New n + ^{235}U evaluation (fast)

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M.W. Herman, V.G. Pronyaev

Mini-CSWEG, 11-12 April 2016
LANL, Los Alamos, USA

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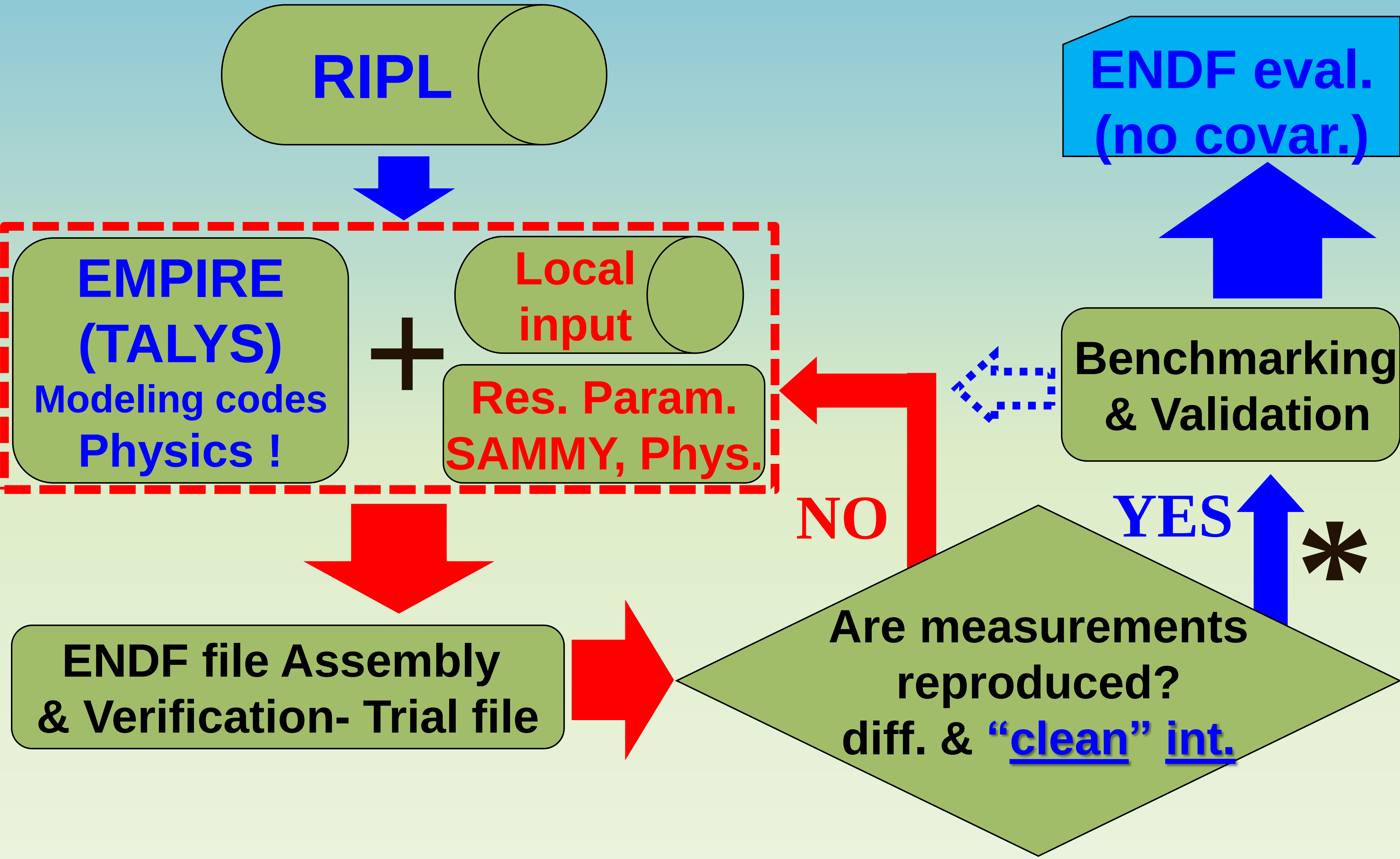
IAEA evaluation process (no covar.)



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n + ^{235}U fast region (E_n>2.25 keV)

- *(n,f) from 2006 Neutron Standards*
  (to be updated with new GMA Standard fit)
- *(n,γ): Adopted from B/VII.1*
  (Update based on Jandel/RPI ?)
- *(n,f): 3H barrier with absorption*
- *PFNS adopted from IAEA CRP*
  (incl. Rising-Talou analysis above thermal)

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PHYSICAL REVIEW C **93**, 034605 (2016)

Extended optical model for fission

M. Sin,[1,*] R. Capote,[2,†] M. W. Herman,[3] and A. Trkov[2]

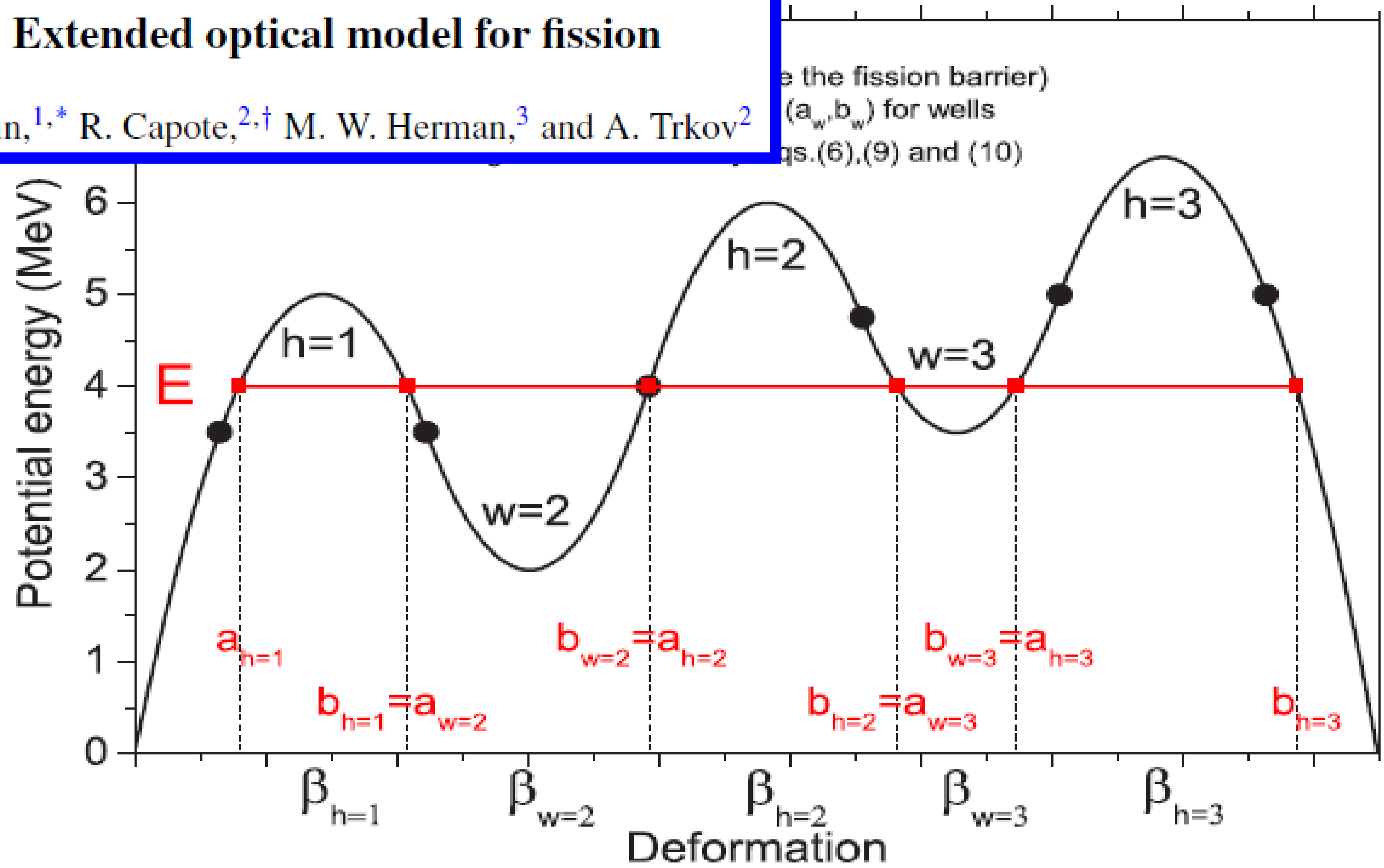

FIG. 1. A triple-humped fission barrier and associated parameters.

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Optical model for fission: 3H

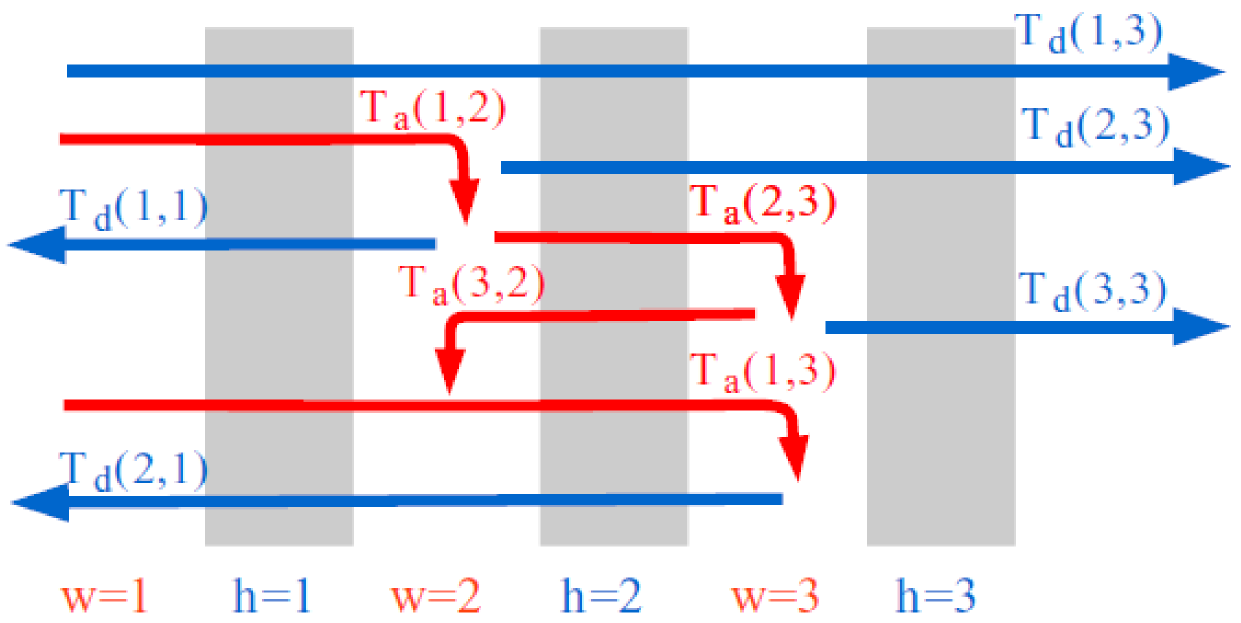

FIG. 2. Schematic representation of the transmission flux for a triple-humped fission barrier. w (h) values indicated below the figure represent the well (barrier) index. The coefficients $T_a(w,w')$ that represents the absorption in a well w of the flux coming from the well w' are shown as bent arrows (in red), the coefficients $T_d(h,h')$ that represent the transmission through the humps h and h' are shown as straight arrows (in blue), and the coefficients $T_d(h,h) \equiv T_h$ represent the transmission through a single hump h. Arrows pointing to the

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^{239}Pu(n,f) 2H barrier, independent barriers ok

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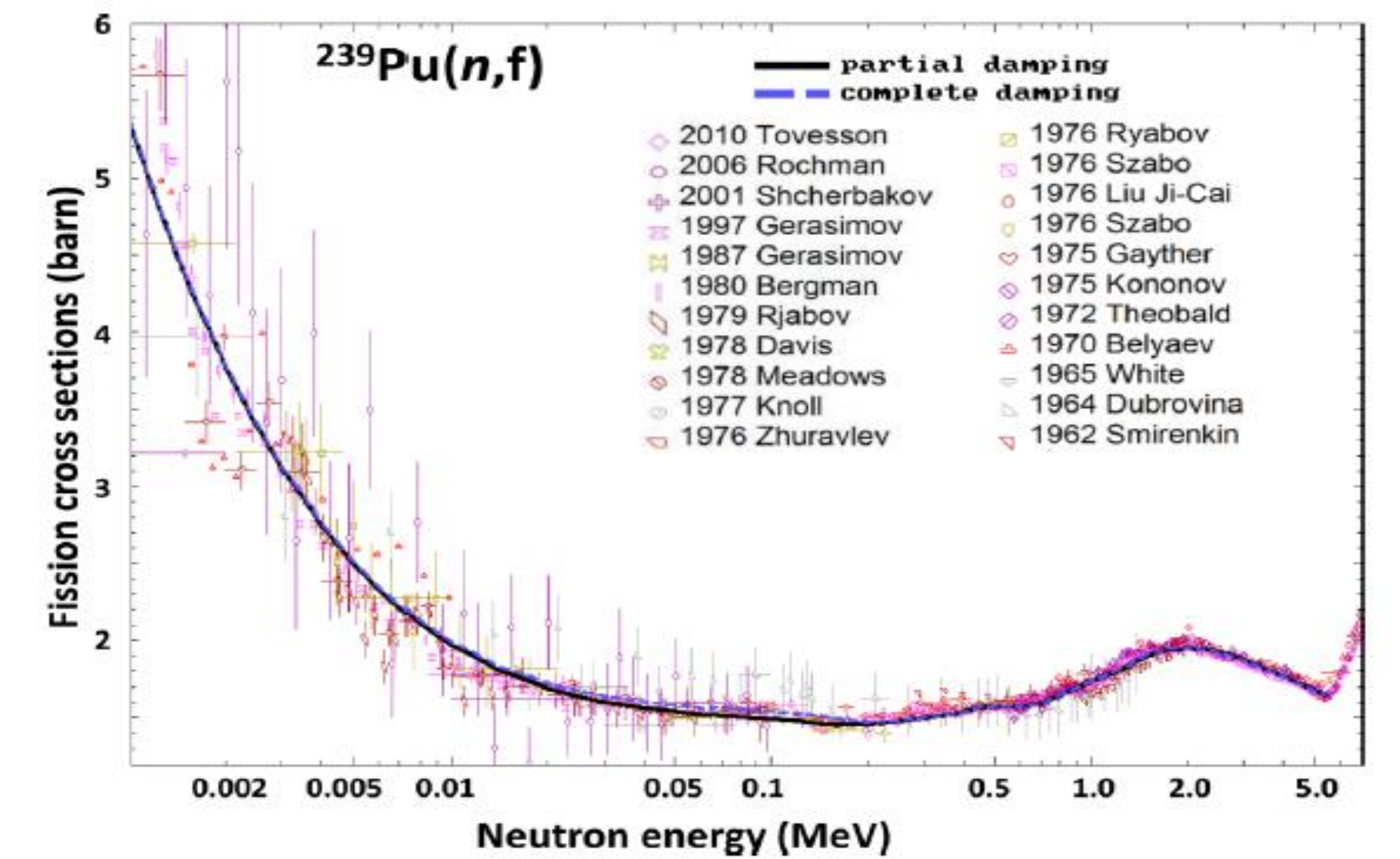

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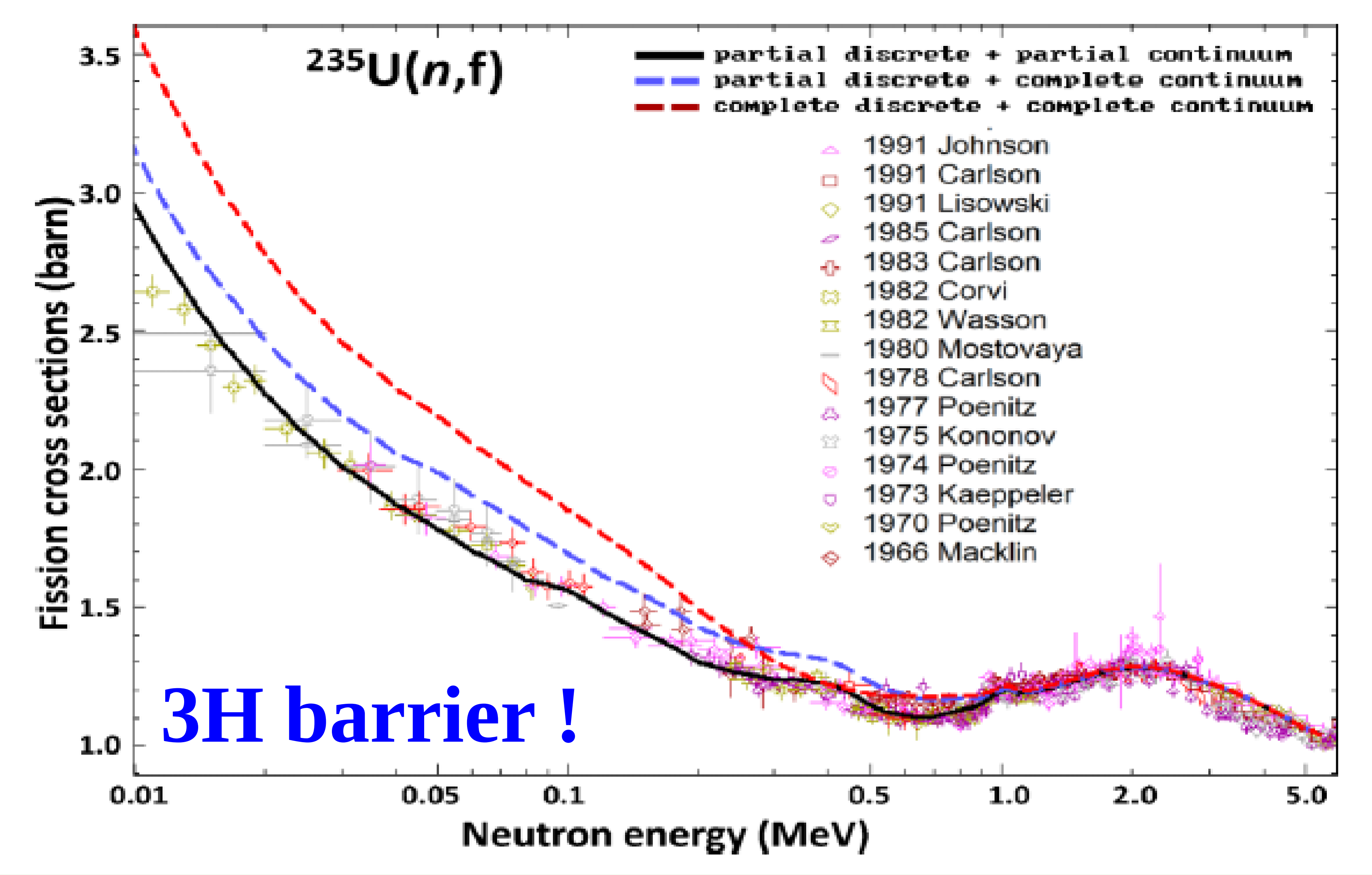

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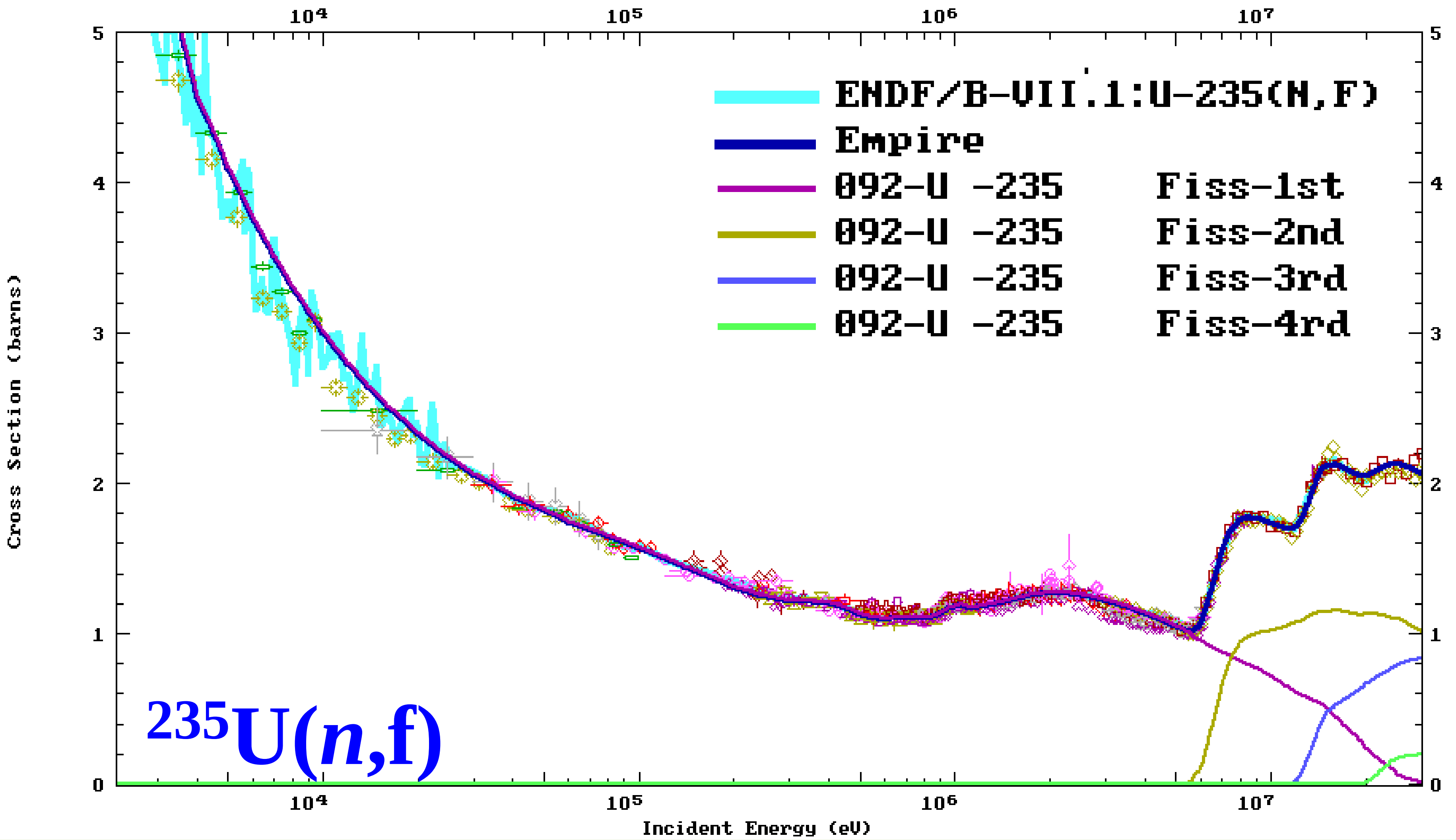
Empire ^{235}U(n,f) vs ENDF/B-VII.1



^{235}U(n,f)-ib6a = ENDF-B/VII.1=STD

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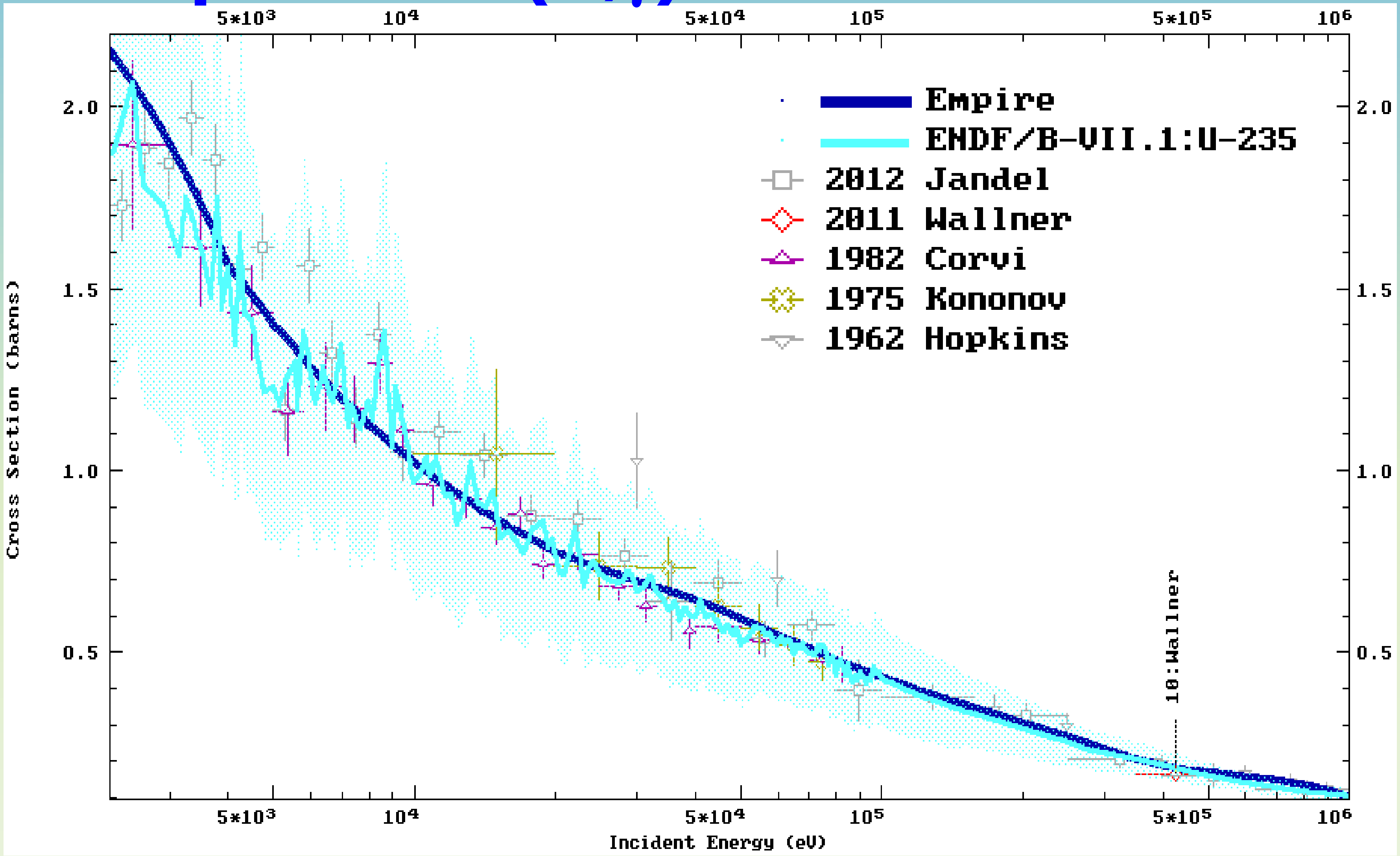
Empire $^{235}U(n,\gamma)$ vs ENDF/B-VII.1



$^{235}U(n,\gamma)$ - ib6a = ENDF-B/VII.1

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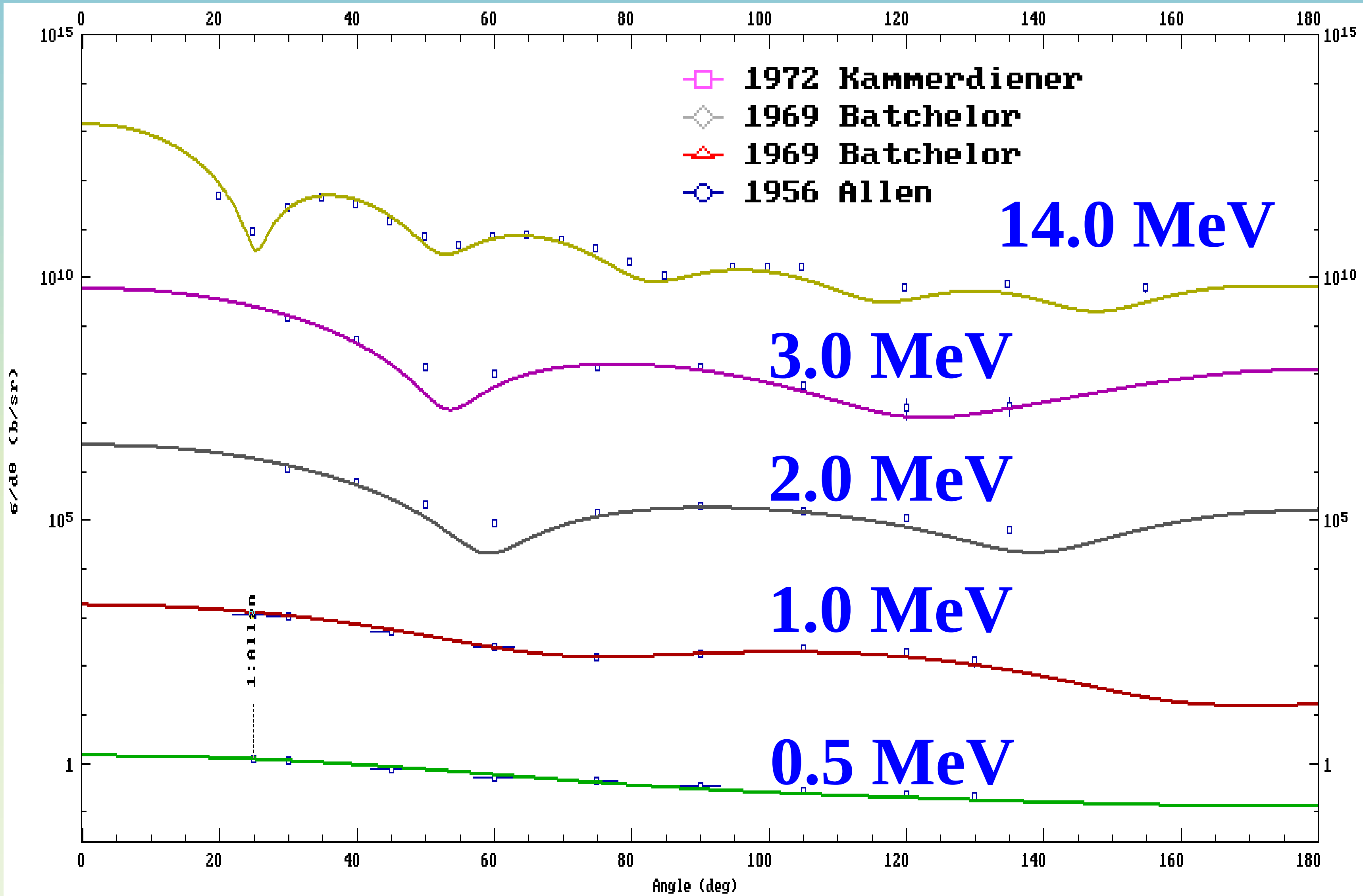
^{235}U(n,el), ^{235}U(n,sct) ang.distributions



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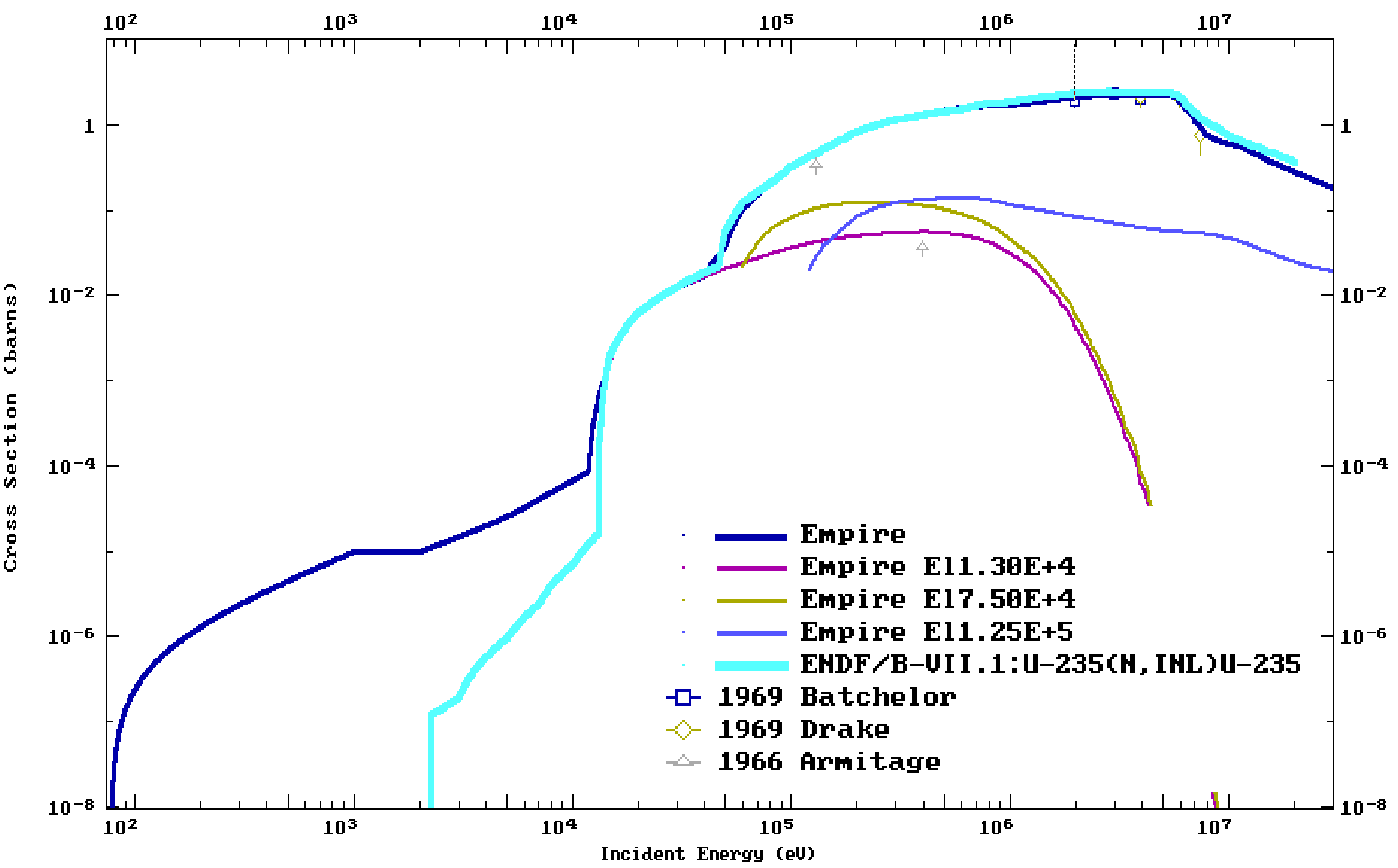
^{235}U(n,inl) (b6a) vs ENDF/B-VII.1



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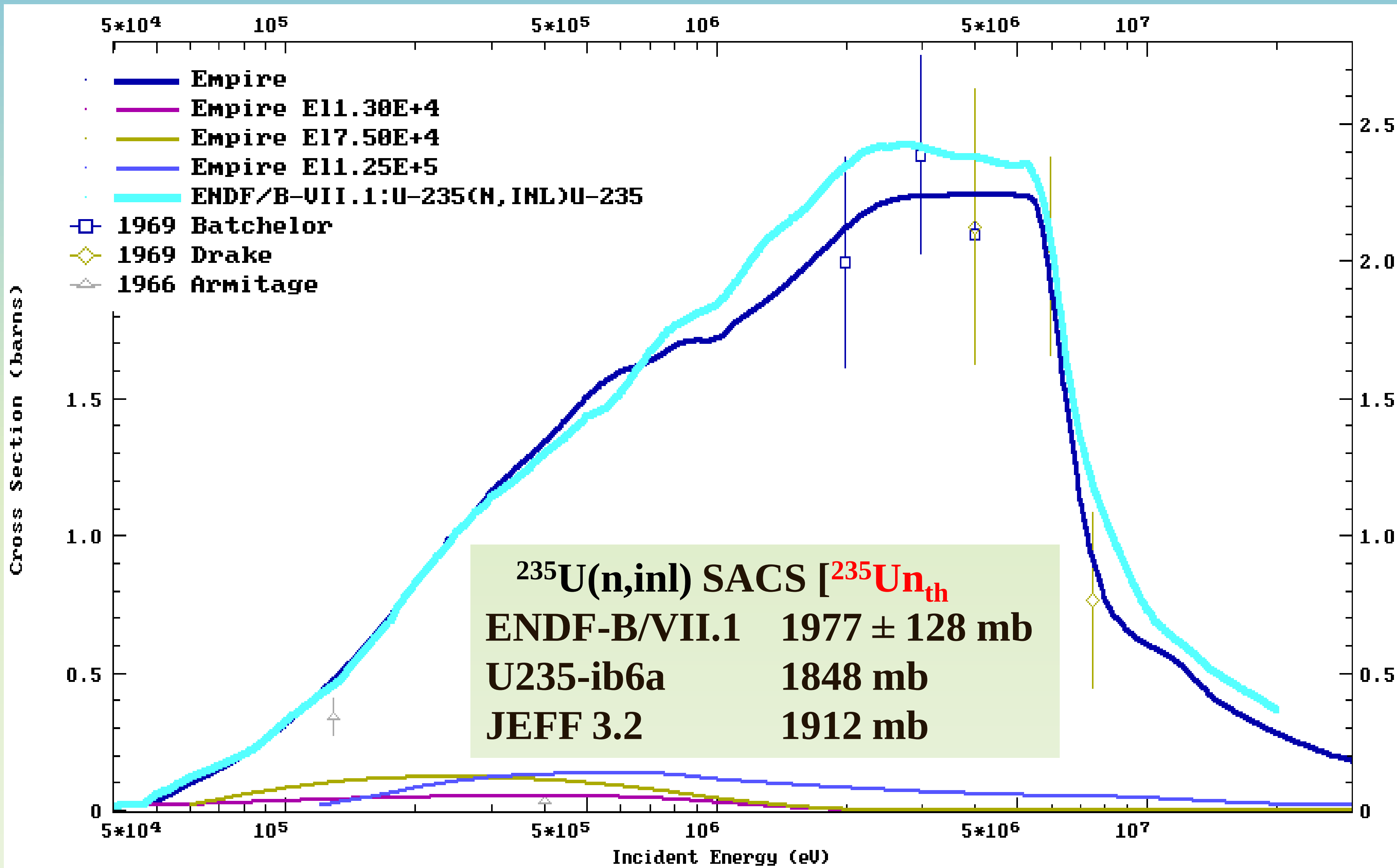
^{235}U(n,inl) (b6a) vs ENDF/B-VII.1



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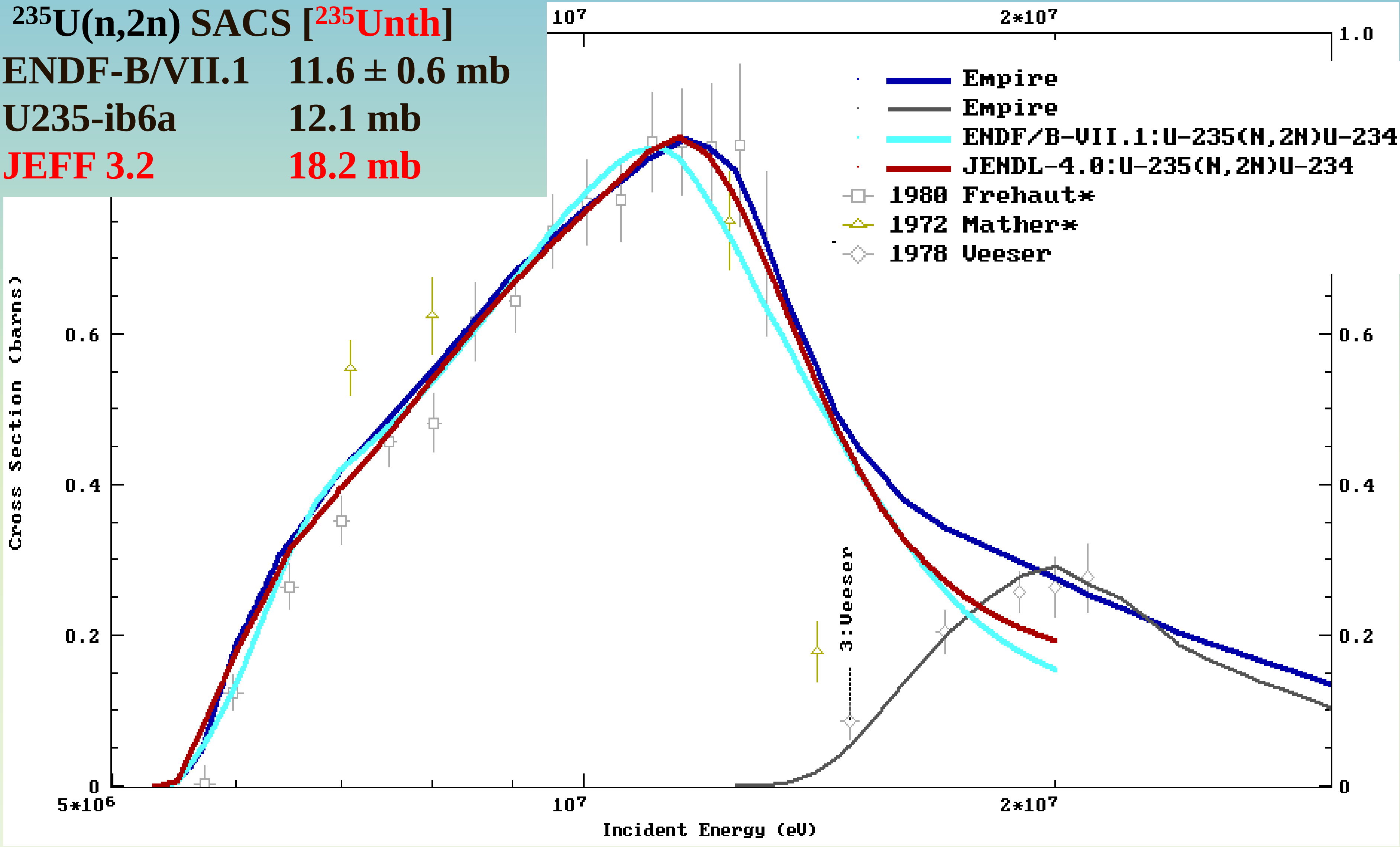
σ(n,2n), σ(n,3n) vs ENDF/B-VII.1

^{235}U(n,2n) SACS [^{235}Unth]

ENDF-B/VII.1	11.6 ± 0.6 mb
U235-ib6a	12.1 mb
JEFF 3.2	18.2 mb



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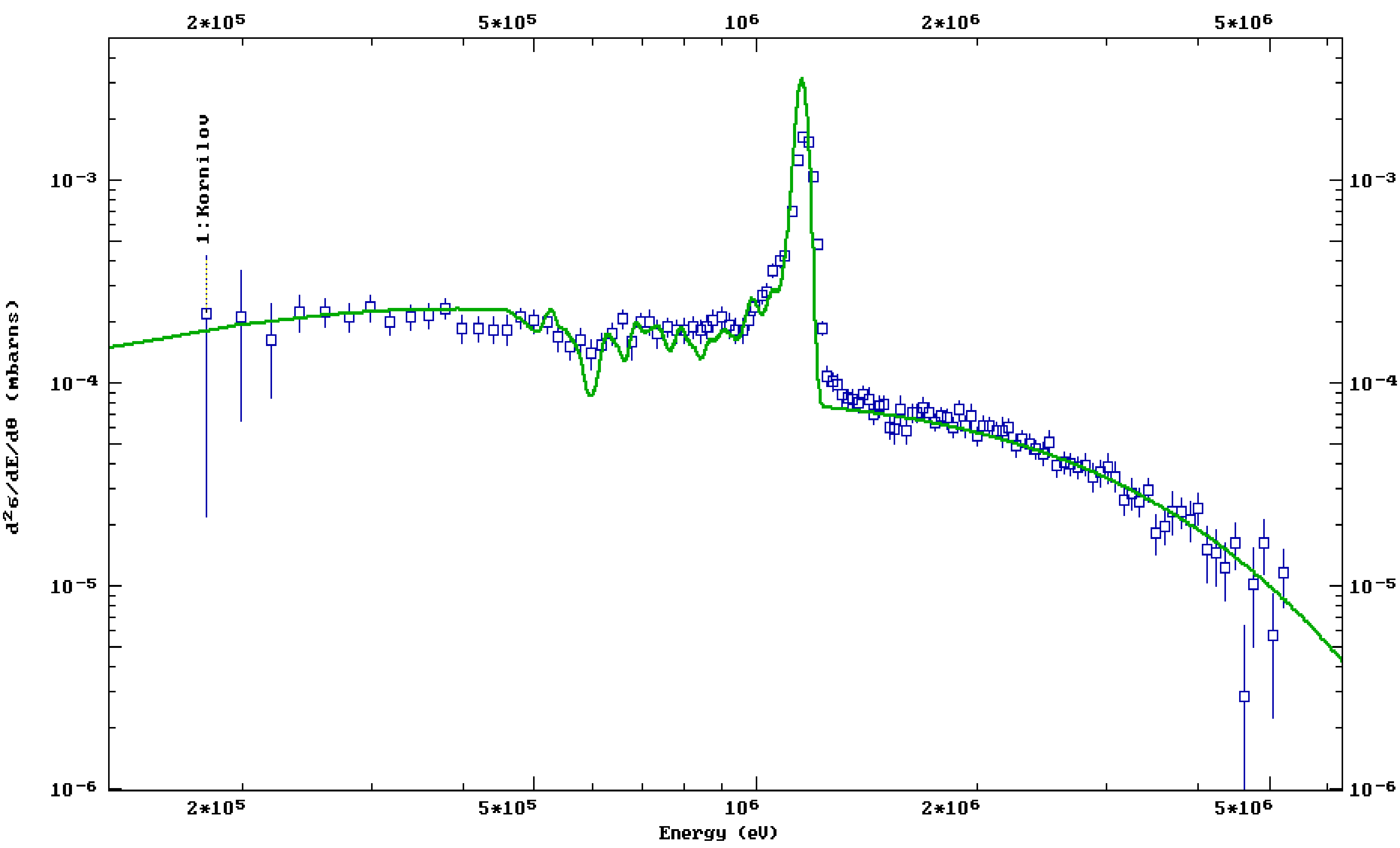
^{235}U+n, DDX yield, E_n=1.19 MeV, 120 deg



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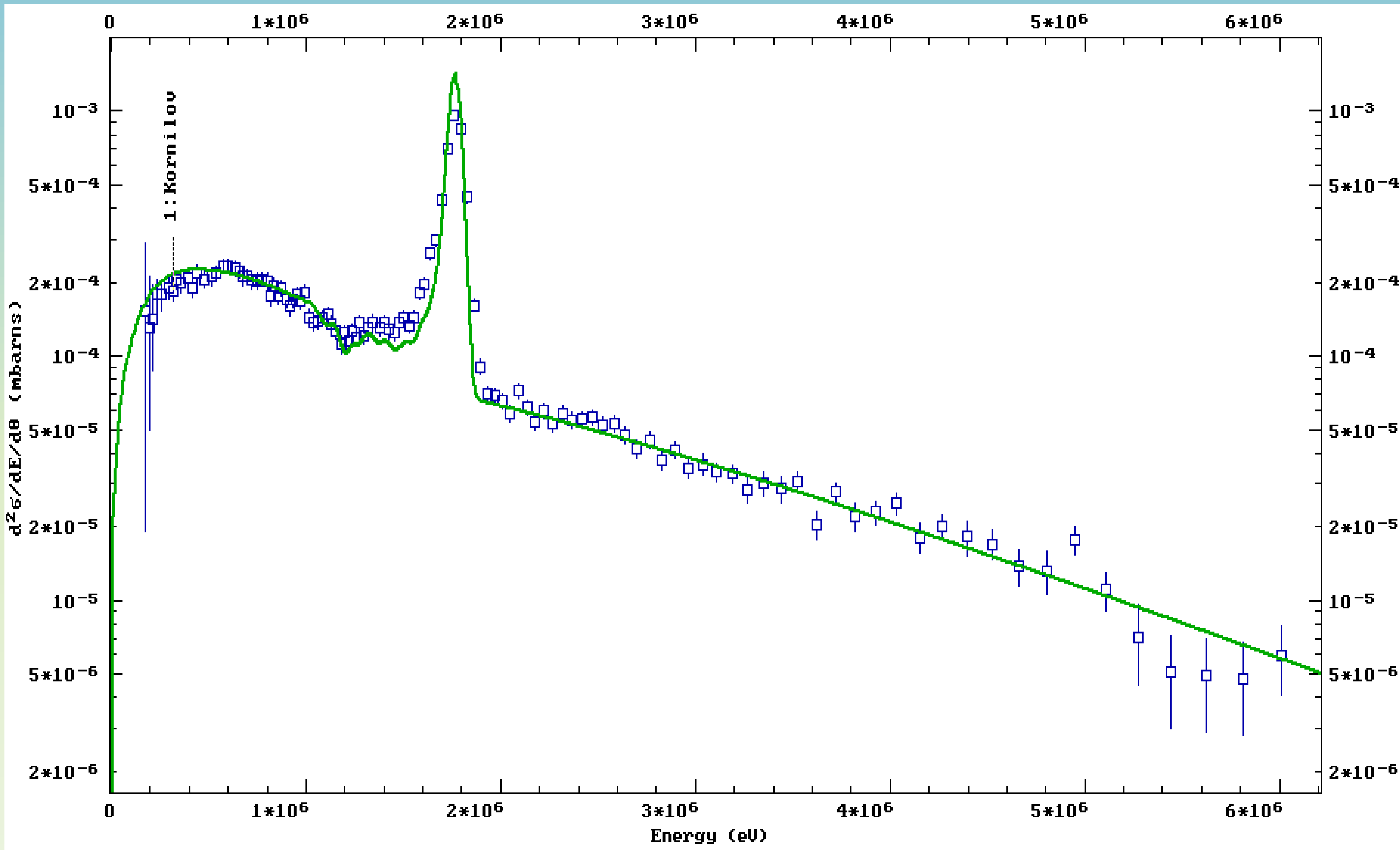
$^{235}U+n$, DDX yield, E_n=1.79 MeV, 120 deg



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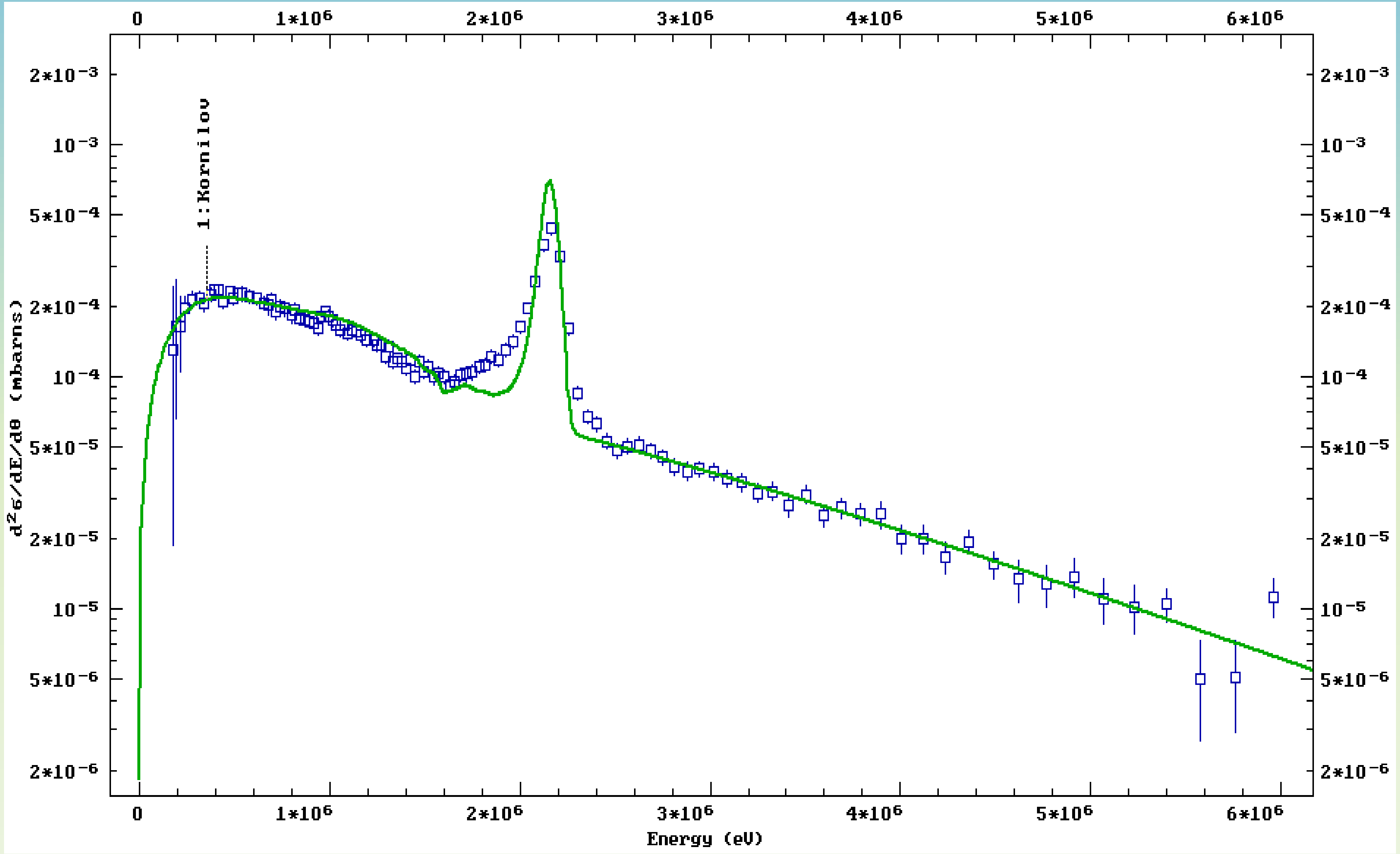
$^{235}U+n$, DDX yield, E_n=2.19 MeV, 120 deg



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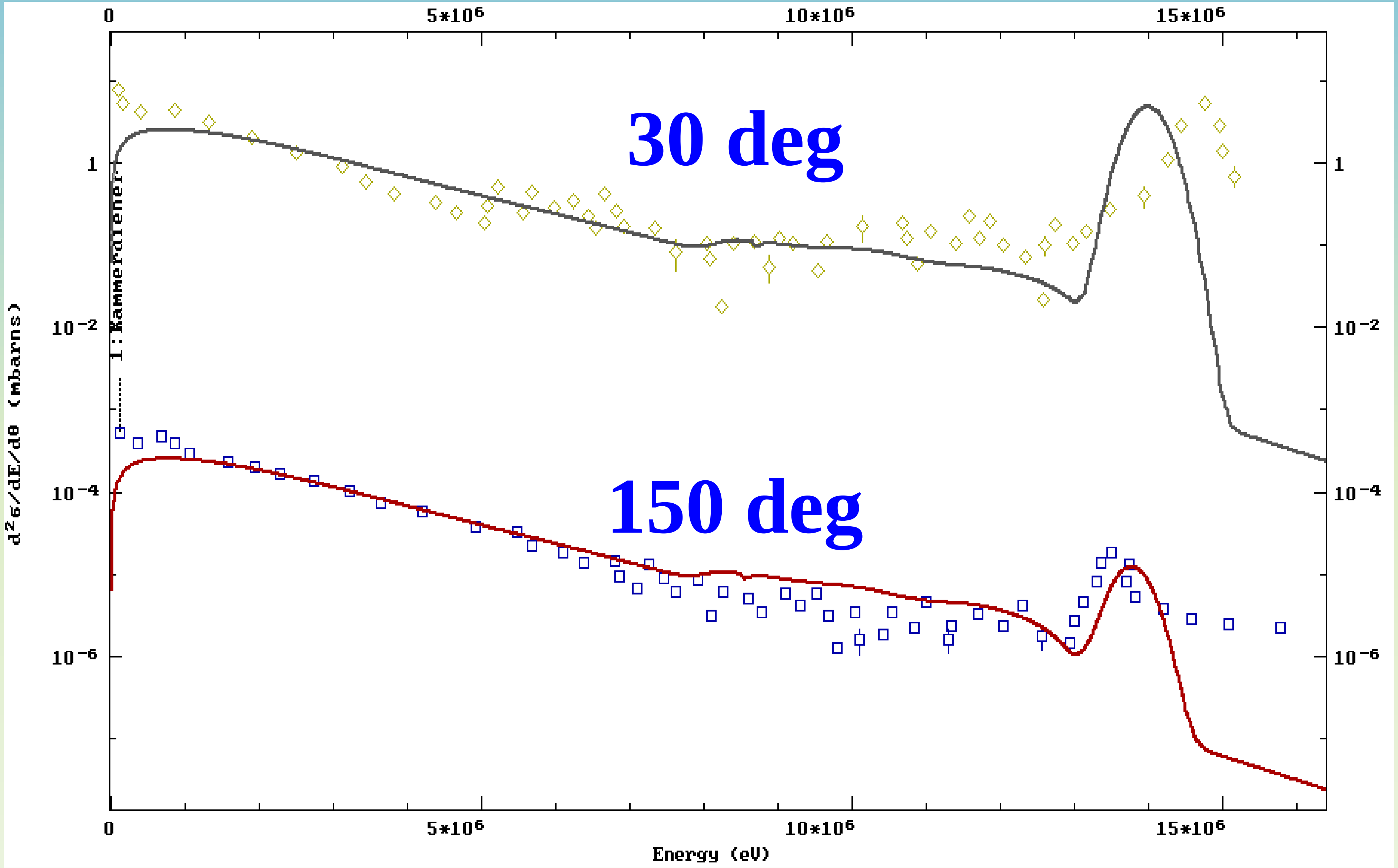
^{235}U+n, DDX yield, E_n=14 MeV



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Conclusions: ^{235}U fast region

Better physics → improved performance

- New fast evaluation with **3H fission barriers** leading to elastic/inelastic and (n,xn) **consistent** changes
- PFNS thermal from IAEA CRP (E_{av}=2.00(1) MeV)
- PFNS fast adopted from Talou-Rising
- Fission in fast region from 2006 Neutron Standards
  (to be updated based on new GMA Standard fit)
- Capture in fast region from ENDF/B-VII.1
  (update based on Jandel/RPI data ??)
- Good agreement between B/VII.1 SACS and new eval.

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