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^{9}Be Photonuclear Evaluation for ENDF/B-IX.0

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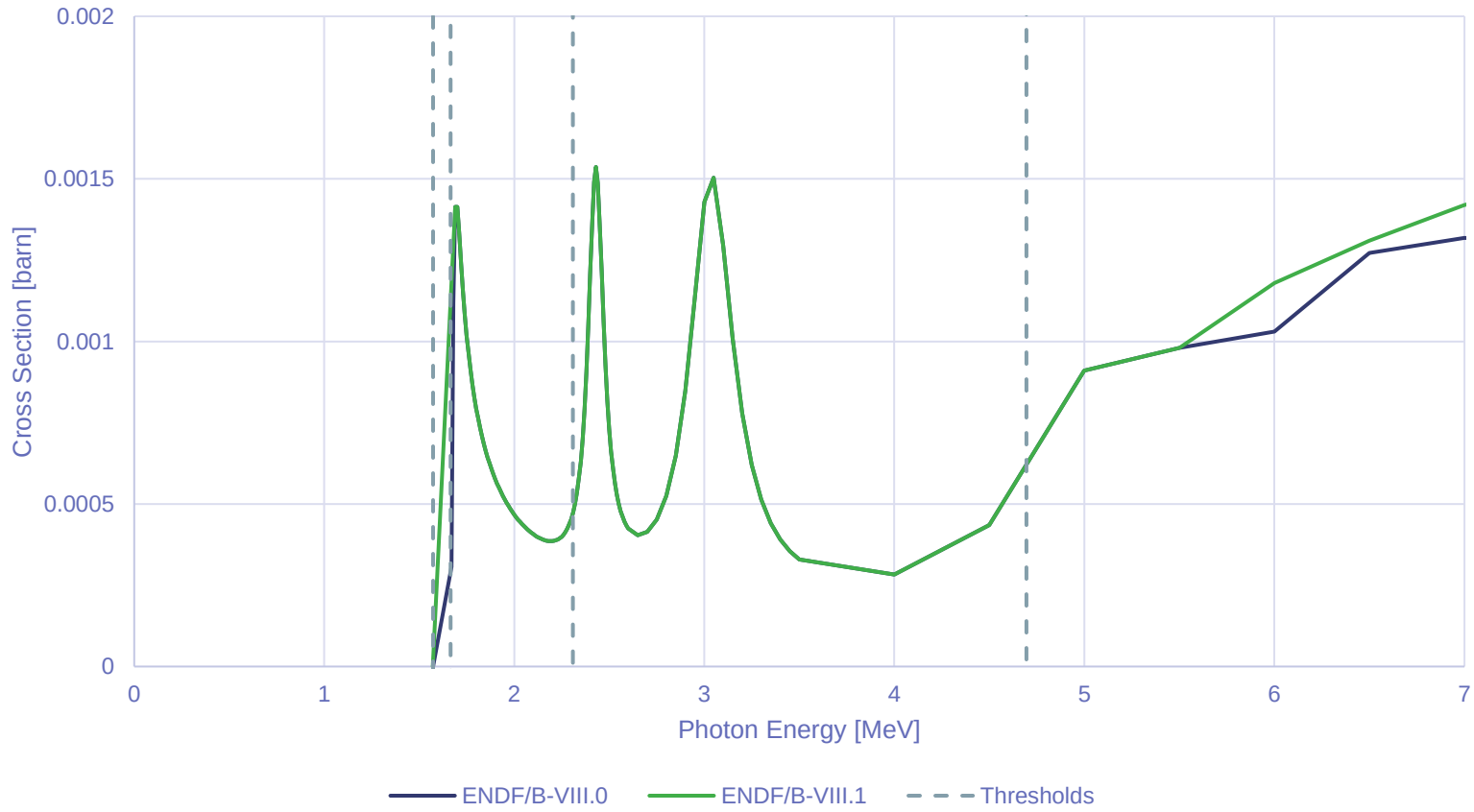
Current ^{9}Be(γ,x) Evaluation(s)



$^{9}Be(\gamma, n_0)\ ^{8}Be$ 1.665 MeV

$^{9}Be(\gamma, n_1)\ ^{8}Be^{*}$ 4.695 MeV

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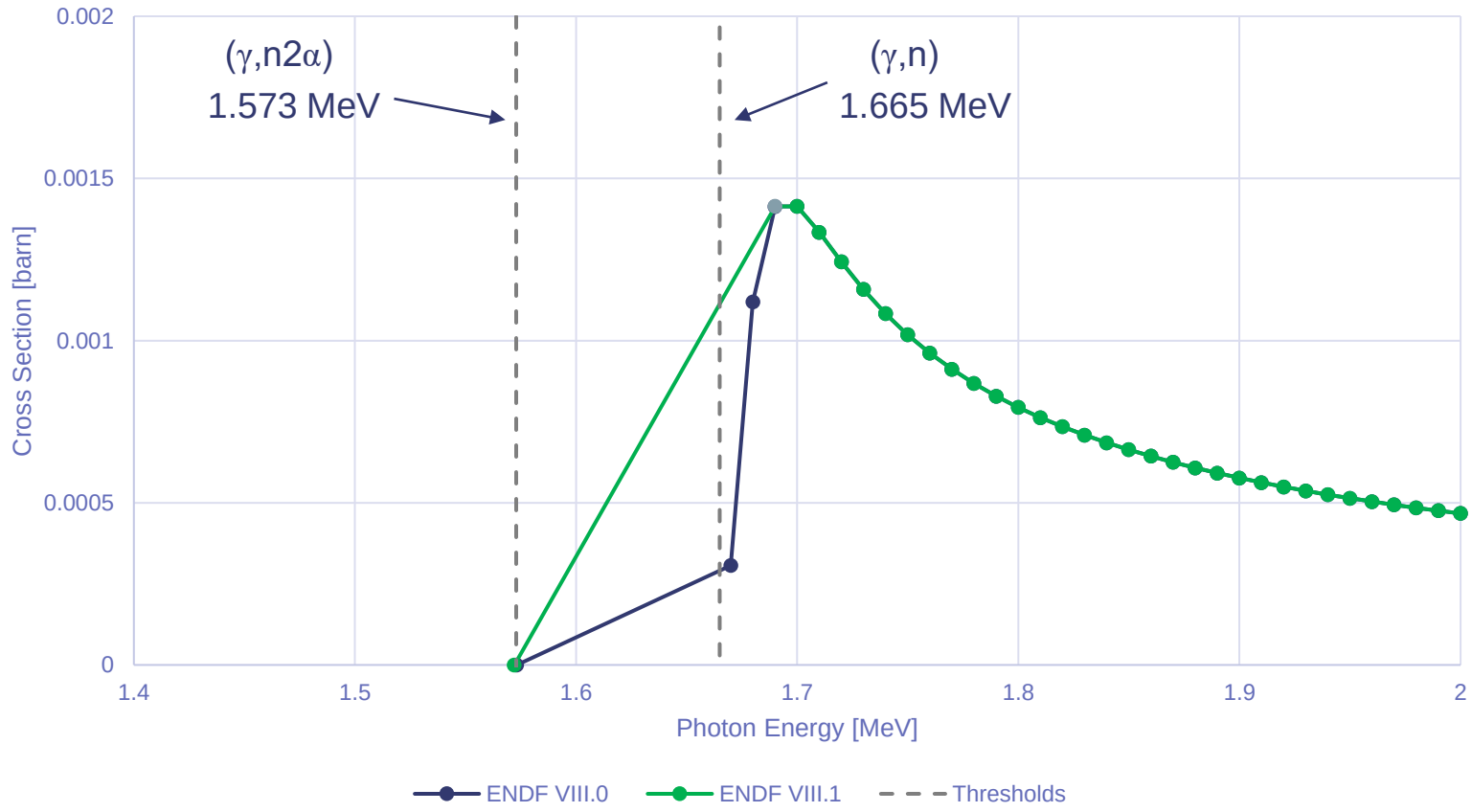
$^{9}Be(\gamma, n2\alpha)$ 1.573 MeV

$^{9}Be(\gamma, \alpha)\ ^{5}He$ 2.308 MeV

Cross Section Between the (γ,n2α) and (γ,n) Thresholds



At 1.576 MeV
9.18 μb from evaluation
0.40±0.18 μb from Fujishiro *et al*., Canadian J. of Phys., **6**, p1579 (1983)

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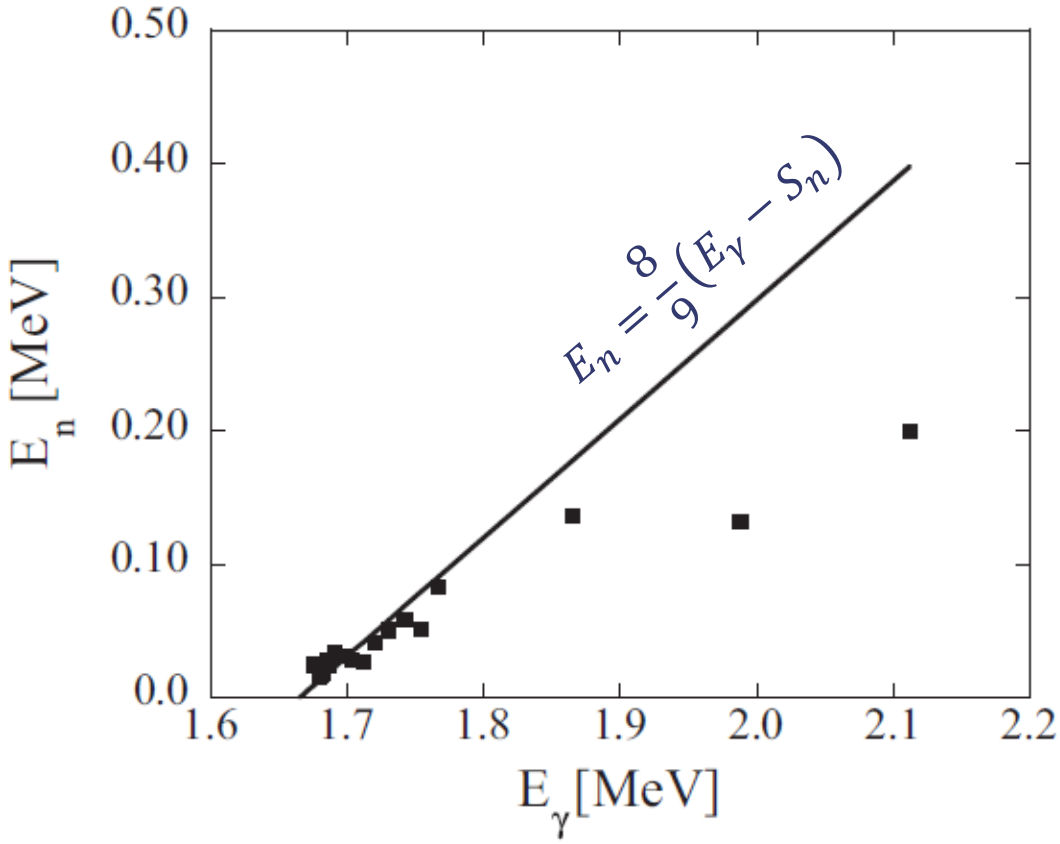
At 1.63 MeV
180 μb from evaluation
0.093±16 μb from Utsunomiya *et al*. Rev C 92, 064323 (2015)

Average Neutron Energy

Utsunomiya, Phys. Rev. C **92**, 064323 (2015)



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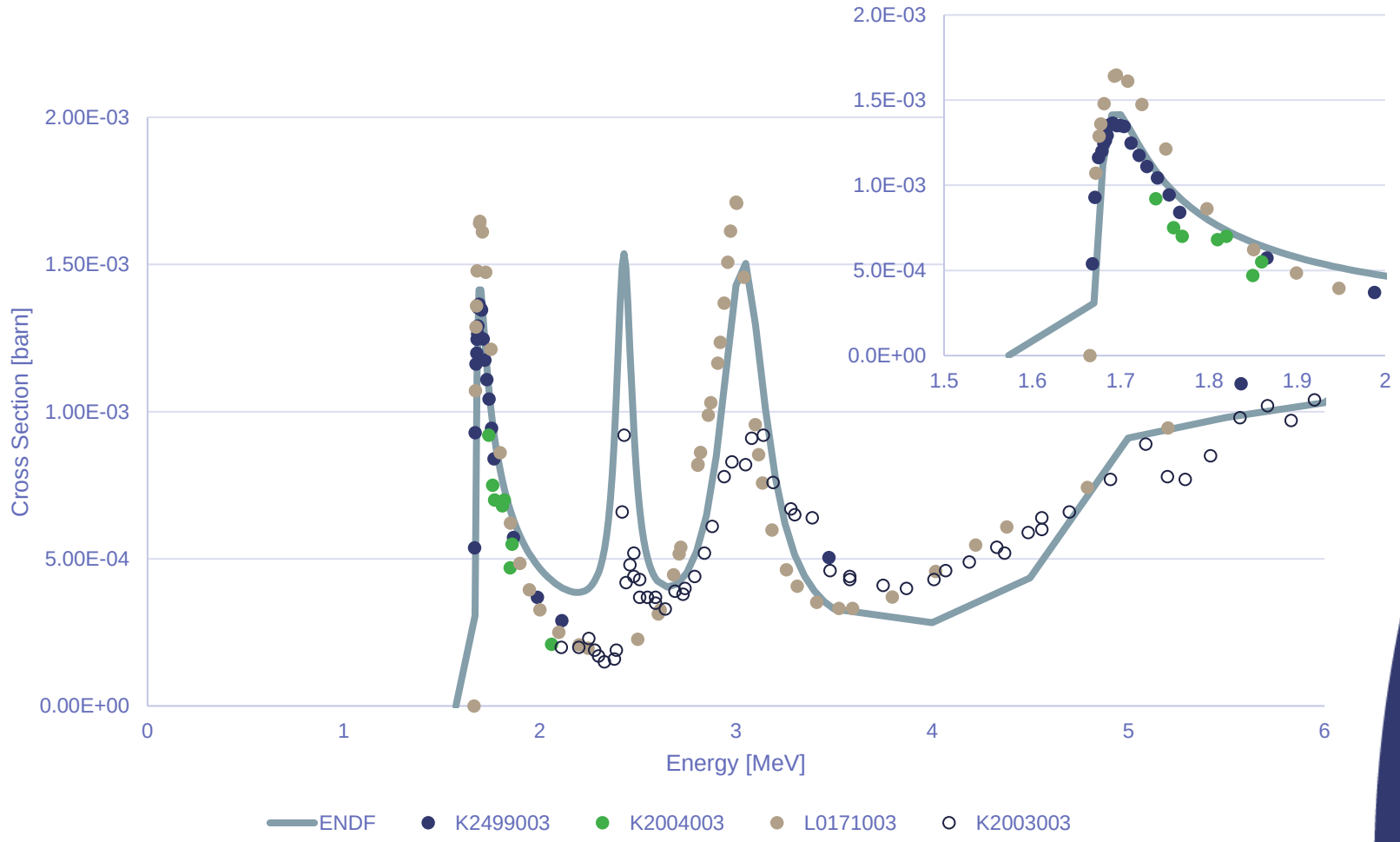
New Data



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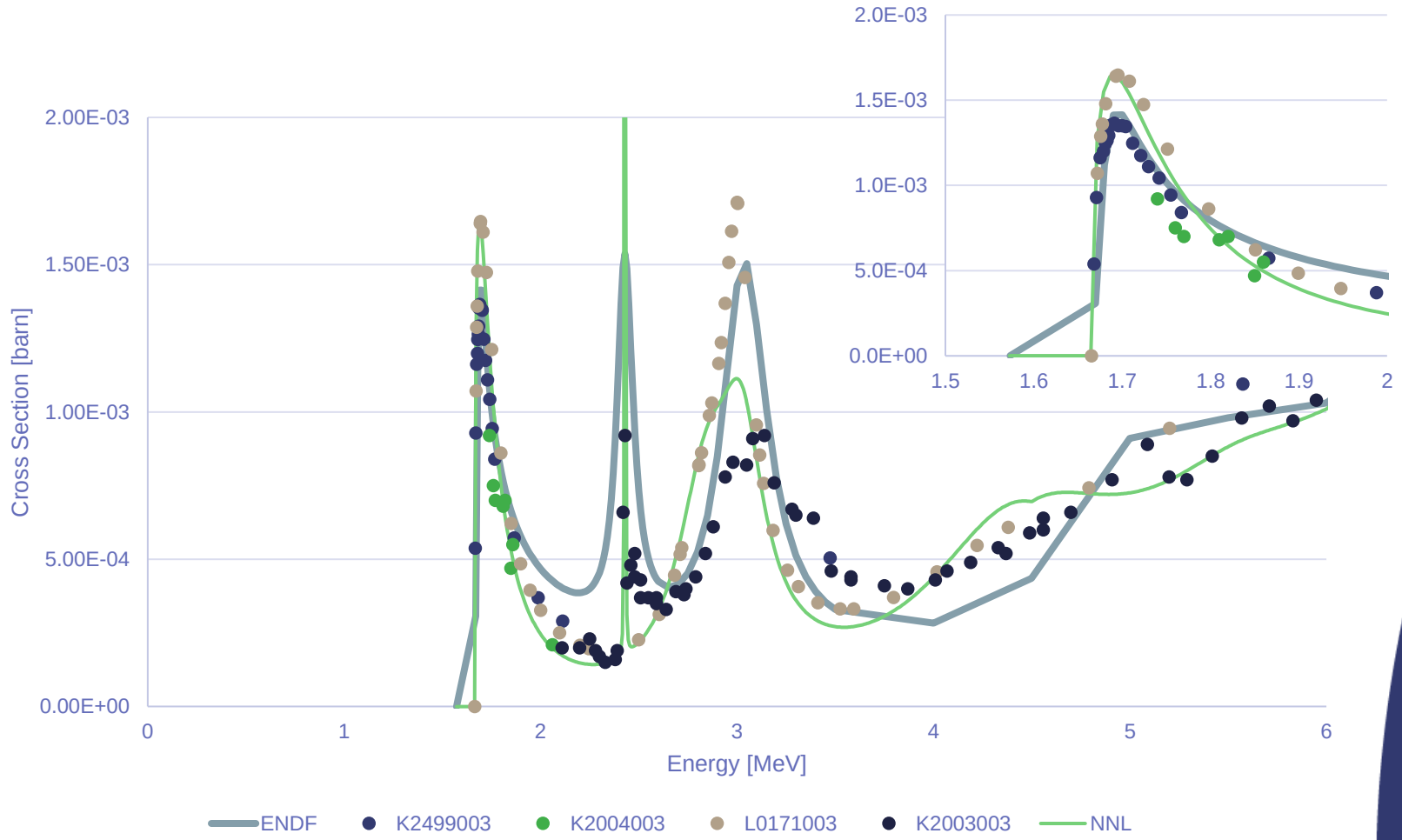
New Evaluation



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Multilevel Breit Wigner Parameters

E_R MeV	J^π	Γ_γ eV	Γ_n keV	Γ keV
1.735	$1/2^+$	0.5333	260	260
2.429	$5/2^-$	0.065333	0.0468	0.78
2.880	$1/2^-$	1.2	393	393
3.049	$5/2^+$	0.3	197.4	282
4.704	$3/2^+$	5.2	585.58	1541
5.590	$3/2^-$	1.046667	357.58	941

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Why this evaluation was not accepted

- Original evaluation assumed (γ,n2α) over the entire low energy range
- The new evaluation attempted to break up these reactions to better describe the energy spectra of the secondary particles
- Energy balance of secondary particles were not checked

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Conclusions

- NNL has a new $^{9}Be(\gamma,x)$ evaluation based on the multilevel Breit-Wigner formalism
  - This evaluation does a better job of matching the low cross section between resonances (~2-3 MeV)
  - The second resonance is significantly narrower than the current evaluation
- Secondary particle distributions need to be corrected to ensure energy balance
- Secondary angle/energy measurement at low energy may help distinguish between reactions and specify the secondary distributions

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