Zirconium evaluations

David Brown

for

H.I.Kim, S. Mughabghab
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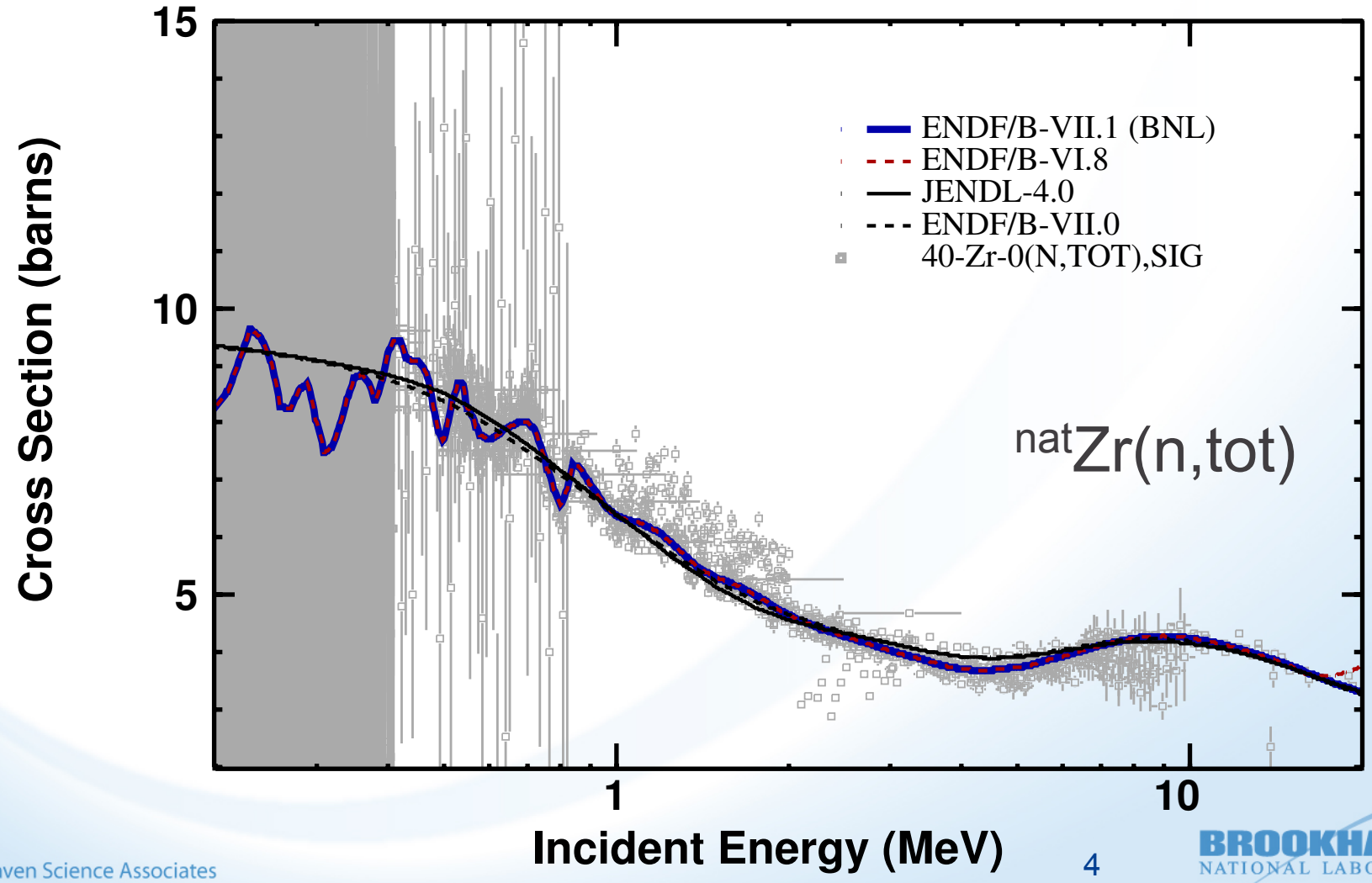
a passion for discovery

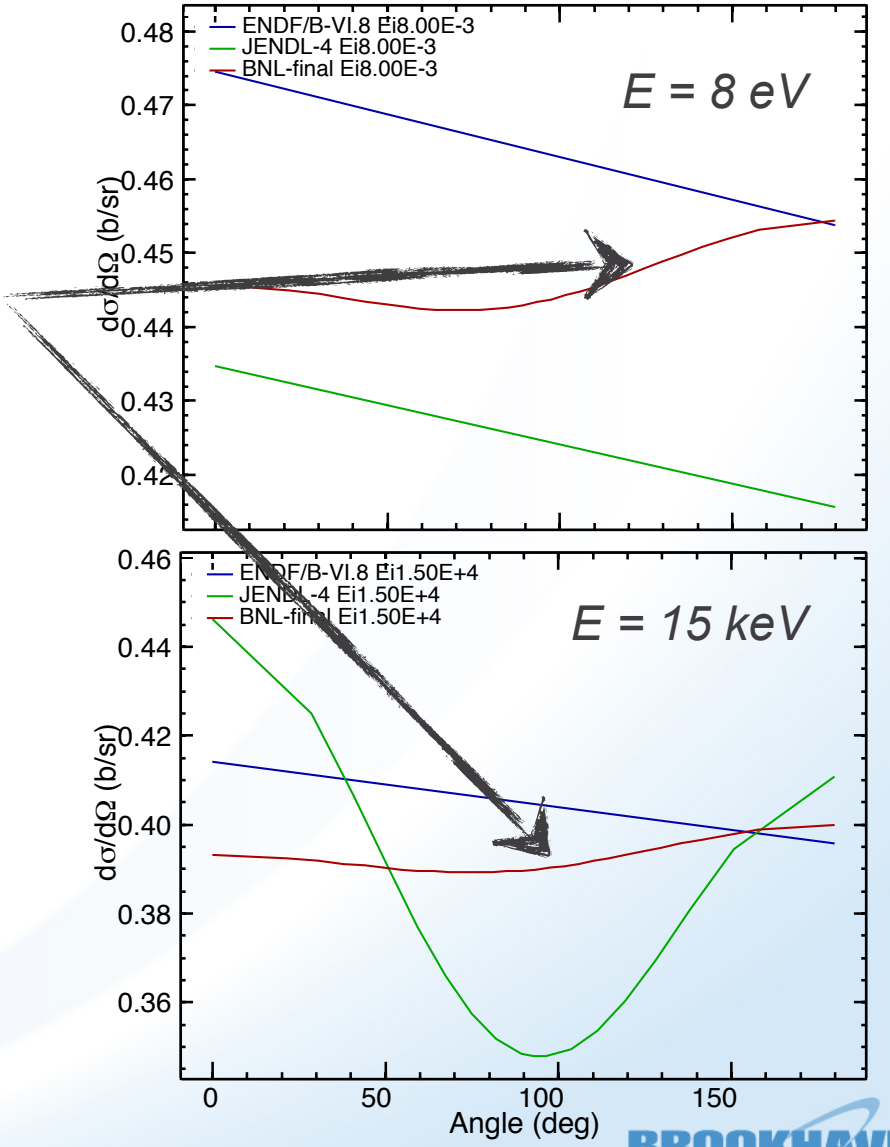
U.S. DEPARTMENT OF ENERGY | Office of Science

H.I. Kim, S. Mughabghab and R. Capote re-evaluated Zr isotopes with EMPIRE, fitting ENDF/B-VI.8 (n,tot)



Strange (n,el) angular distributions changed leakage

Backward peaked at low energy?!?



Note: This keeps low energy neutrons from leaking out by scattering them back into the system, increasing k_{eff}

Reported by C. Lubitz, T. Trumbull

Given the short time-scale before ENDF/B-VII.1 due, we looked to other libraries

- Since the double differential (n,el) cross section is

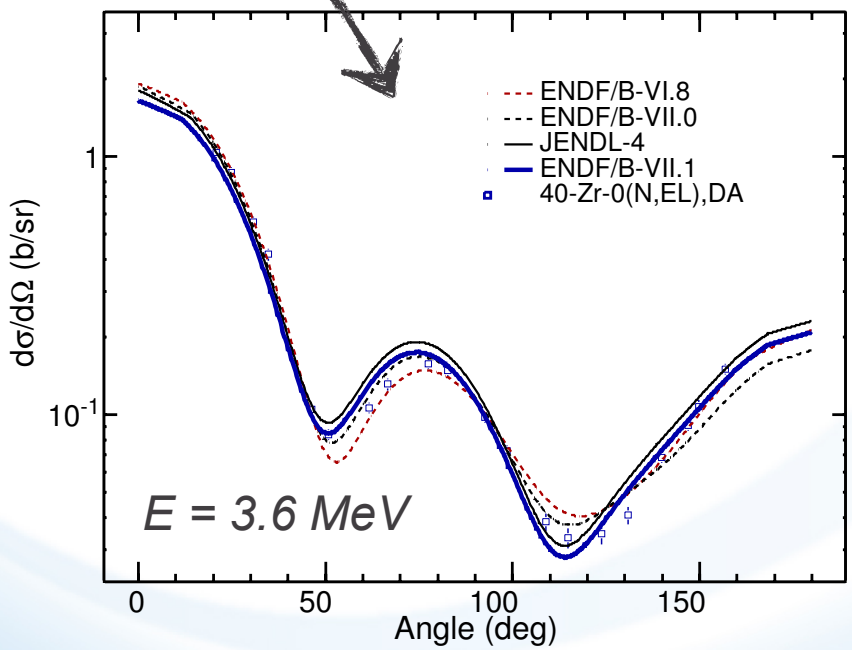
$$\frac{d\sigma(E)}{d\Omega} = (2\pi)^{-1}\sigma(E)P(E|\mu)$$

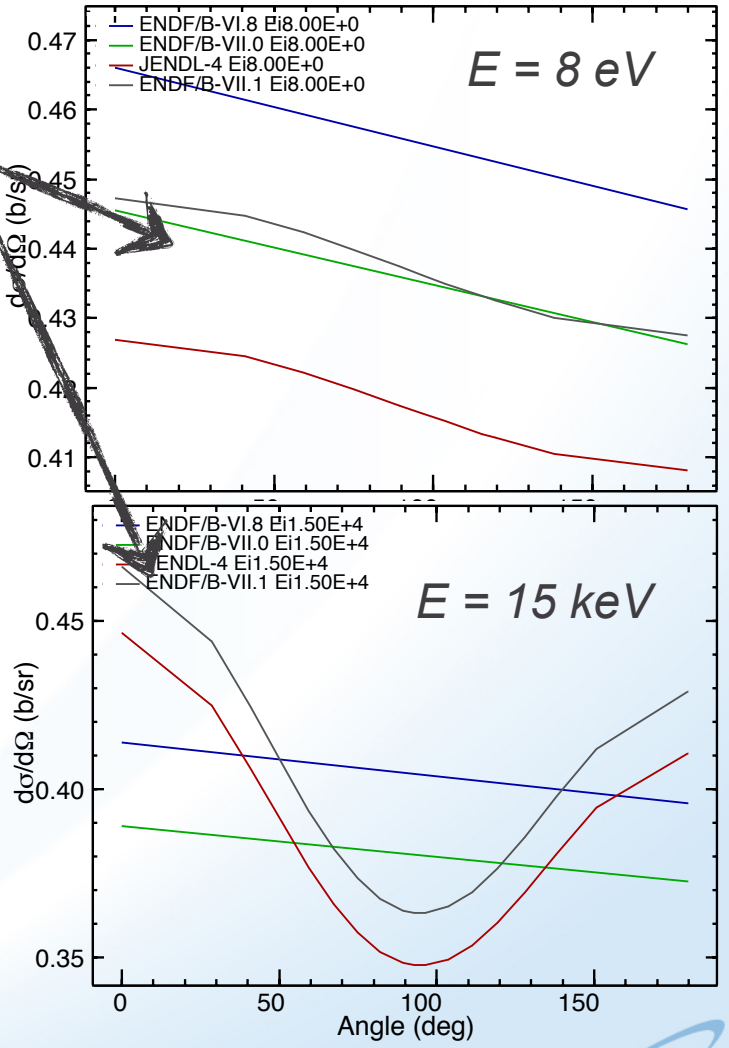
- We can preserve the excellent (n,el) total cross section by replacing only the $P(E|\mu)$ in file 4
- JENDL-4 used Koning-Deleroche OMP, a reasonable substitute given that we are at a closed shell
- FUDGE made this substitution simple

You call it a Franken-evaluation, we say that it is a strong case for organ donation

Agreement with data fantastic

Shape of distribution now makes sense





Benchmarking of new evaluations