2007 CSEWG/USNDP Meeting

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Overview of JENDL Activities & WPEC SG29 ^{235}U Capture

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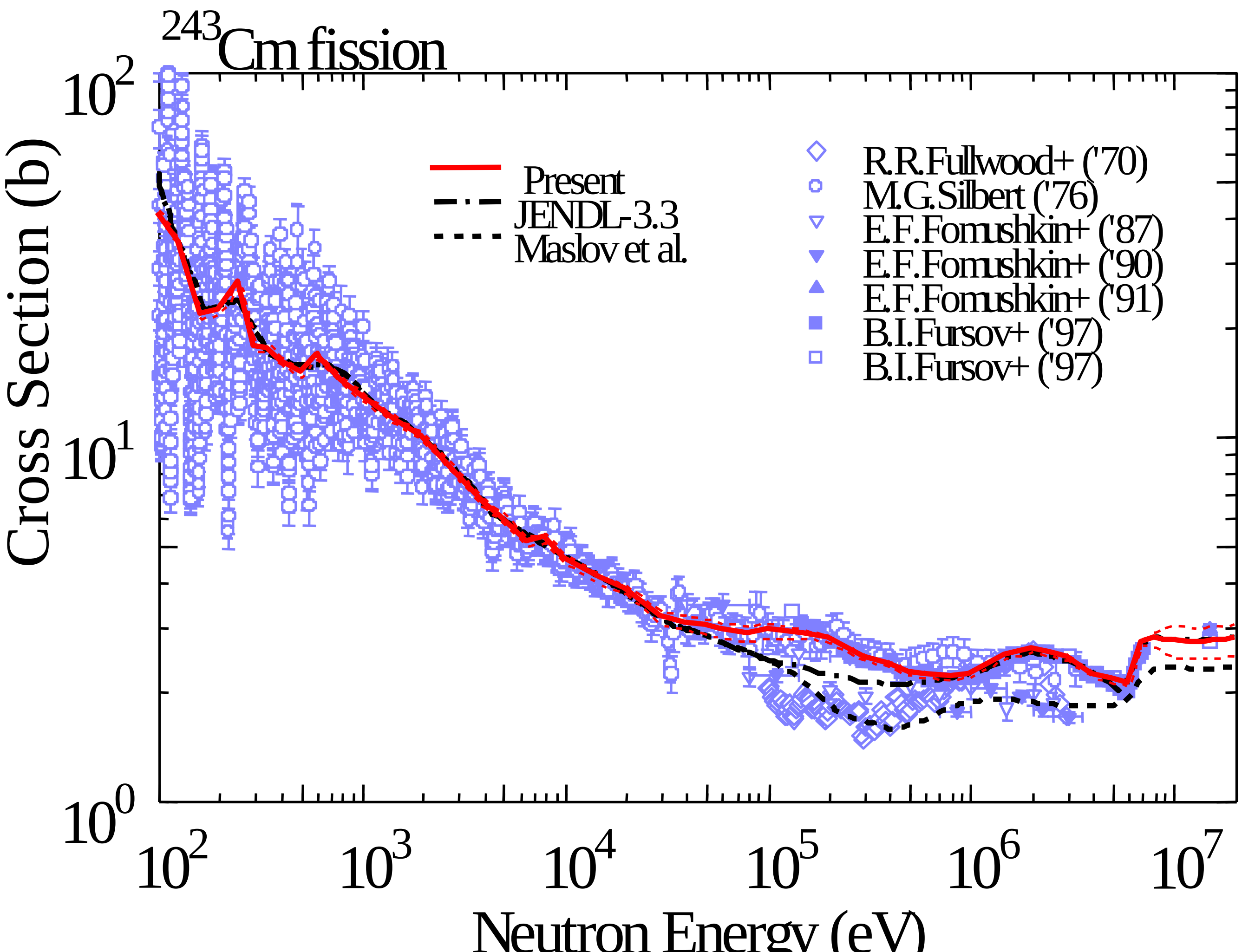
Recent Progress

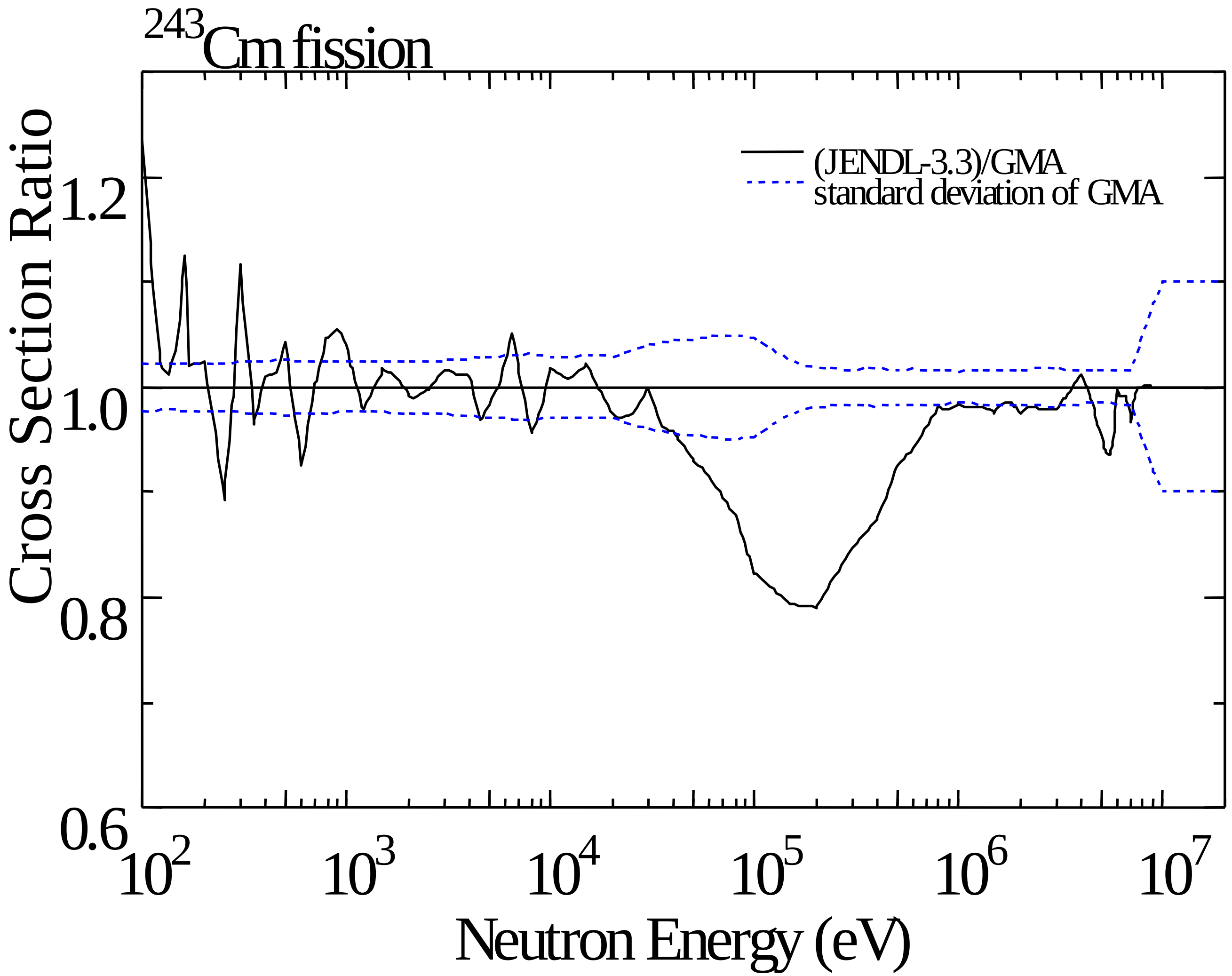
- Evaluation of MA nuclides:
  - Analyses of experimental fission cross section data with GMA code

    Th-230, 232, Pa-231, U-232, 234, 236, Np-237, Pu-236, 238, 242, 244, Am-241, 242m, 243, Cm-242, 243, 244, 245, 246, 247, 248, Cf-249, 252 (23 nuclides)
- Evaluation of Resonance Parameters of FP Nuclides.
  - Total 212 nuclides
    - 89: revised,
    - 13: newly evaluated,
    - 69: no change,
    - 41: no measured data.

GMA analysis for ^{243}Cm fission

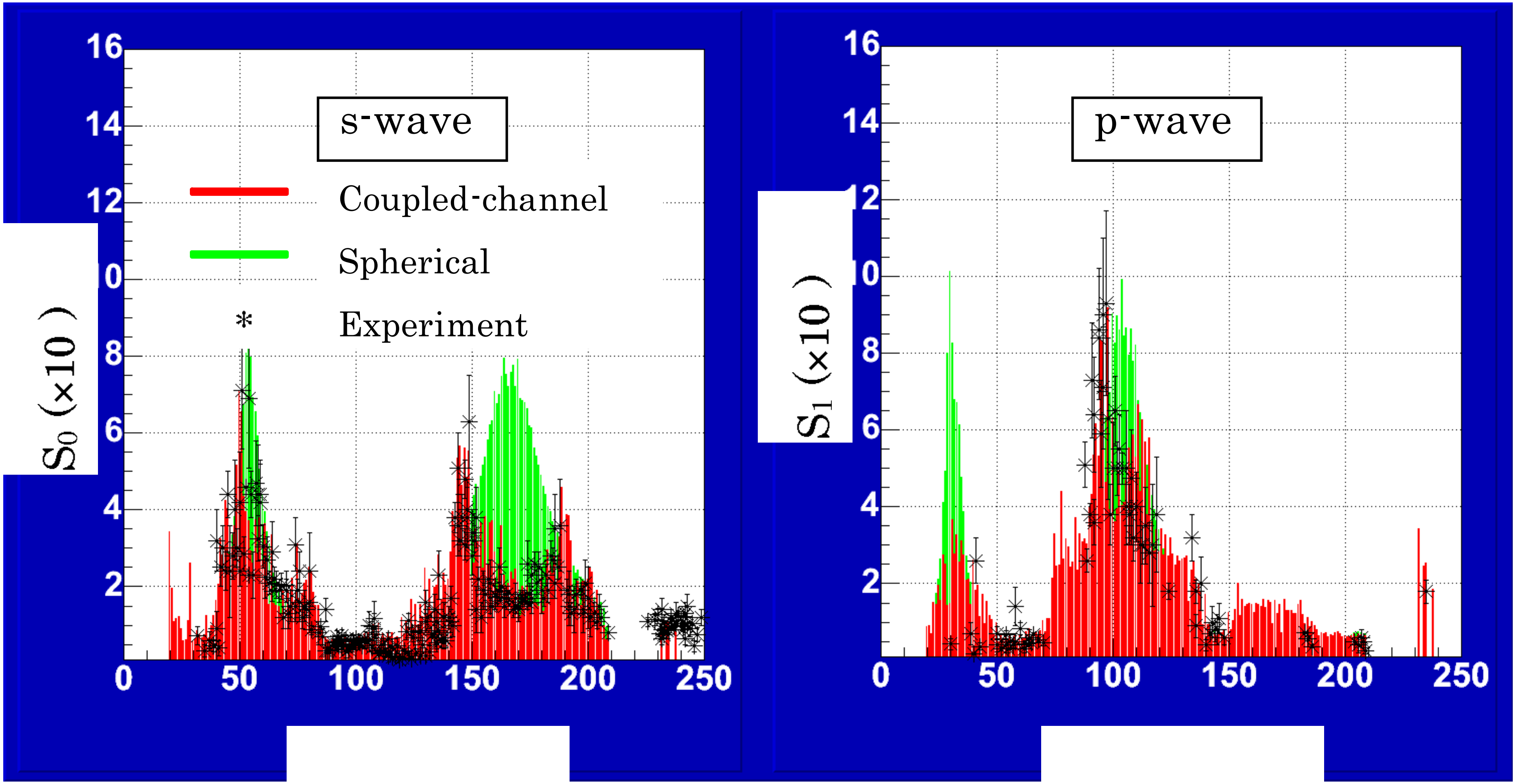


Ratio to JENDL-3.3



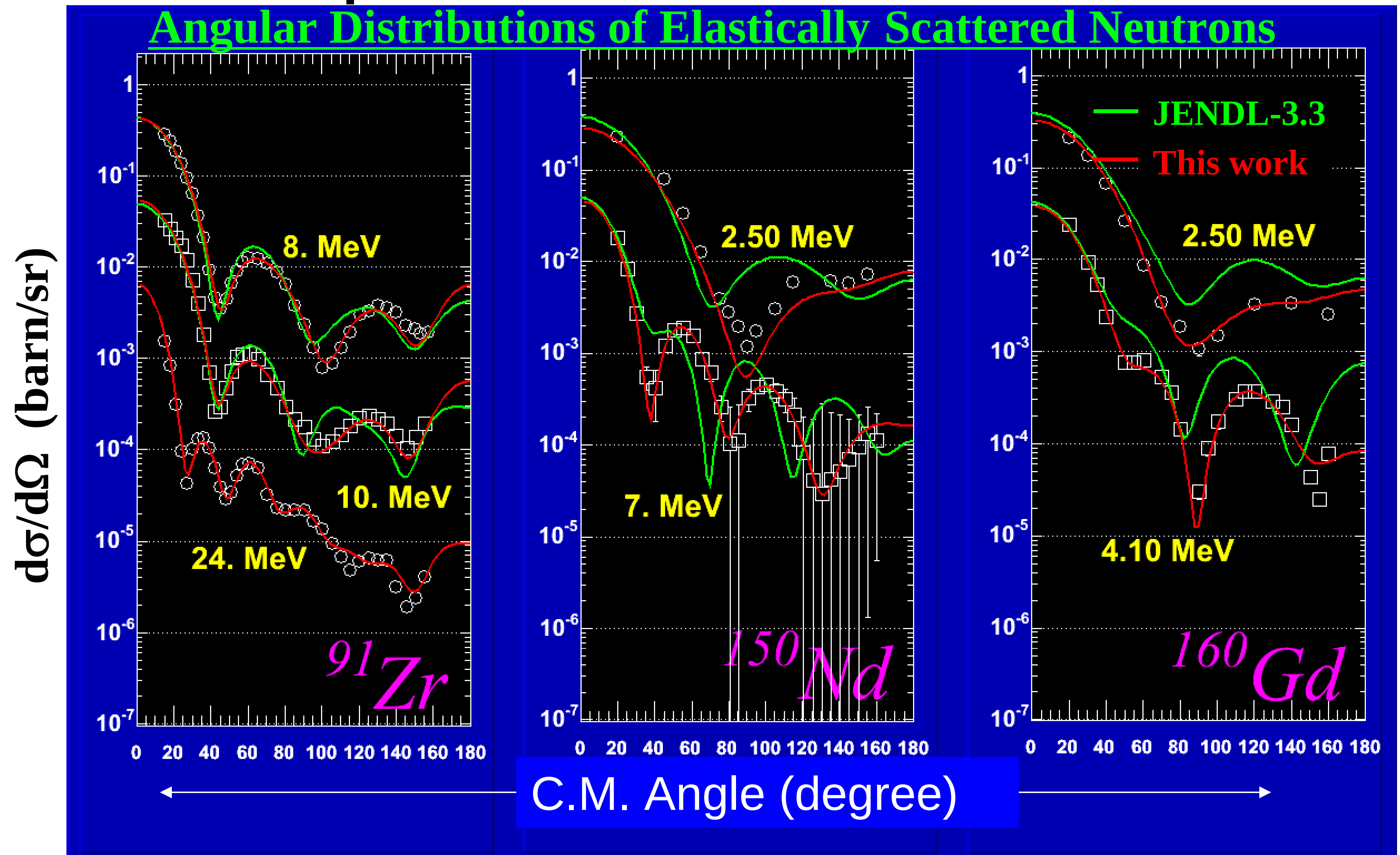
Optical Potential Parameters

s-wave and p-wave neutron strength functions



Optical Potential Parameters

Comparison with JENDL-3.3



JENDL/HE-2007

JAPAN ATOMIC ENERGY AGENCY

Neutron & Proton File up to 3 GeV (Total: 132 nuclides)

1^{st} priority (39)	^{1}H, ^{12}C, ^{14}N, ^{16}O, ^{27}Al, ^{50,52,53,54}Cr, ^{54,56,57,58}Fe, ^{58,60,61,62,64}Ni, ^{63,65}Cu, ^{180,182,183,184,186}W, ^{196,198,199,200,201,202,204}Hg, ^{204,206,207,208}Pb, ^{209}Bi, ^{235,238}U
2^{nd} priority (43)	^{9}Be, ^{10,11}B, ^{24,25,26}Mg, ^{28,29,30}Si, ^{39,41}K, ^{40,42,43,44,46,48}Ca, ^{46,47,48,49,50}Ti, ^{51}V, ^{55}Mn, ^{59}Co, ^{90,91,92,94,96}Zr, ^{93}Nb, ^{92,94,95,96,97,98,100}Mo, ^{238,239,240,241,242}Pu
3^{rd} priority (40)	^{2}H, ^{6,7}Li, ^{13}C, ^{19}F, ^{23}Na, ^{35,37}Cl, ^{35,38,40}Ar, ^{64,66,67,68,70}Zn, ^{69,71}Ga, ^{70,72,73,74,76}Ge, ^{75}As, ^{89}Y, ^{181}Ta, ^{197}Au, ^{232}Th, ^{233,234,236}U, ^{237}Np, ^{241,242,242m,243}Am, ^{243,244,245,246}Cm
4^{th} priority (10)	^{15}N, ^{18}O, ^{74,76,77,78,80,82}Se, ^{113,115}In

Nuclides with red color (66) : Released in March 2004 as JENDL/HE-2004

Nuclides with underline are revised for JENDL/HE-2007.

Nuclides with blue color (42): Additionally Release in 2007 as JENDL/HE-2007

Newly Adopted are …

OMP for Cluster Particles

- No global and wide energy range phenomenological potential parameter set previously

new ⇒ **Simple folding potential parameter sets**

Cluster Particle Emission

- Kalbach's model made significant underestimation for cluster particle emission spectra.

new ⇒ **Iwamoto-Harada-Sato Preequilibrium Model (< 100 MeV)**

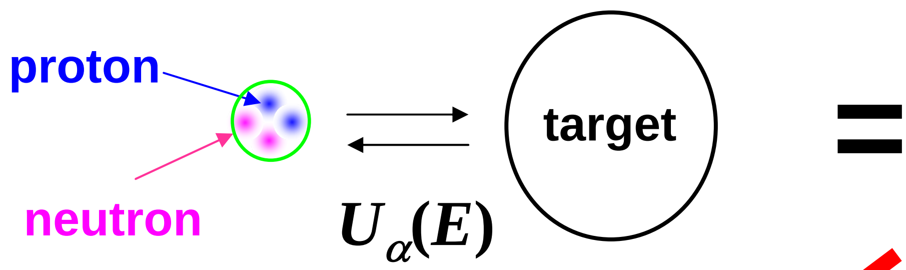
Above are applied for ^{56}Fe, Zr, Nb, W, Pb and Bi.

OMP for Cluster Particles

Based on methods proposed by Madland

—— **Simple Folding Potential**

e.g.) **Alpha-Particle Potential**



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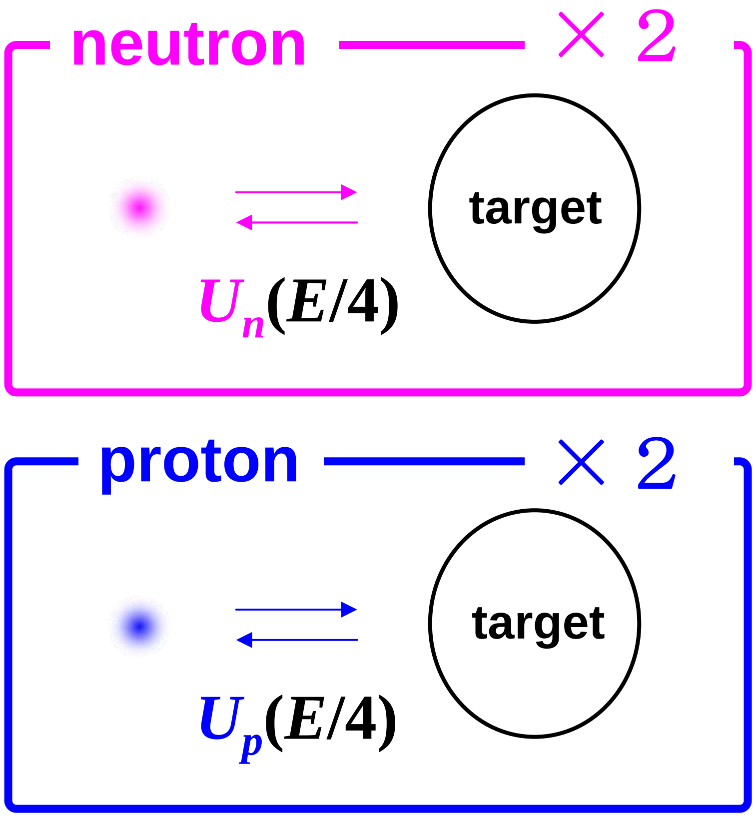


Potential for neutron and proton

Kunieda-Chiba-Shibata (2007)

1 keV-200 MeV, 26 < A < 238

OMP for Cluster Particles

Small adjustment for OMP

Real part: $V(E)$

Real diffuseness: a_R

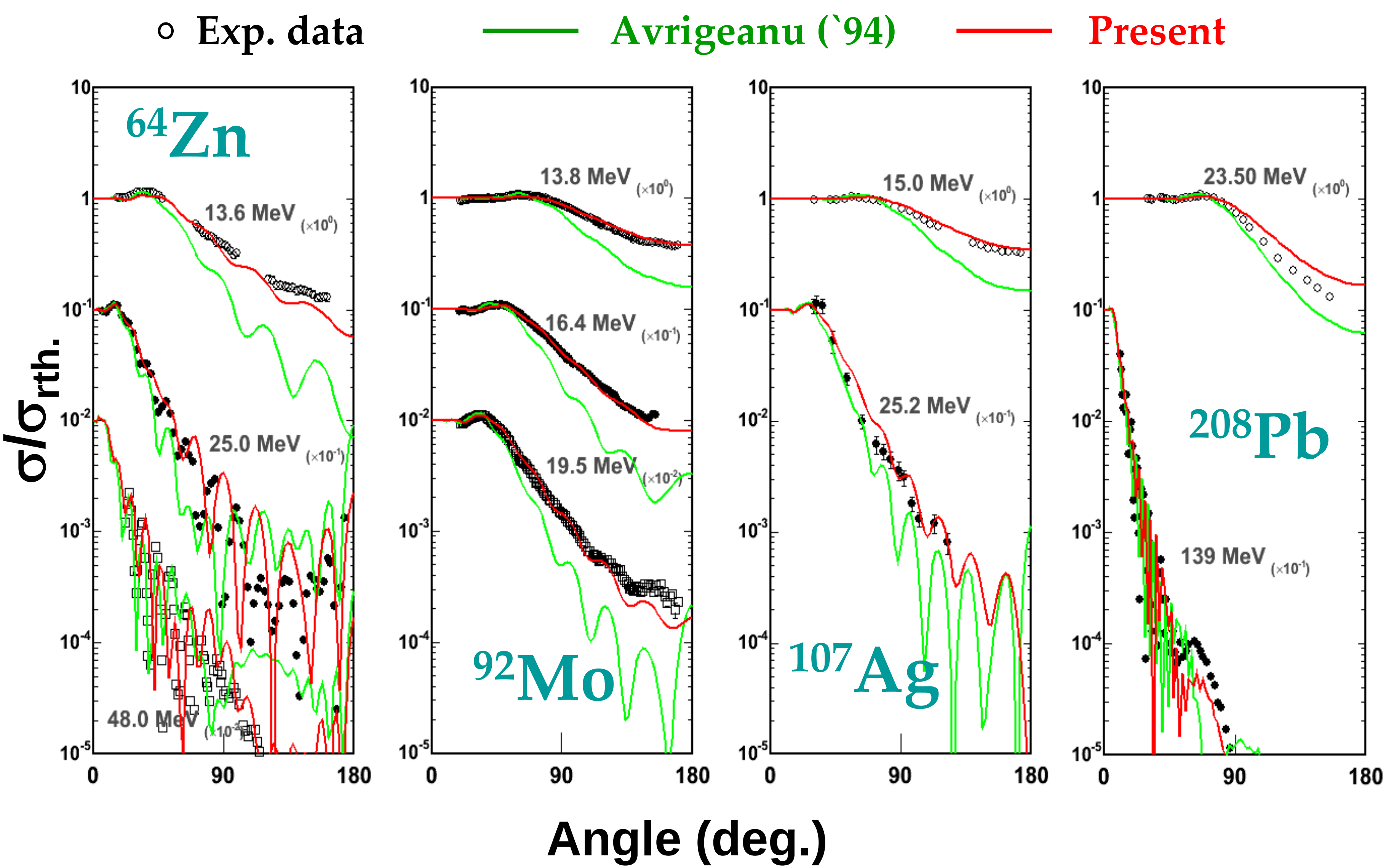
Imaginary diffuseness: a_I

d	$V(E)\times 0.85$	$a_R\times 1.05$	$a_I\times 1.35$
t, h	$V(E)\times 0.80$	$a_R\times 1.15$	$a_I\times 1.35$
a	$V(E)\times 0.95$	$a_R\times 1.00$	$a_I\times 1.00$

? → Internal Energy of Cluster

? → Cluster Radius

Alpha Elastic Scattering



Preequilibrium Model for Cluster Particles

Emission Rate of Cluster Particles

$$W_{n(l,m)}^{(x)}(\varepsilon)=\frac{2s+1}{\pi^2\hbar^3}\mu_x\varepsilon\times\sigma_{inv.}^{(x)}(\varepsilon)\times F_{l,m}(\varepsilon)\times\frac{\omega(p-l,h,U)}{\omega(p,h,E)}$$

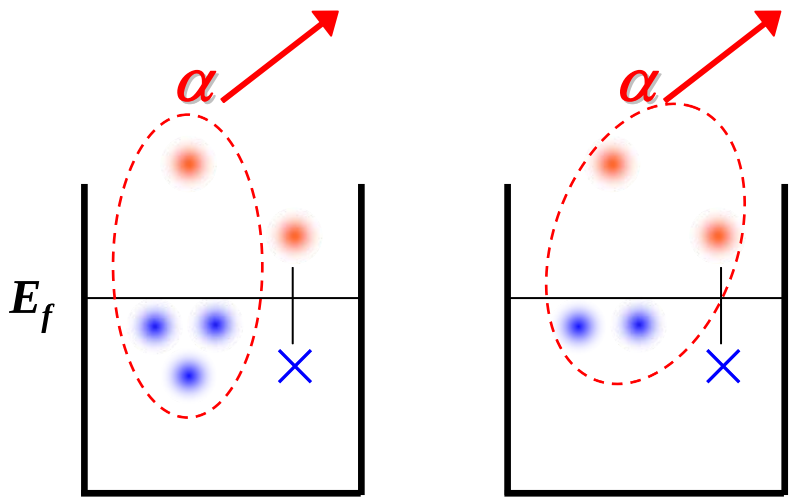
Inverse X-sec

（e.g. α + Target）

Optical Model

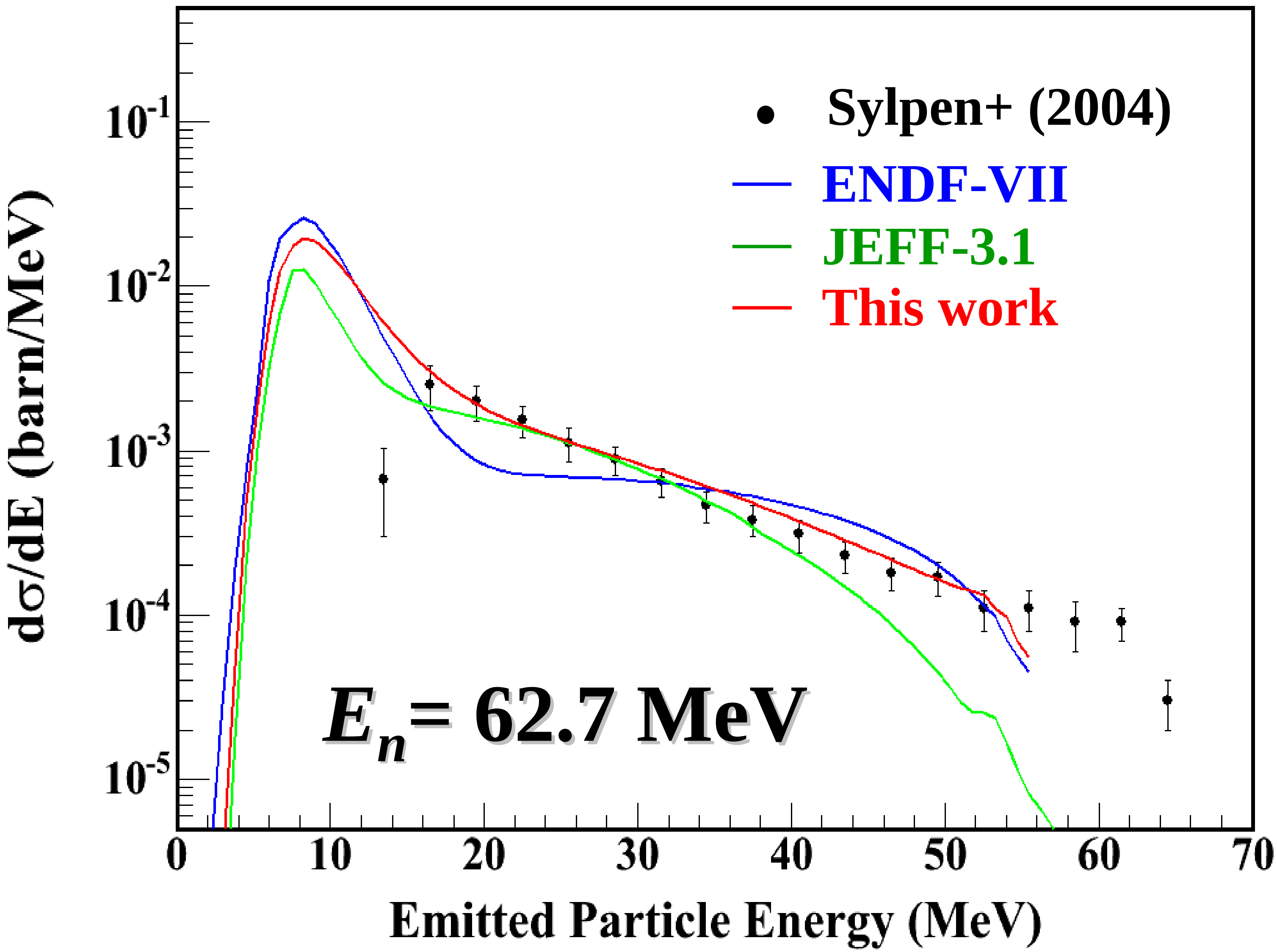
Formation Factors

Iwamoto-Harada-Sato Model

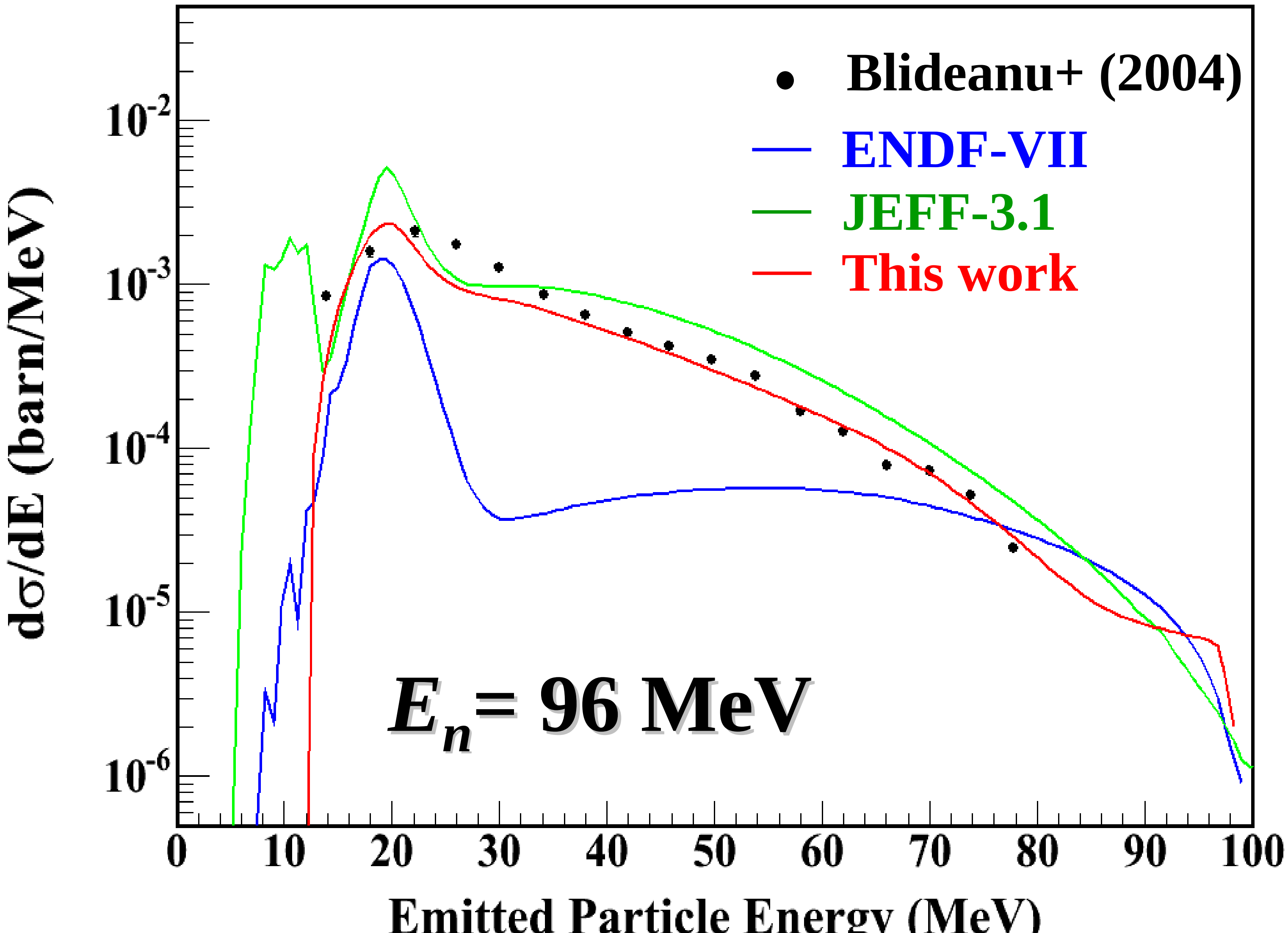


2p-1h State

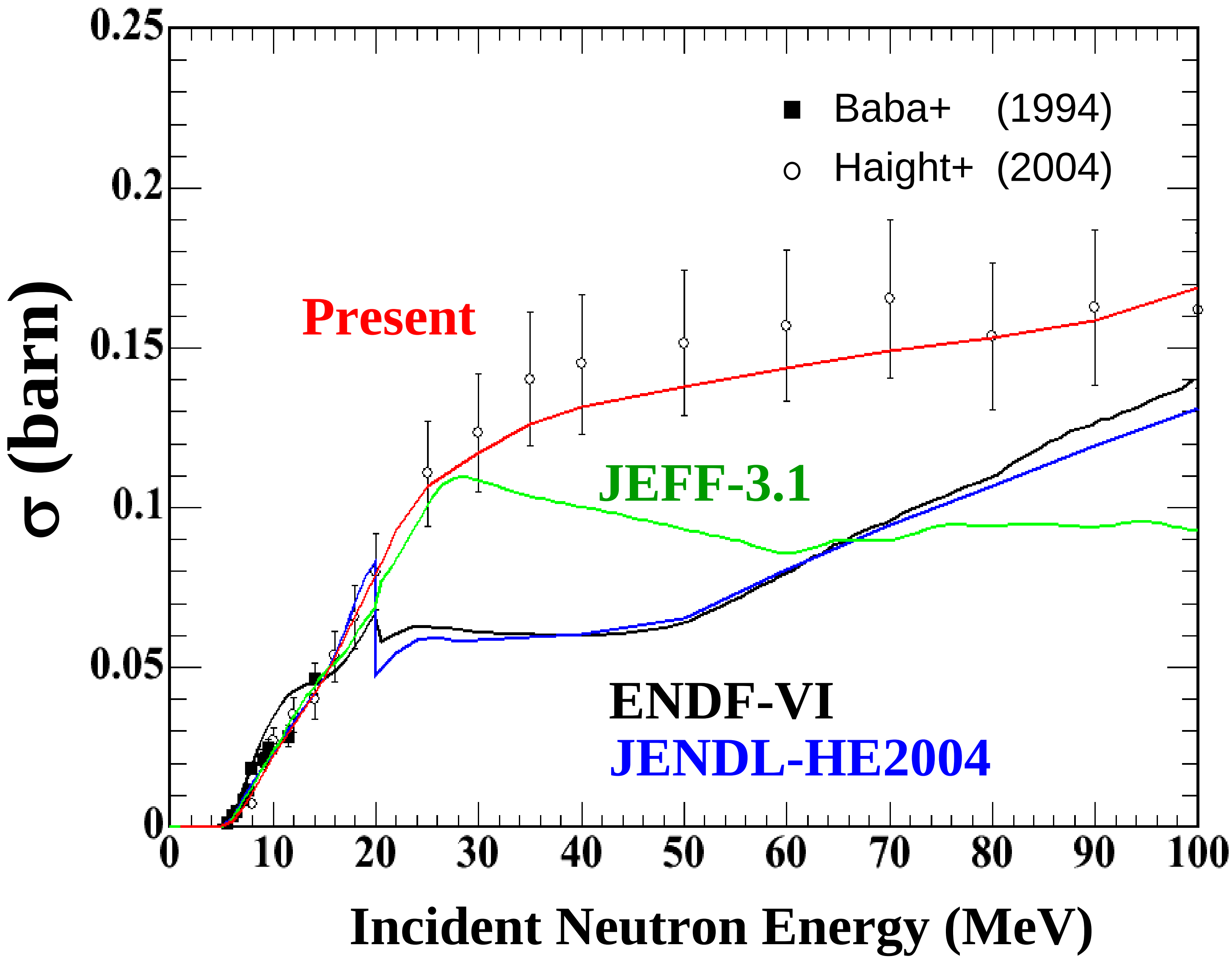
Fe(n,xα) Spectrum



Pb(n,xα) Spectrum



Fe(n,xα) Cross Section

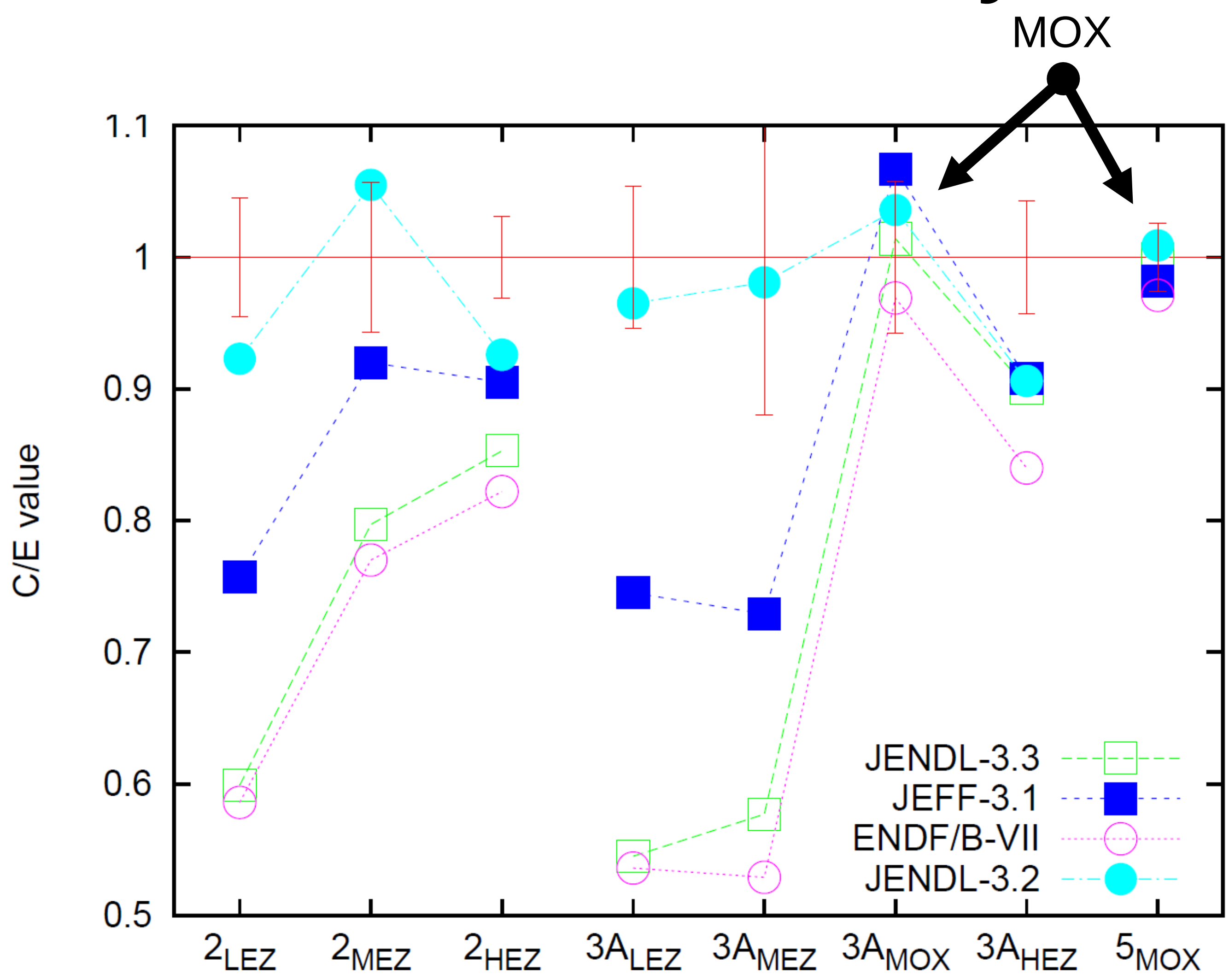


ENDF/B-VII adopts exp. data.

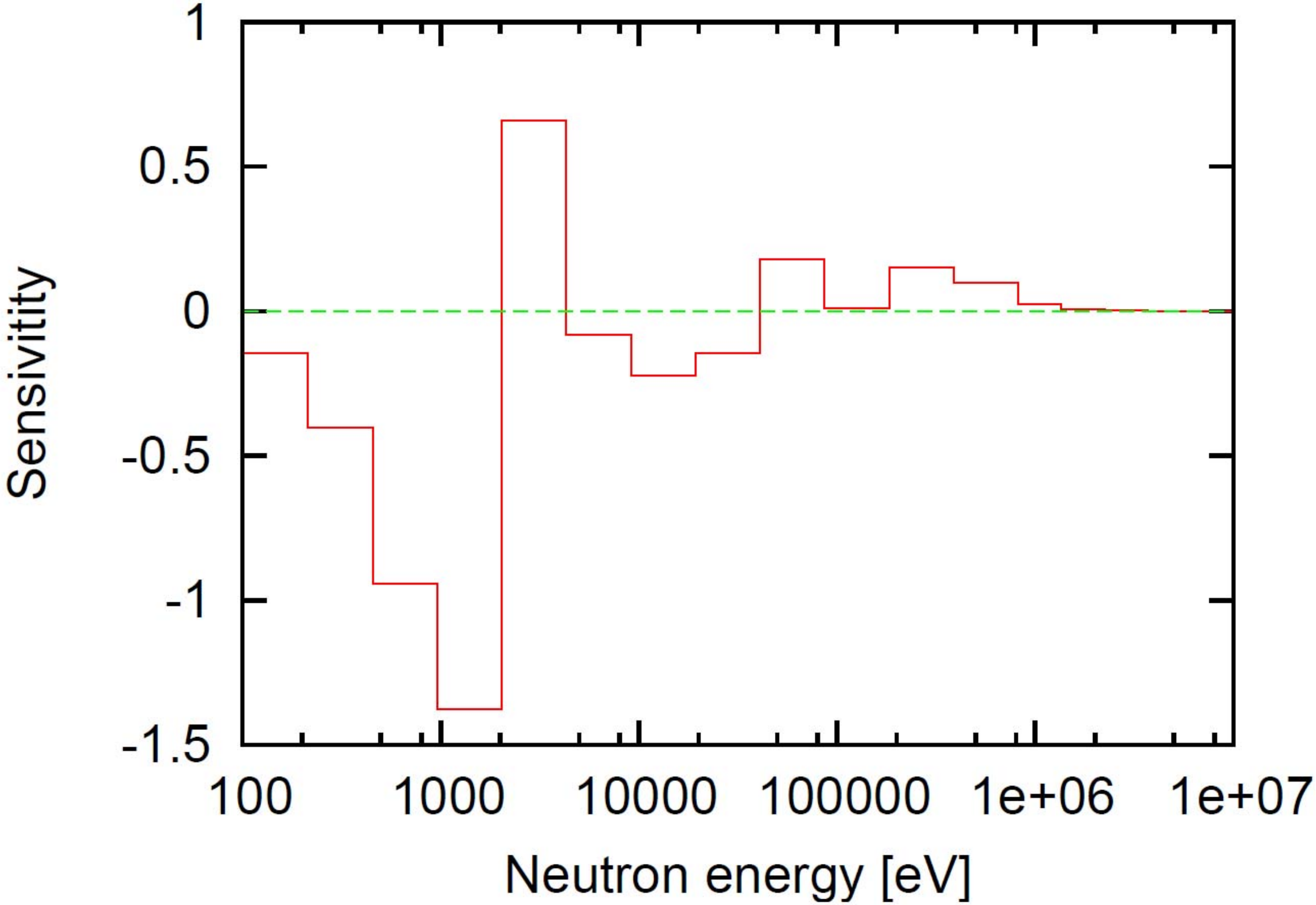
Definition of the SG29 Project

- Investigate the problems seen for the BFS and FCA-IX critical experiments
- Survey available experiments on fast-neutron cores with U fuels other than BFS and FCA-IX
- Re-evaluate cross sections and resonance parameters
- Re-analyze BFS and FCA-IX experiments
- New sodium-voided reactivity experiments with U fuels at FCA (planed on 2008)

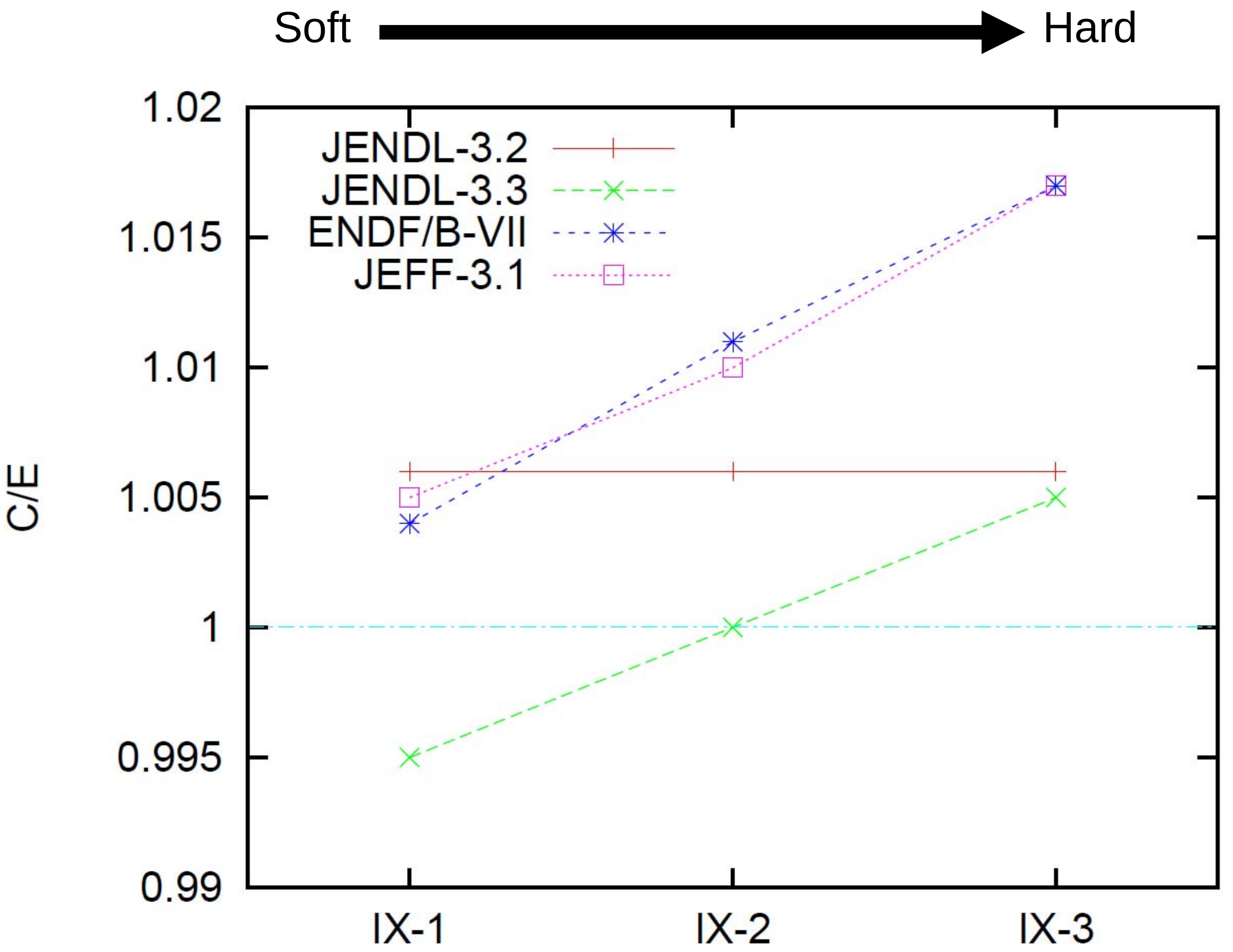
sodium voided reactivity in BFS



Sensitivity of capture cross section of ^{235}U to sodium-voided reactivity



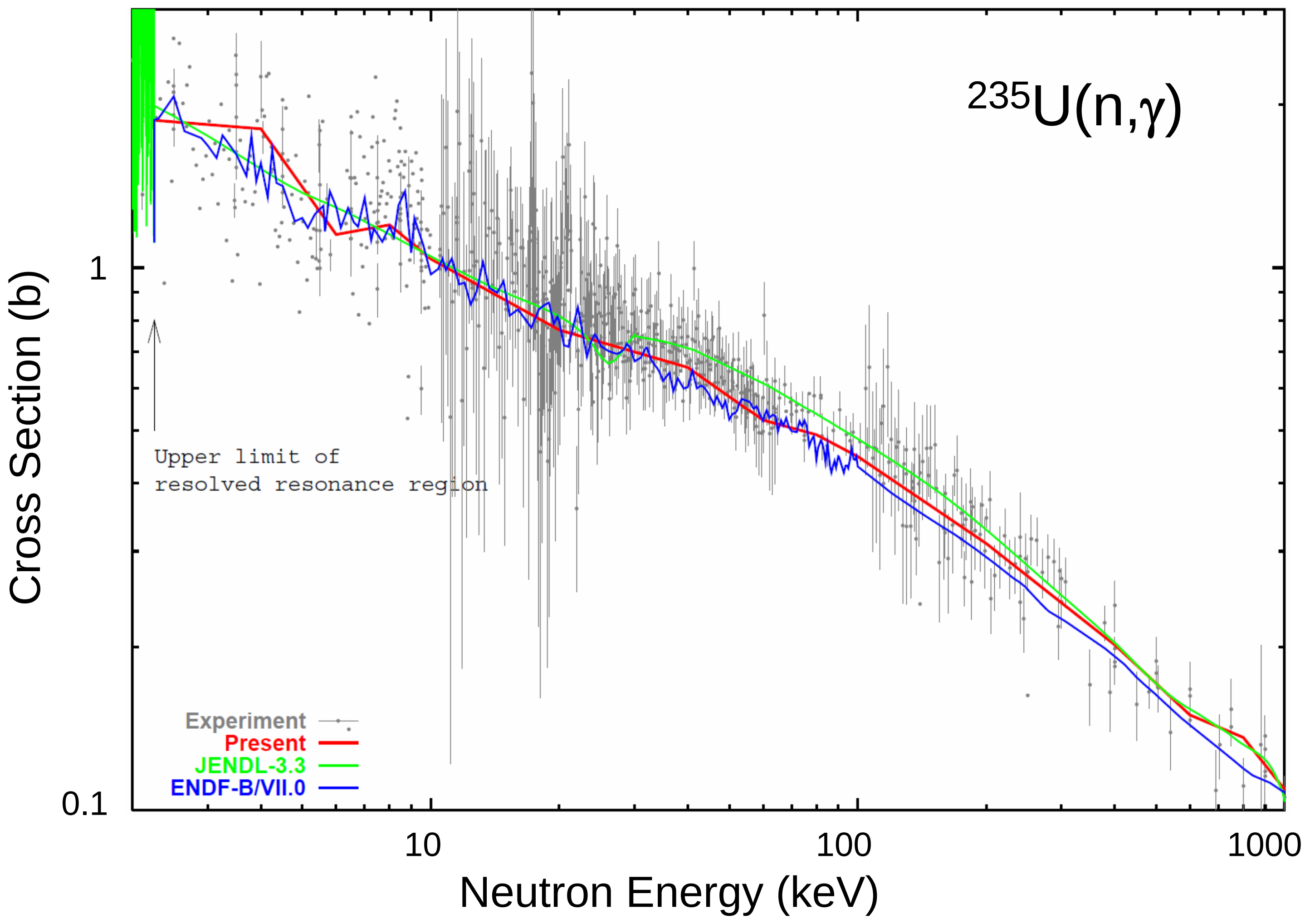
criticality of FCA IX assemblies



Status of SG29

- Request of U-235 capture cross section measurement was submitted to HPRL.
- Differential data
  - Large background correction exists in the SAMMY analysis .
- Integral data
  - Control rod worth of ZPPR-18A supports JENDL-3.2.
  - ZEUS data in ICSBEP were found to be useful.
  - FCA-IX benchmark problem has been prepared.

^{235}U capture cross section (above 2 keV)



Summary

- Present Status of JENDL-4 is reported. Evaluations for MA and Optical Model Parameter are also explained.

- Status of JENDL/HE was introduced.

- Brief description about U-235 evaluation related to WPEC/SG-29 was reported.