New evaluation for ^{90}Zr

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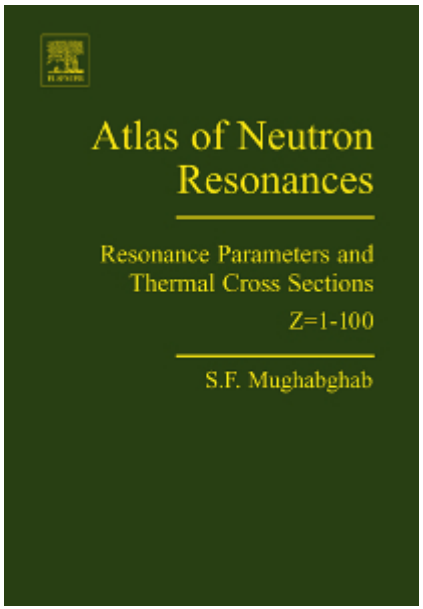
BNL evaluation capacity

Resonance Region



Fast Neutron Region

EMPIRE

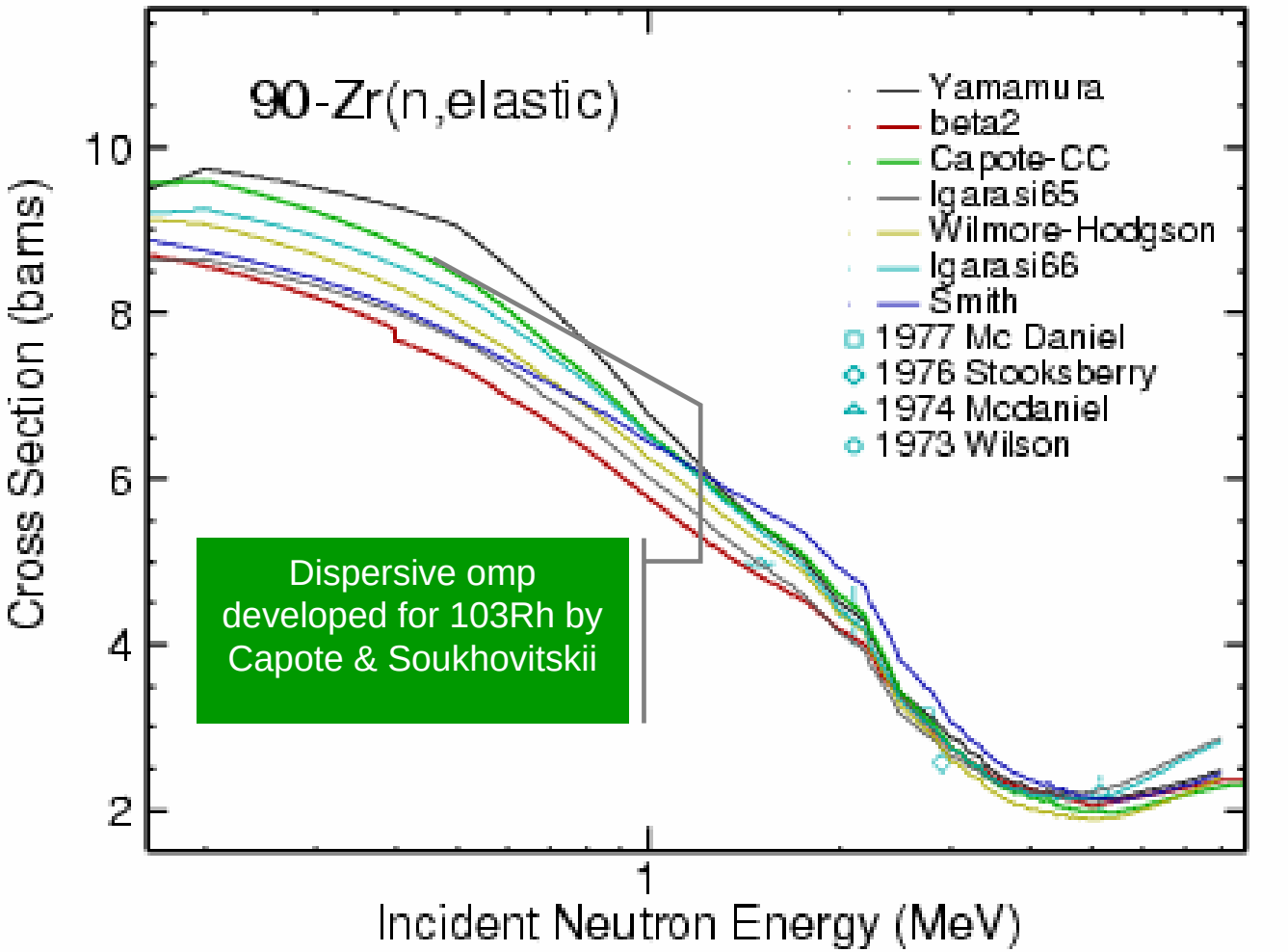
Nuclear Reaction Model Code

Version 2.19 (Lodi)

^{90}Zr evaluation history

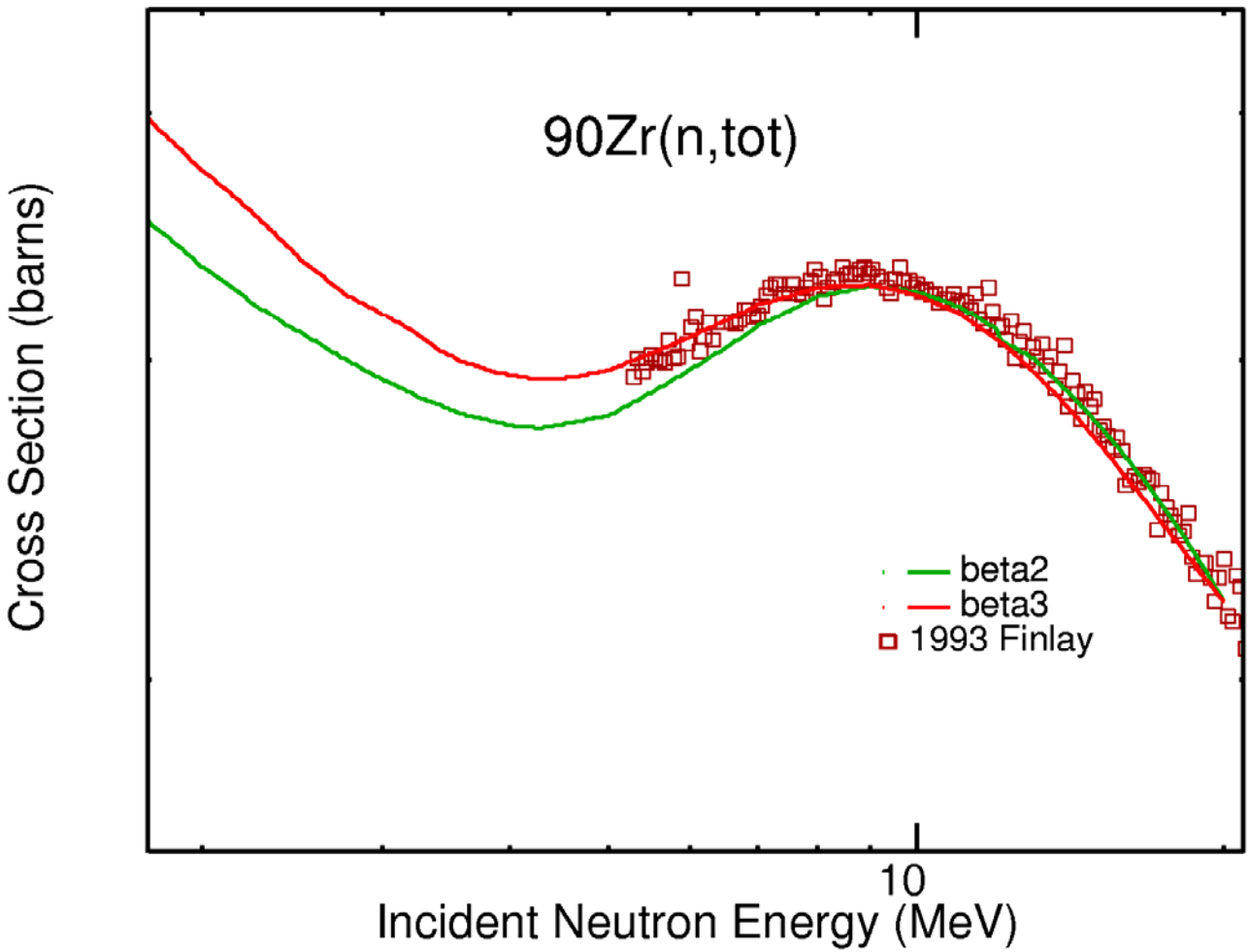
Version	RR	URR	Fast
beta2	SG23=BROND-2	SG23=BROND-2	SG23=BROND-2
		(background!)	
"stealth"	"	as above but for self-shielding only, x-sections from EMPIRE	default EMPIRE with dispersive o.m.p., elastic increased
beta3	"	"	EMPIRE adjusted to exp. data, dispersive o.m.p.
beta4	Mughabghab	Mughabghab	"

Elastic with various o.m.p.



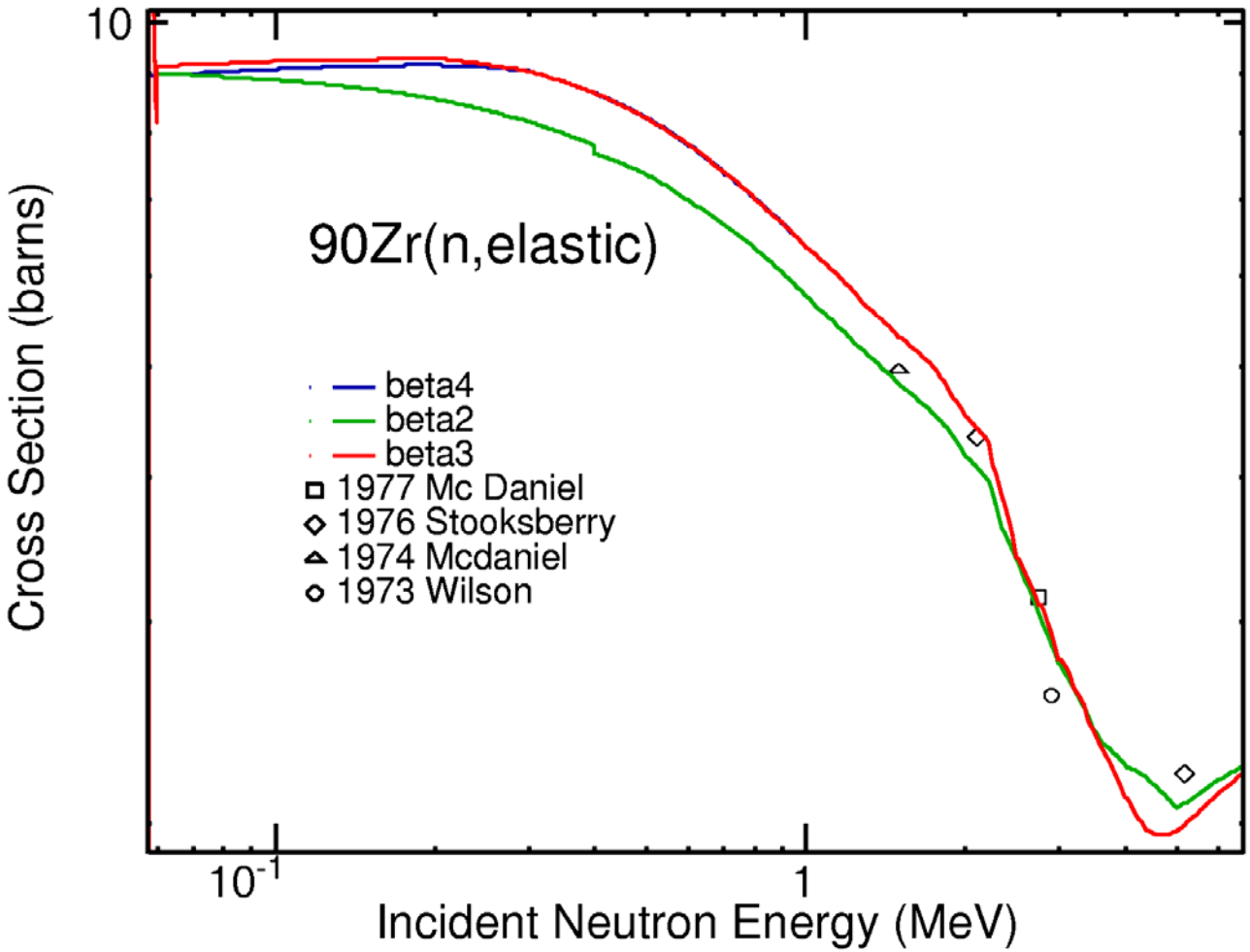
All optical model potentials provide elastic higher than beta2

Total cross sections



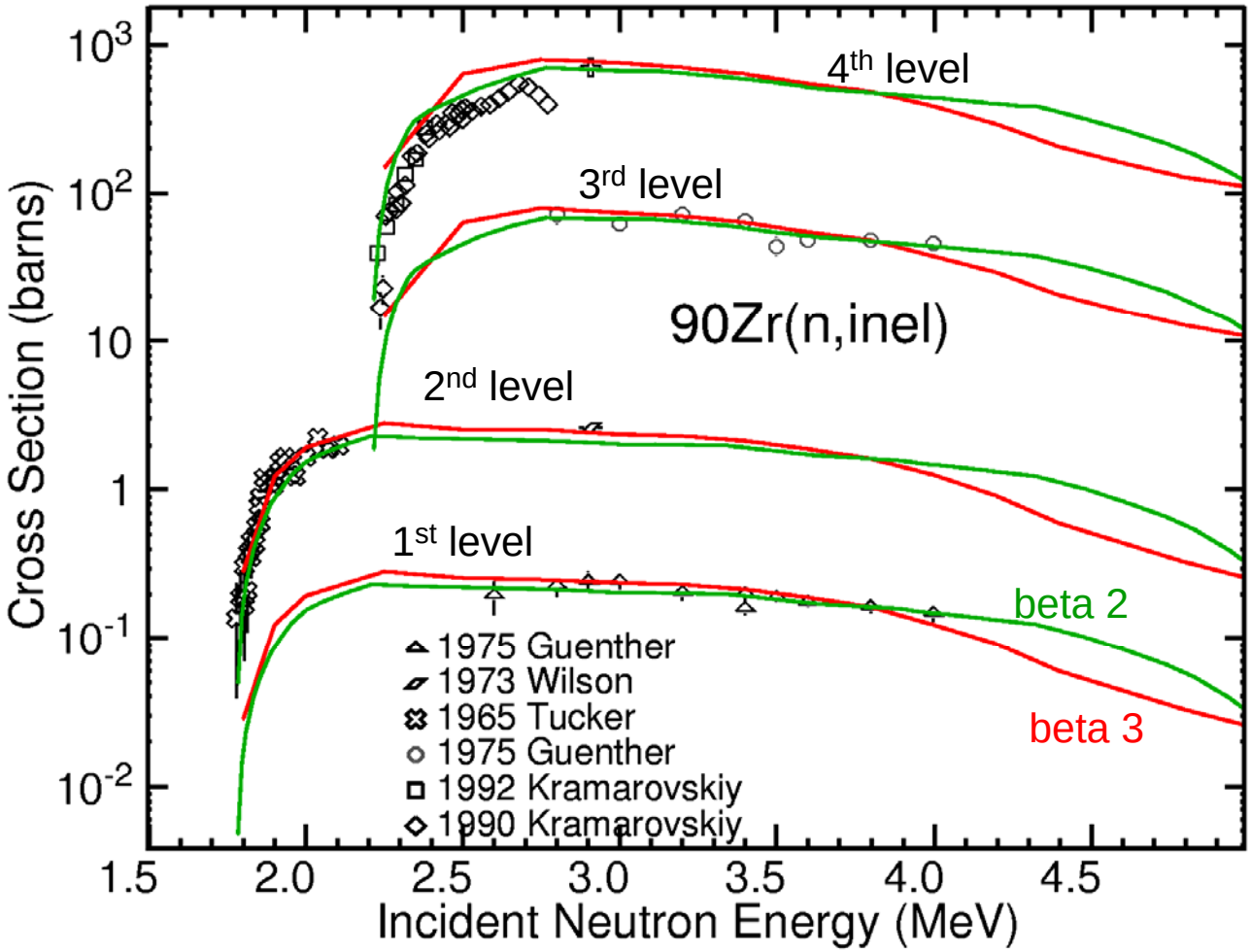
Dispersive omp by Capote et al. is the only one that can compete with beta2 for total

Elastic cross sections



Beta3 elastic considerably higher than in beta2

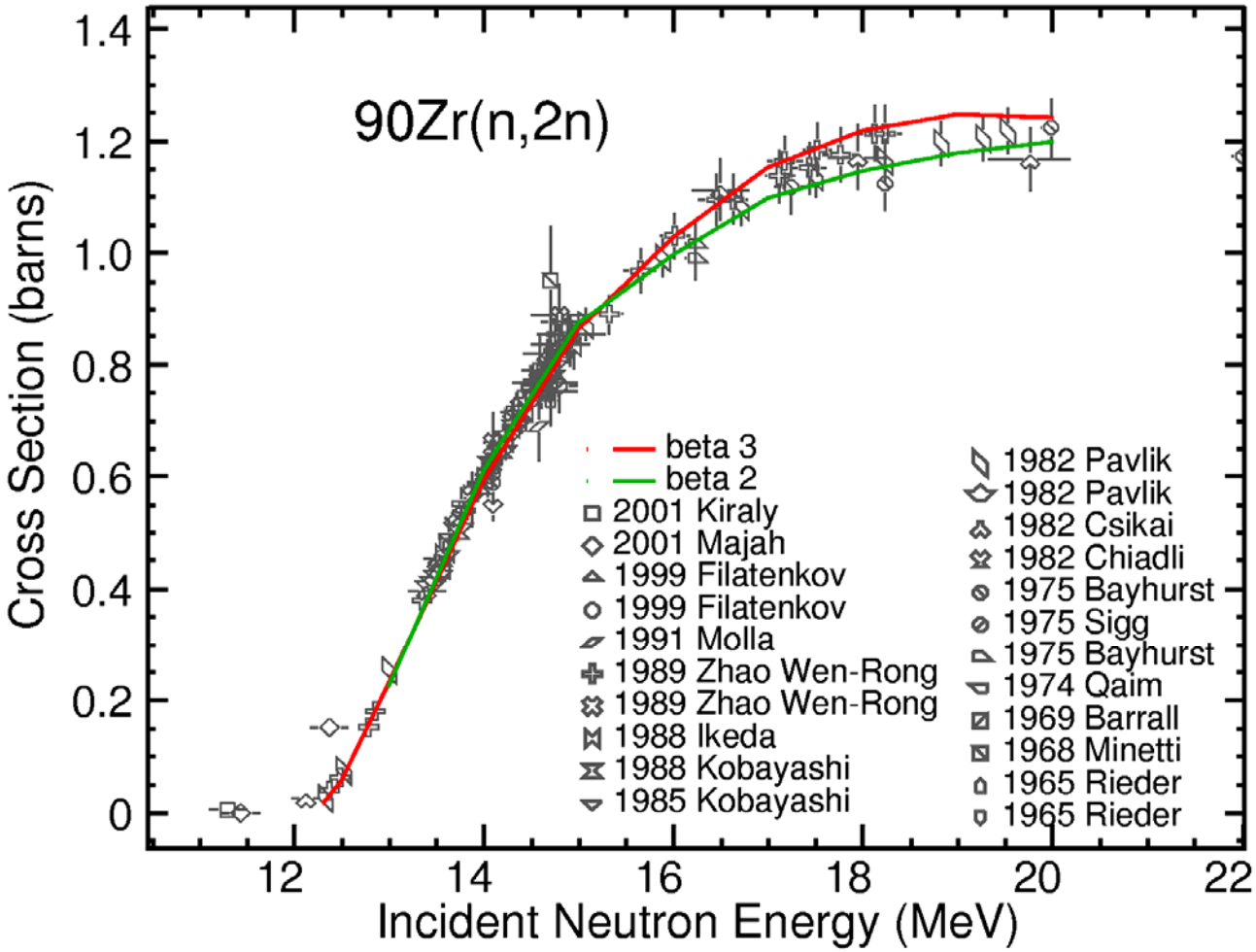
Inelastic to discrete levels



beta3 and beta2 are about equally good for inelastic scattering to discrete levels.

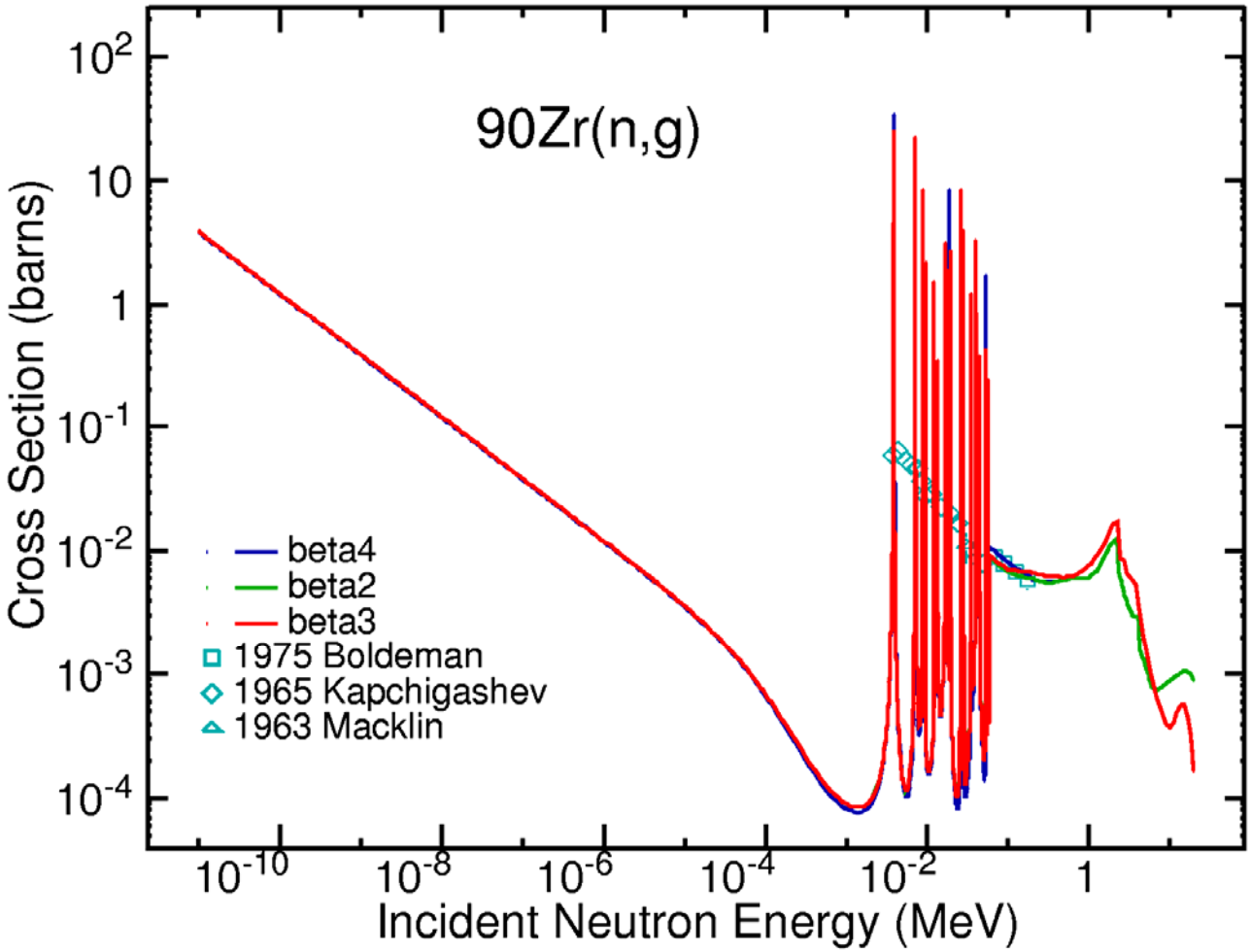
Due to the CC beta3 tends to be higher than beta2 above 5 MeV

(n,2n) cross sections



Microscopic level densities (HF-BCS) calculated by Gorieli for RIPL-2 are needed to reproduce (n,2n) curvature around 14 MeV

Capture cross sections



Microscopic level densities require 0.4 factor on the gamma strength function but shape of the cross section is right.

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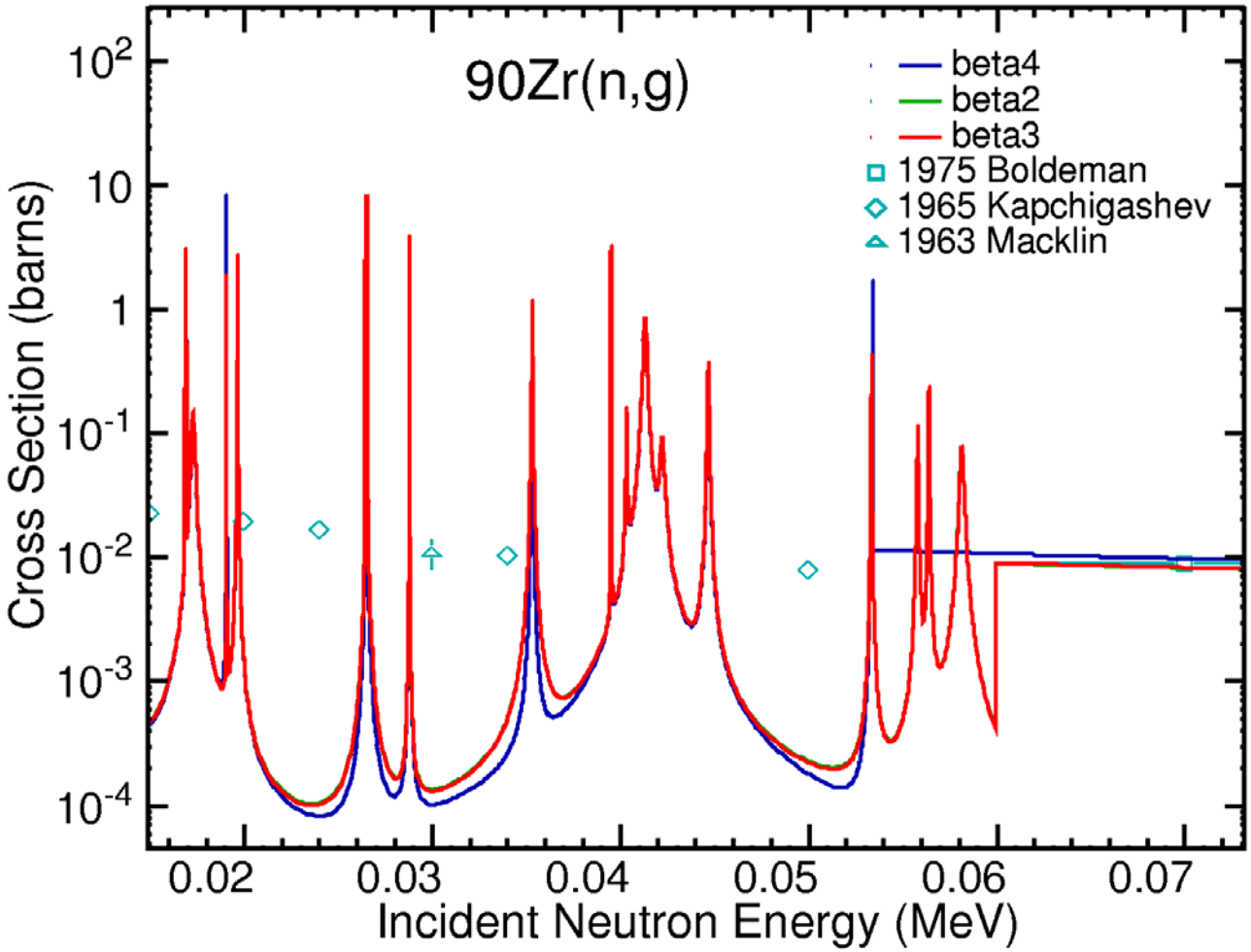
beta3	"	"	EMPIRE adjusted to exp. data, dispersive o.m.p.
beta4	Mughabghab	Mughabghab	"

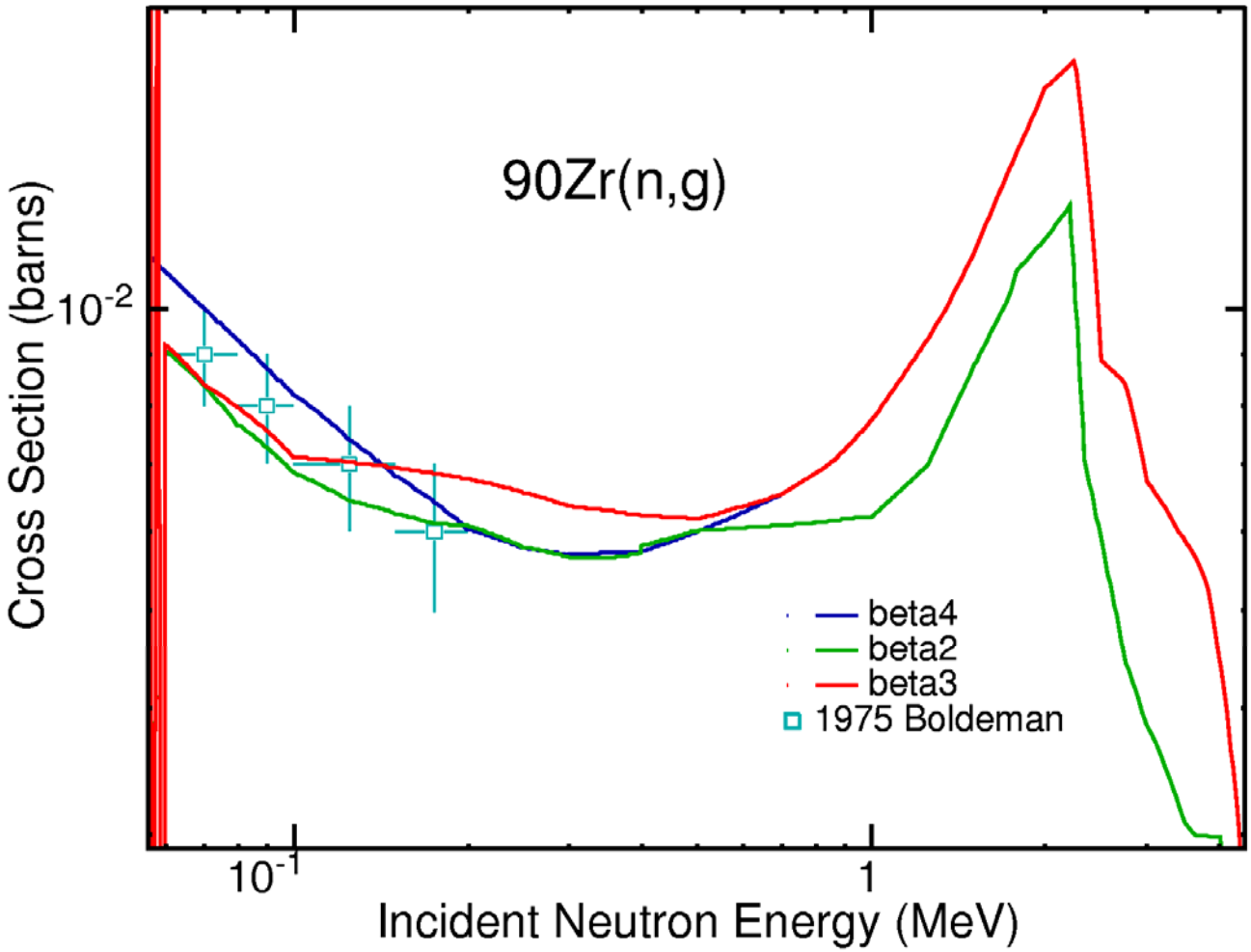
b3 or b4, this is a question!

beta3⇔beta4 (n,γ) in RR



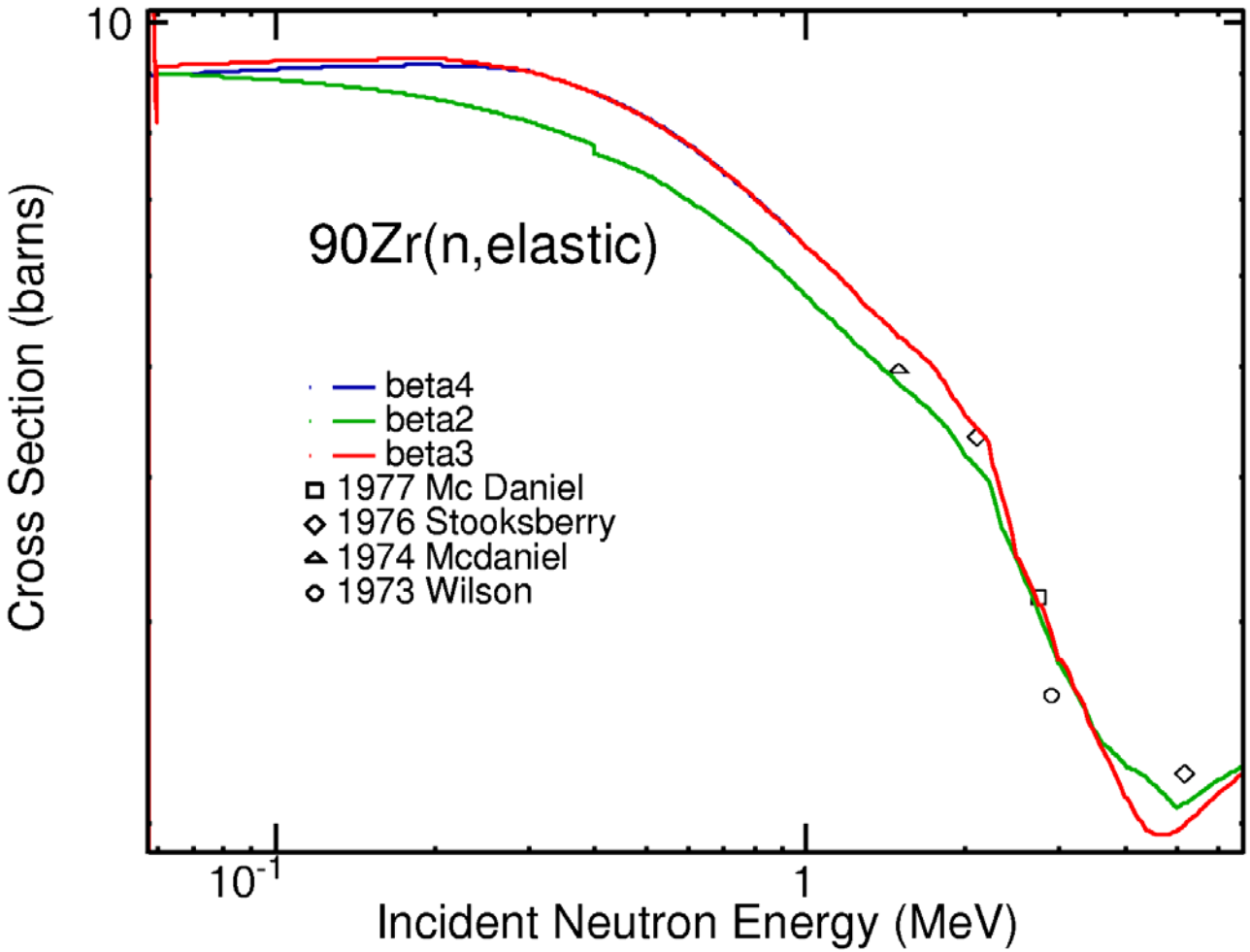
- beta4 – new resonance region by Mughabghab
- 3 resonances less in beta4
- Thermal cross section and resonance integral practically the same

beta3⇔beta4 (n,γ) in URR



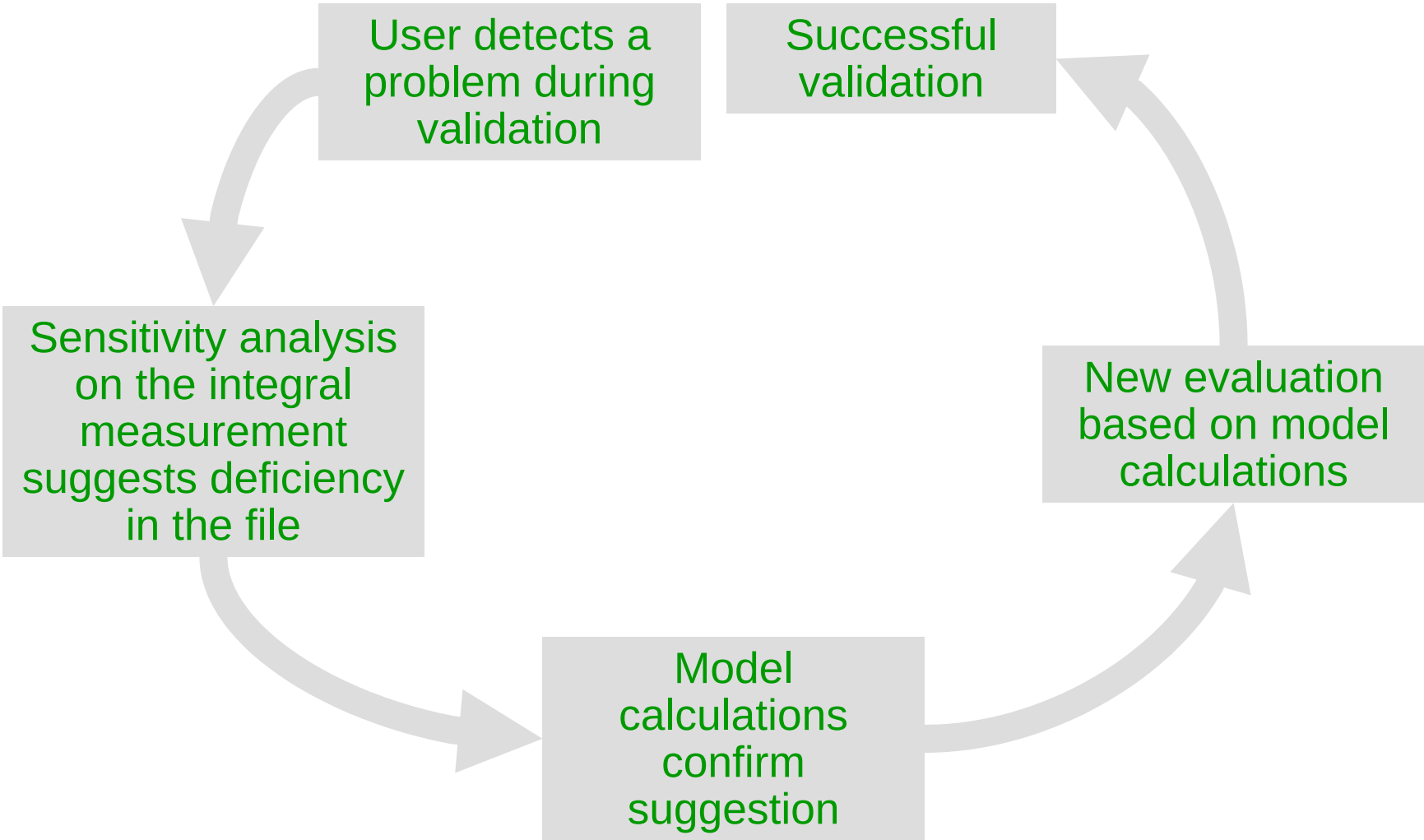
beta3 and beta4 differ but this difference does not affect integral testing

beta3⇔beta4 elastic in URR



beta3 and beta4 nearly identical!

Evaluation ⇔ Validation



Conclusions

- Sensitivity analysis of the integral experiment might provide useful hint to the evaluators
- New complete evaluation for ^{90}Zr in RR, URR and fast region produced promptly due to highly automated evaluation system at BNL
- Better physics ➡ better results**!**
  - Dispersive optical potential
  - Microscopic level densities
- beta3 or beta4 – your choice!