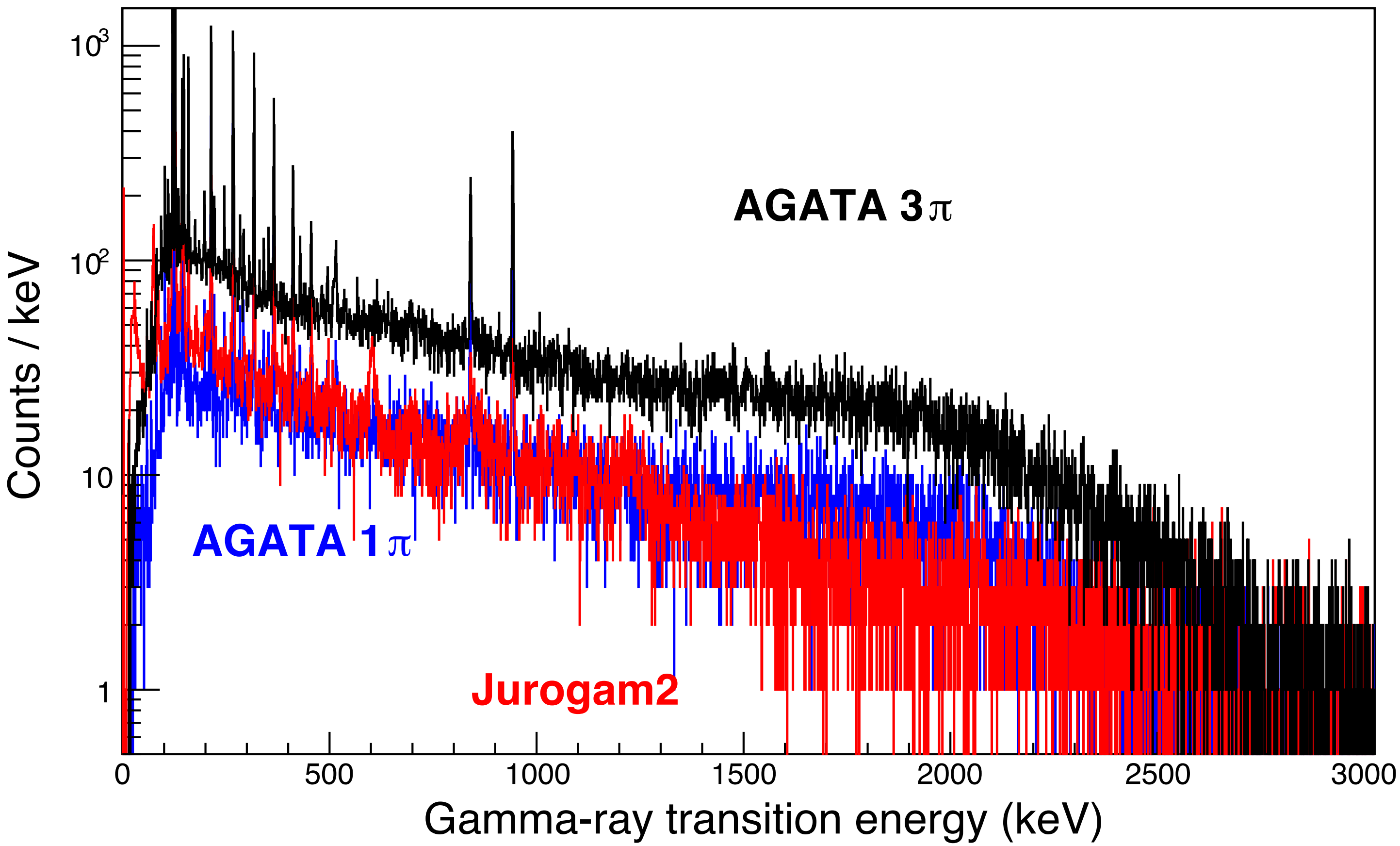
Simulations (1)

Detected emission from the decay of 40 000 ^{254}No nuclei

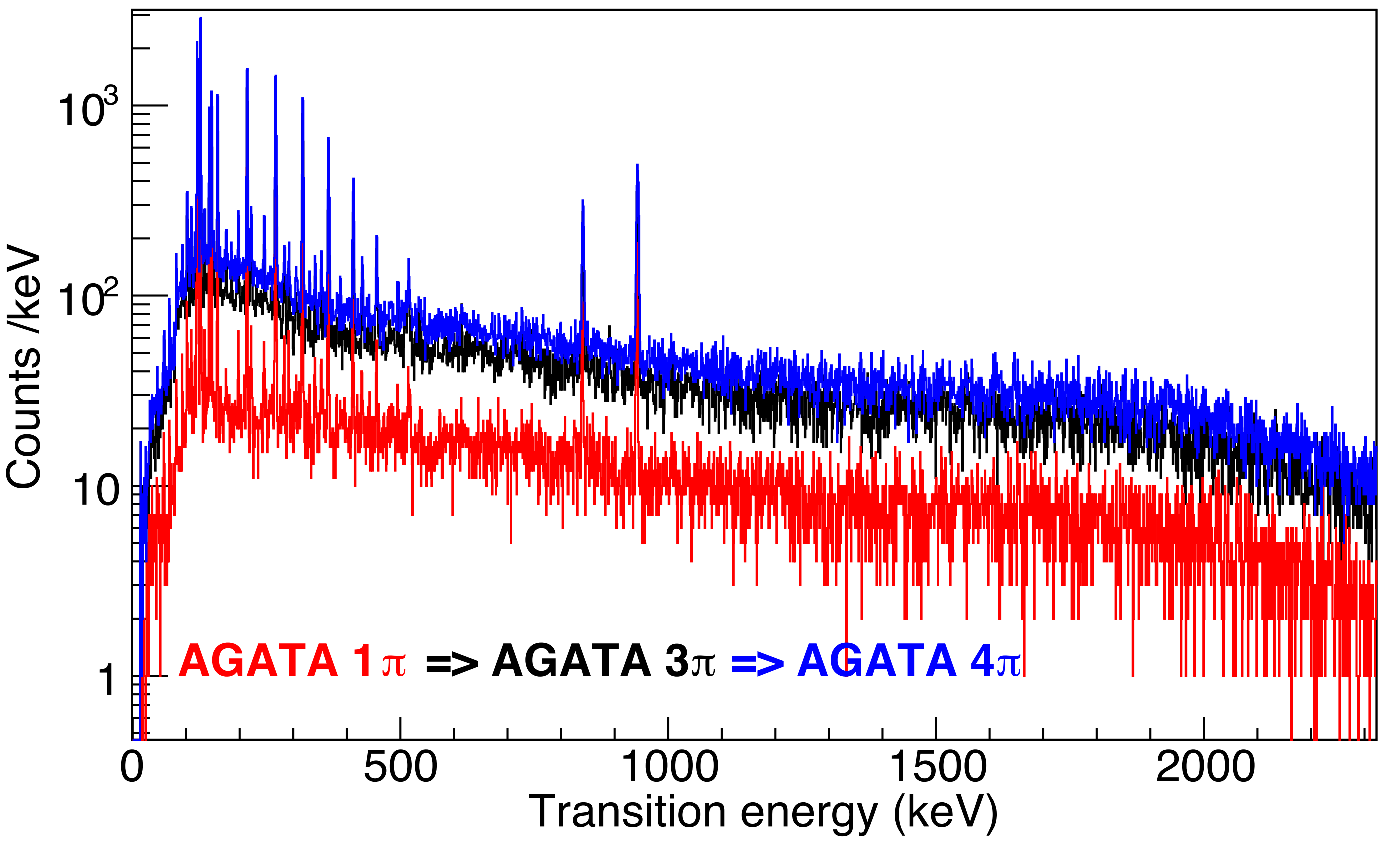


Jurogam2 simulations ongoing with Nptool (D. Cox)

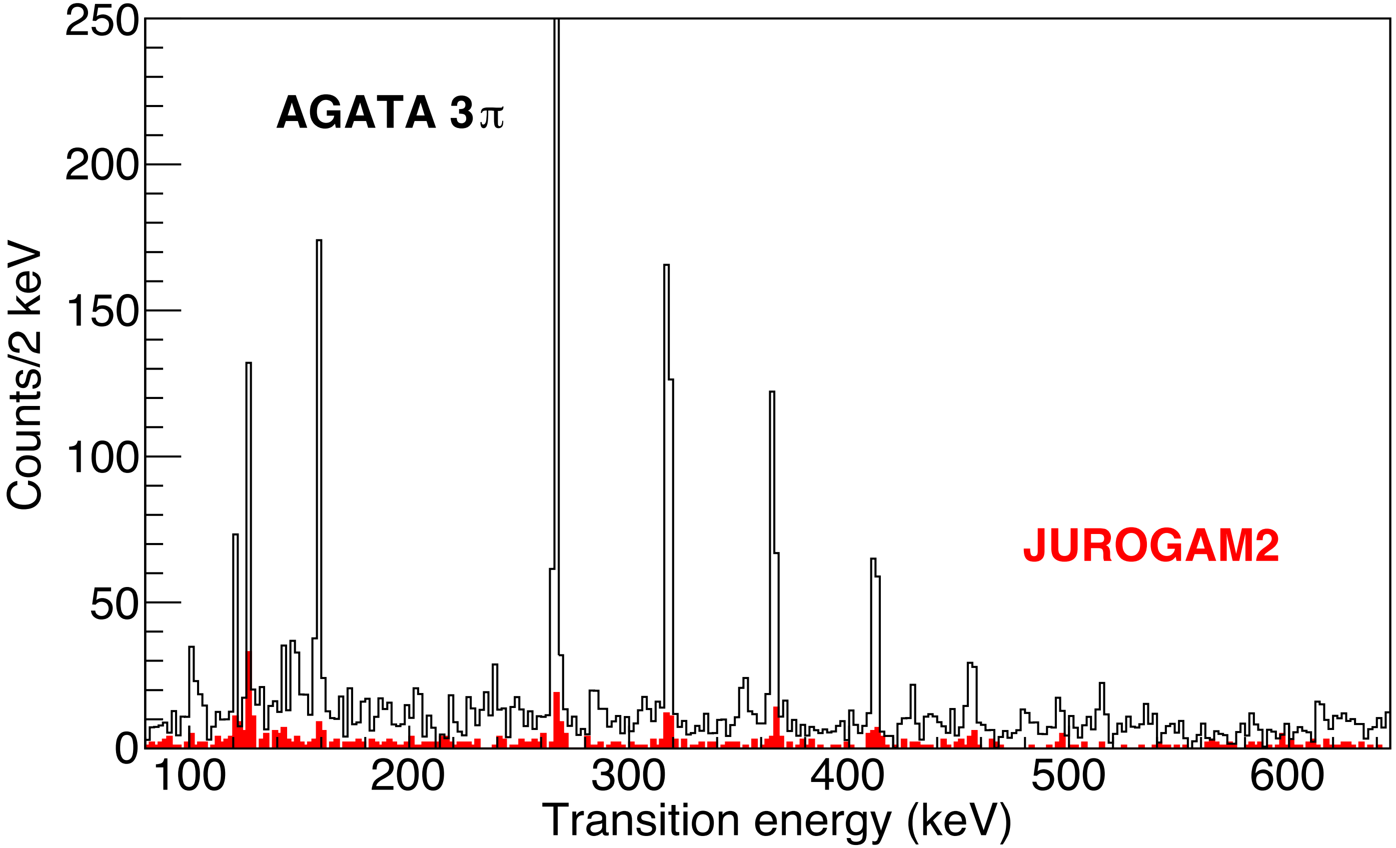
Simulations (2)



Simulations (3)



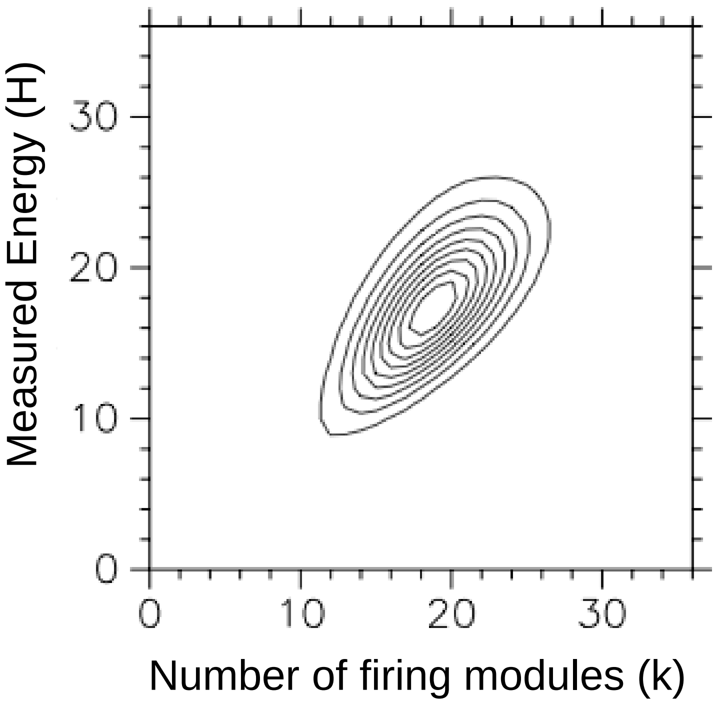
Simulations (4)

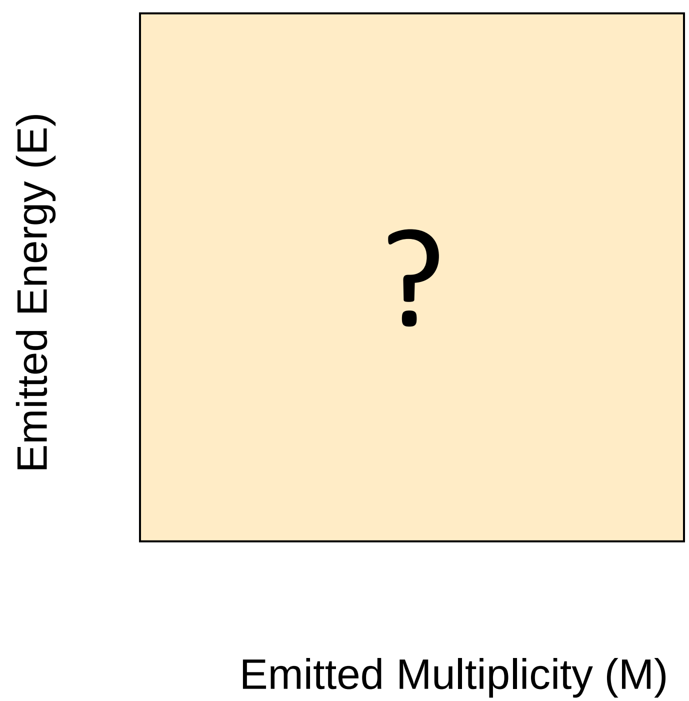


Calorimetric studies

GAMMASPHERE: 78% (110 Ge+BGO modules)
Resolution ~200 keV

M. Jääskeläinen et al., Nucl. Instr. Meth. 204 (1983) 385
P. Benet, PhD thesis, Université Louis Pasteur, Strasbourg (1988)





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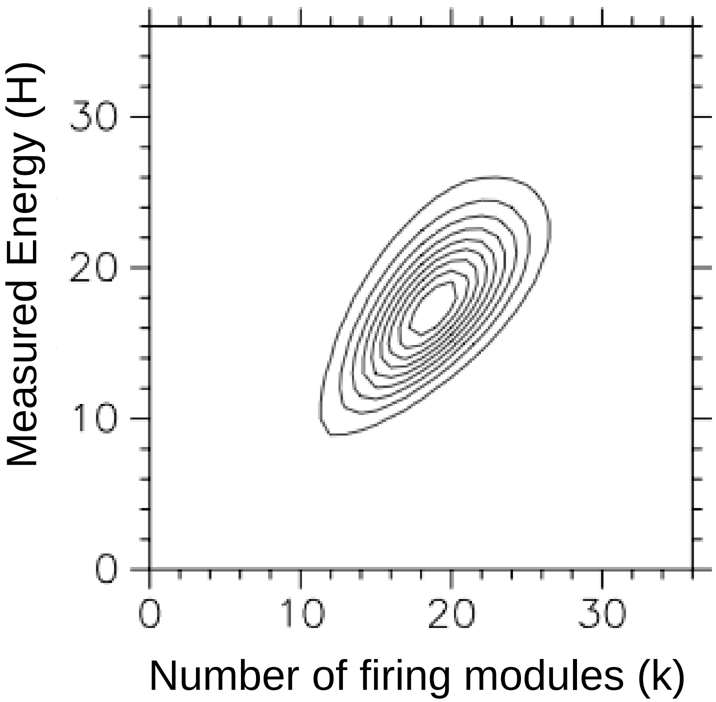

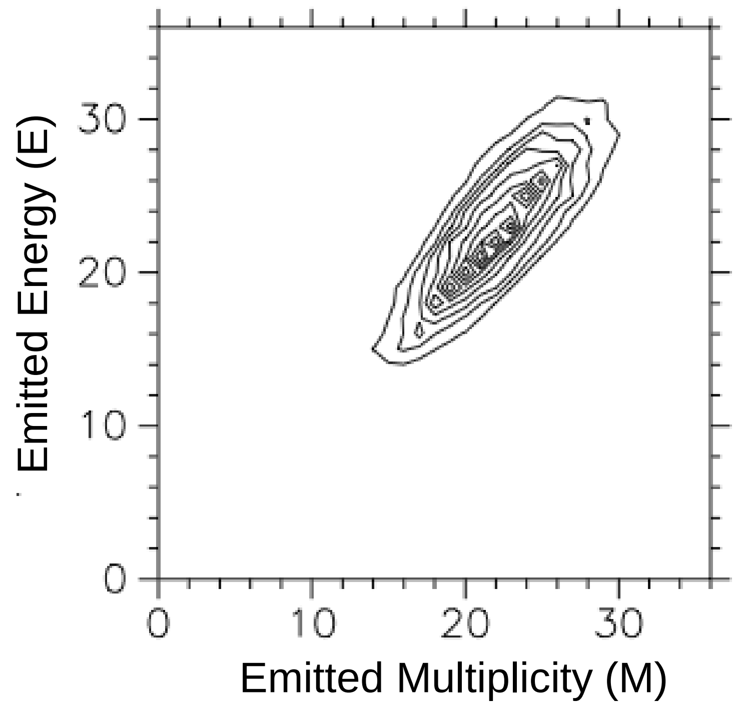

AGATA as a calorimeter

Efficiency (~1 MeV) ~ 50 %
Resolution ~ 2.5 keV

Questions:

can we unfold AGATA data ?
what gain can be obtained wrt GAMMASPHERE ?