



Re-analysis of TUD Benchmark Experiment on Tungsten Using JENDL-3.3 Data

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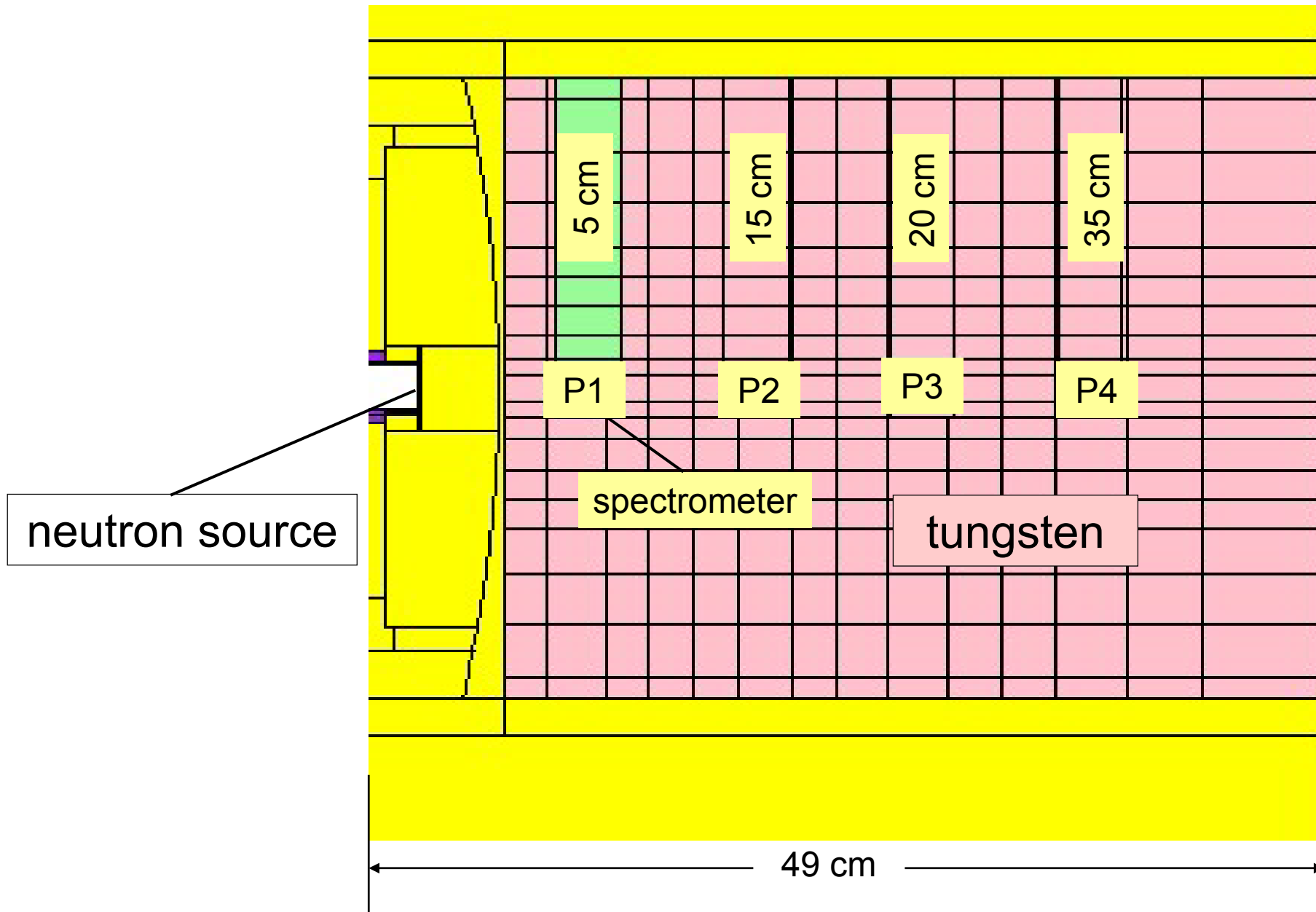
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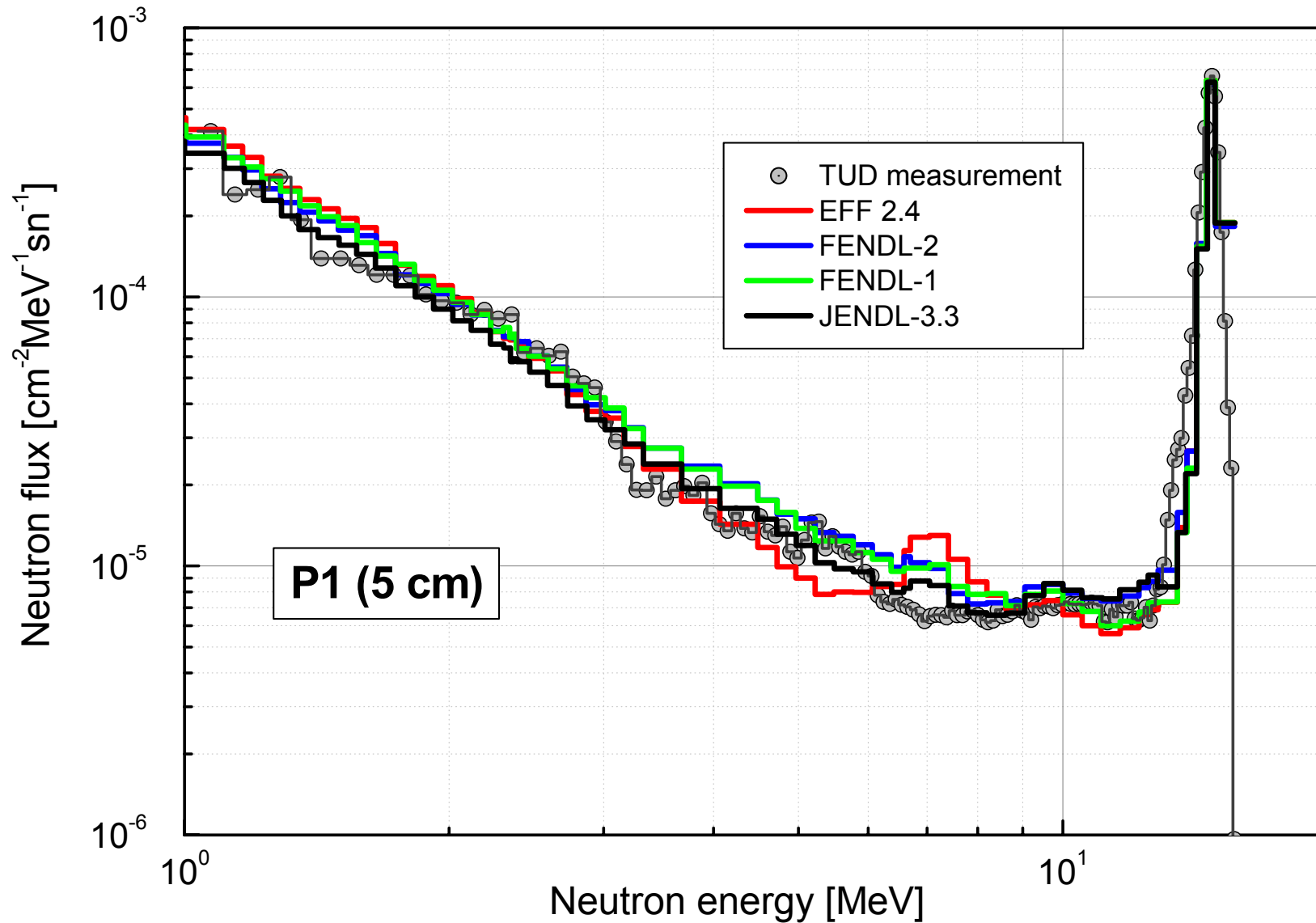
Outline

- TUD Experiment on W at FNG
 - Measurement of neutron & photon flux spectra in W assembly using a NE 213 liquid-scintillation spectrometer (*K. Seidel et al., EFF-DOC-857*)
 - Spectra measured in four positions in W assembly
 - Previous analyses (*U. Fischer et al, EFF-DOC-860*)
 - MCNP4C calculations for 3D model of W assembly & rack, spectrometer, neutron generator and experimental hall (FNG)
 - W data: EFF-2.4 (=JENDL-3.0), FENDL-1(=ENDF/B-VI.0),
 FENDL-2(=JENDL-FF)
 - Comparison of flux spectra & C/E-data
 - Cross-section data checks
- ⇒ *Re-analysis using recent JENDL-3.3 data*
- ⇒ *Support for ongoing EFF evaluation of W*
(P. Pereslavytsev et al, EFF-DOC 898)

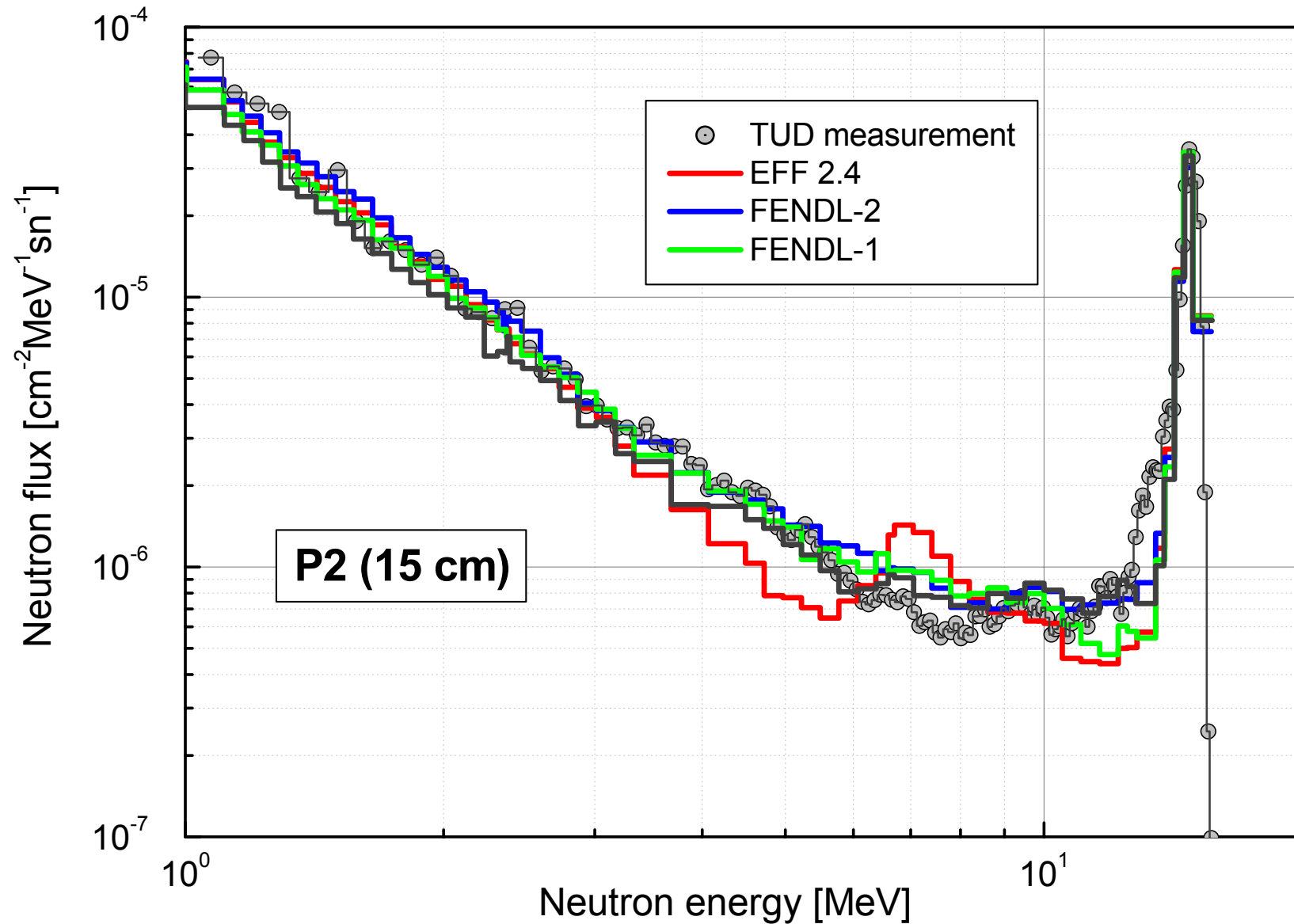
W assembly model



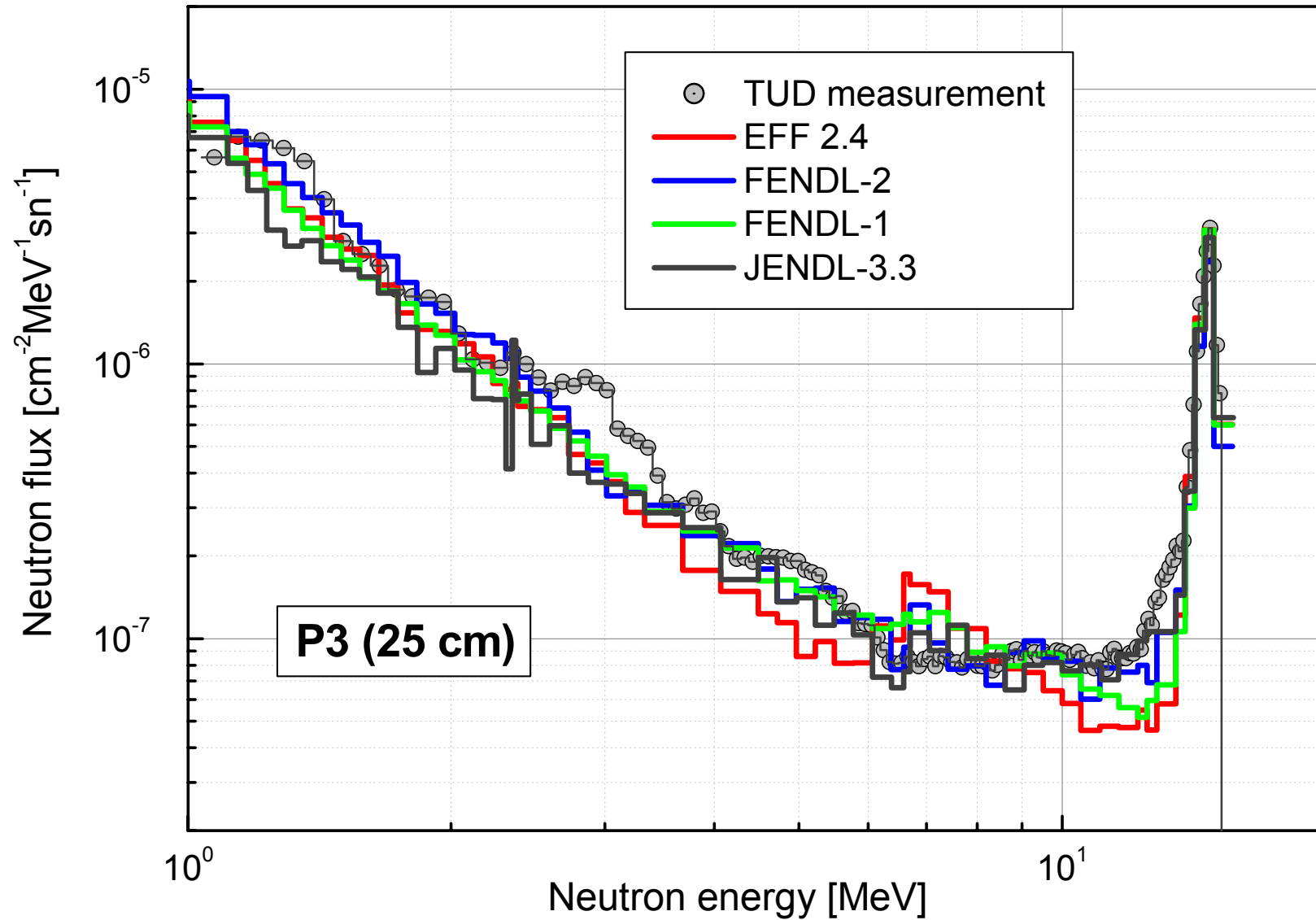
Neutron flux spectra in W assembly at P1



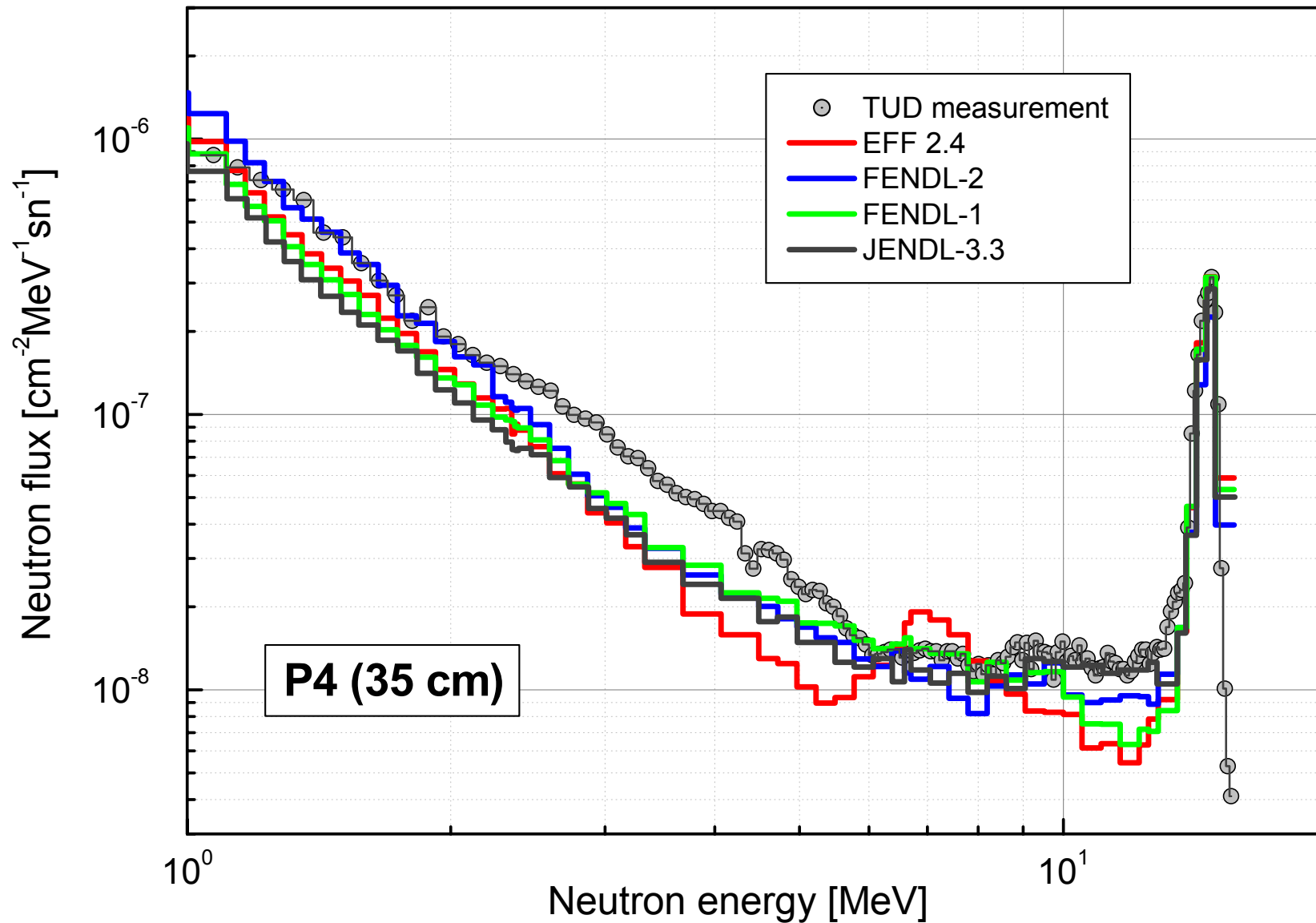
Neutron flux spectra in W assembly at P2



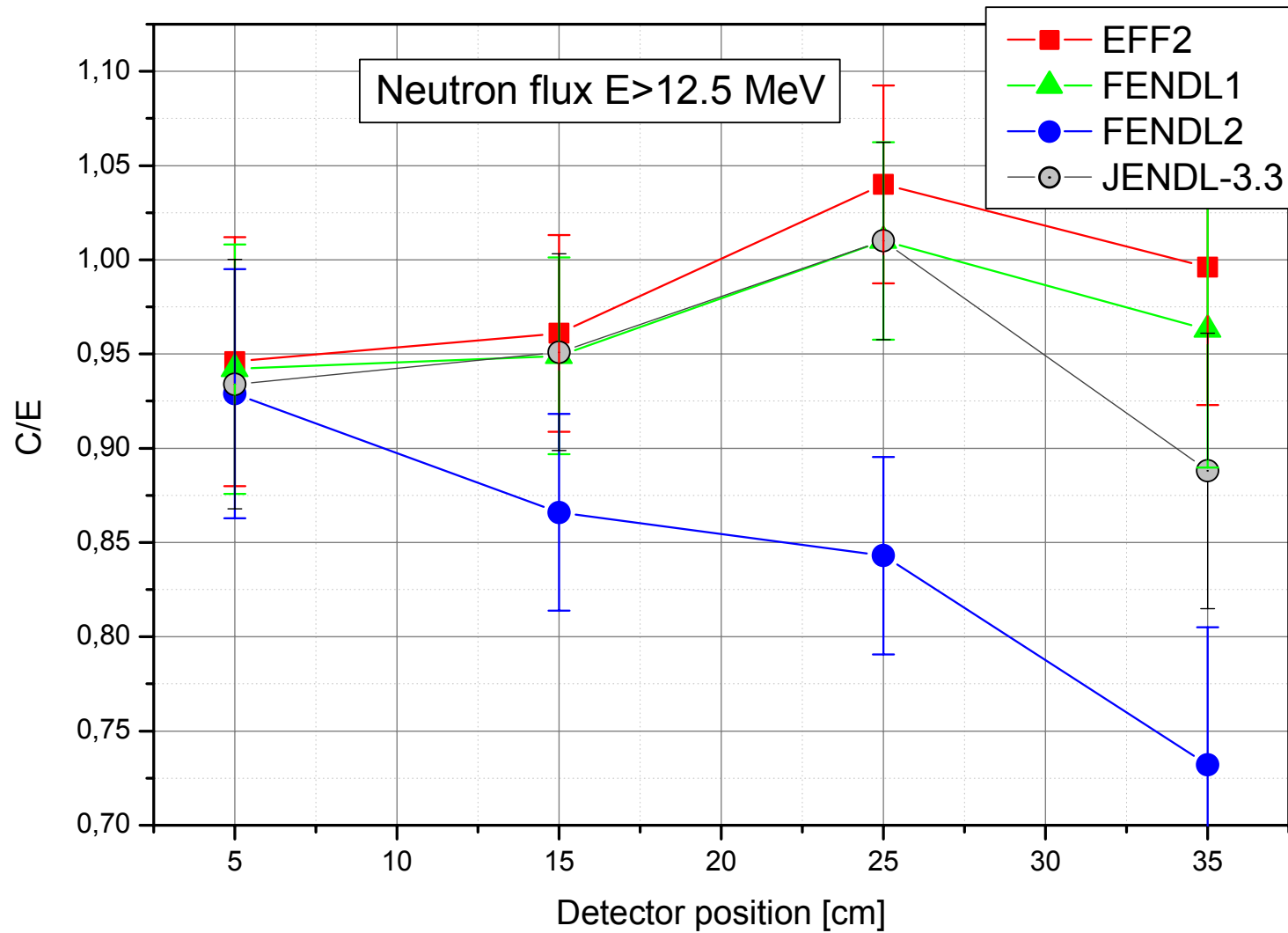
Neutron flux spectra in W assembly at P3



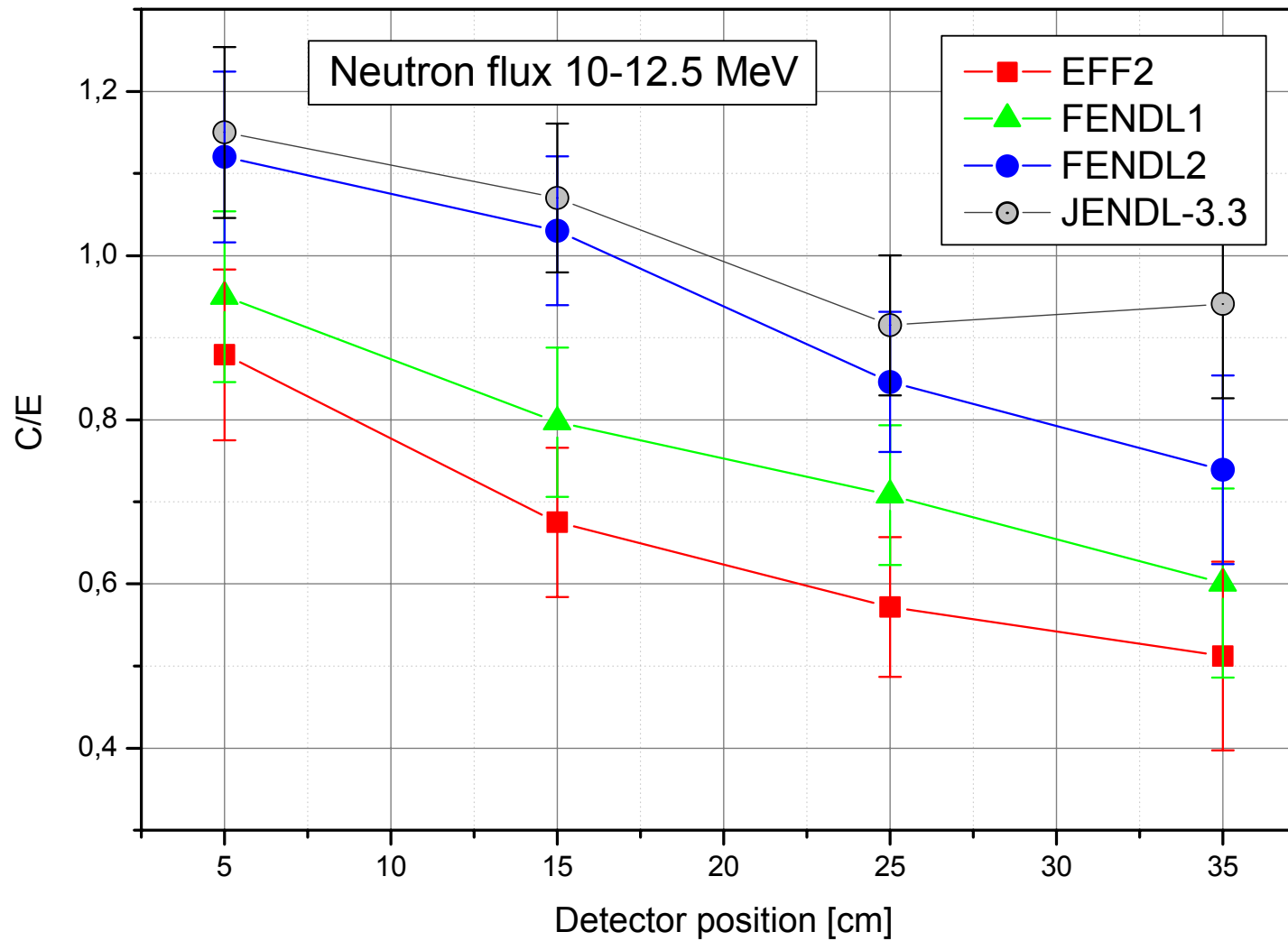
Neutron flux spectra in W assembly at P4



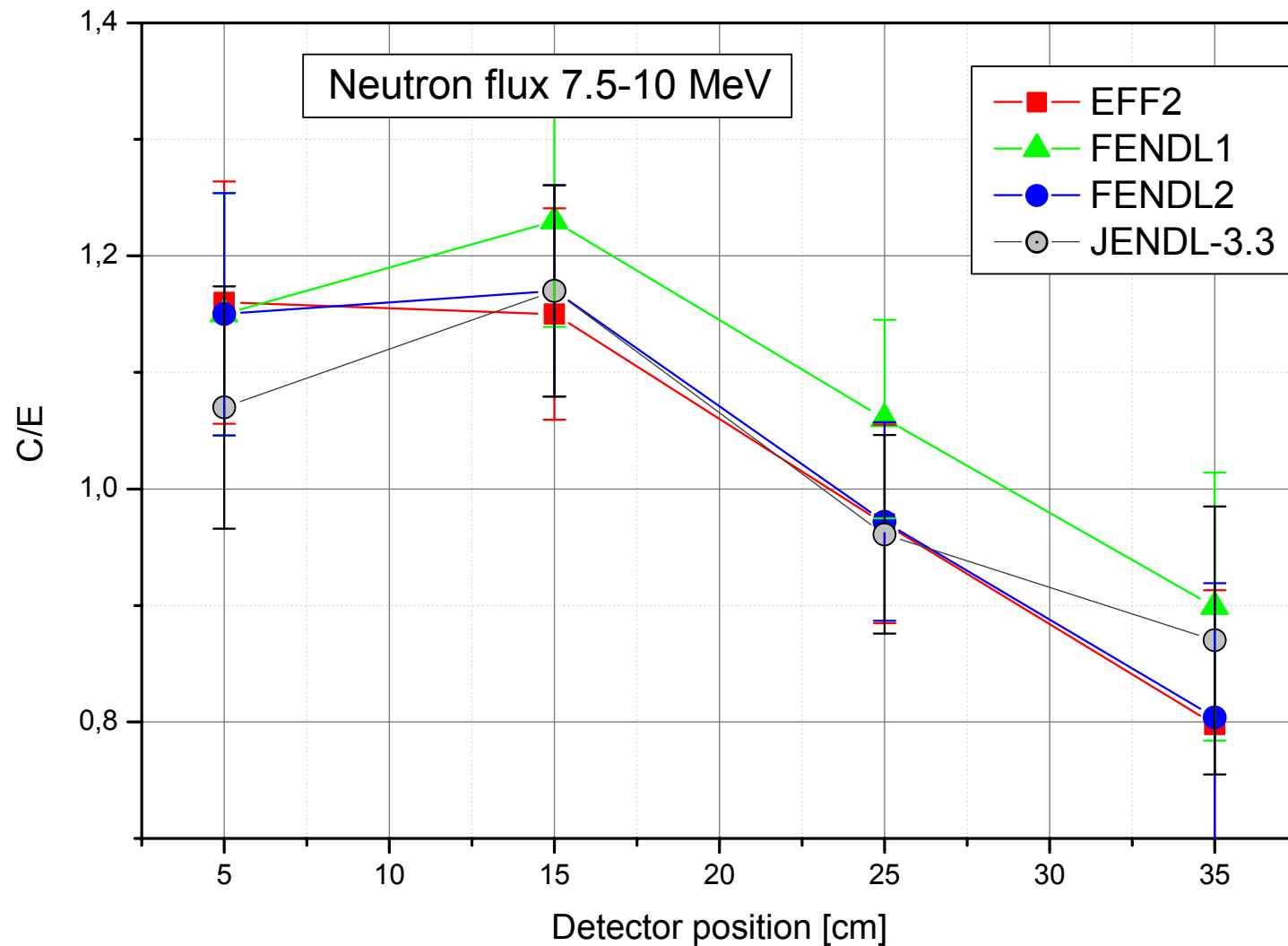
C/E comparison of neutron flux integrals



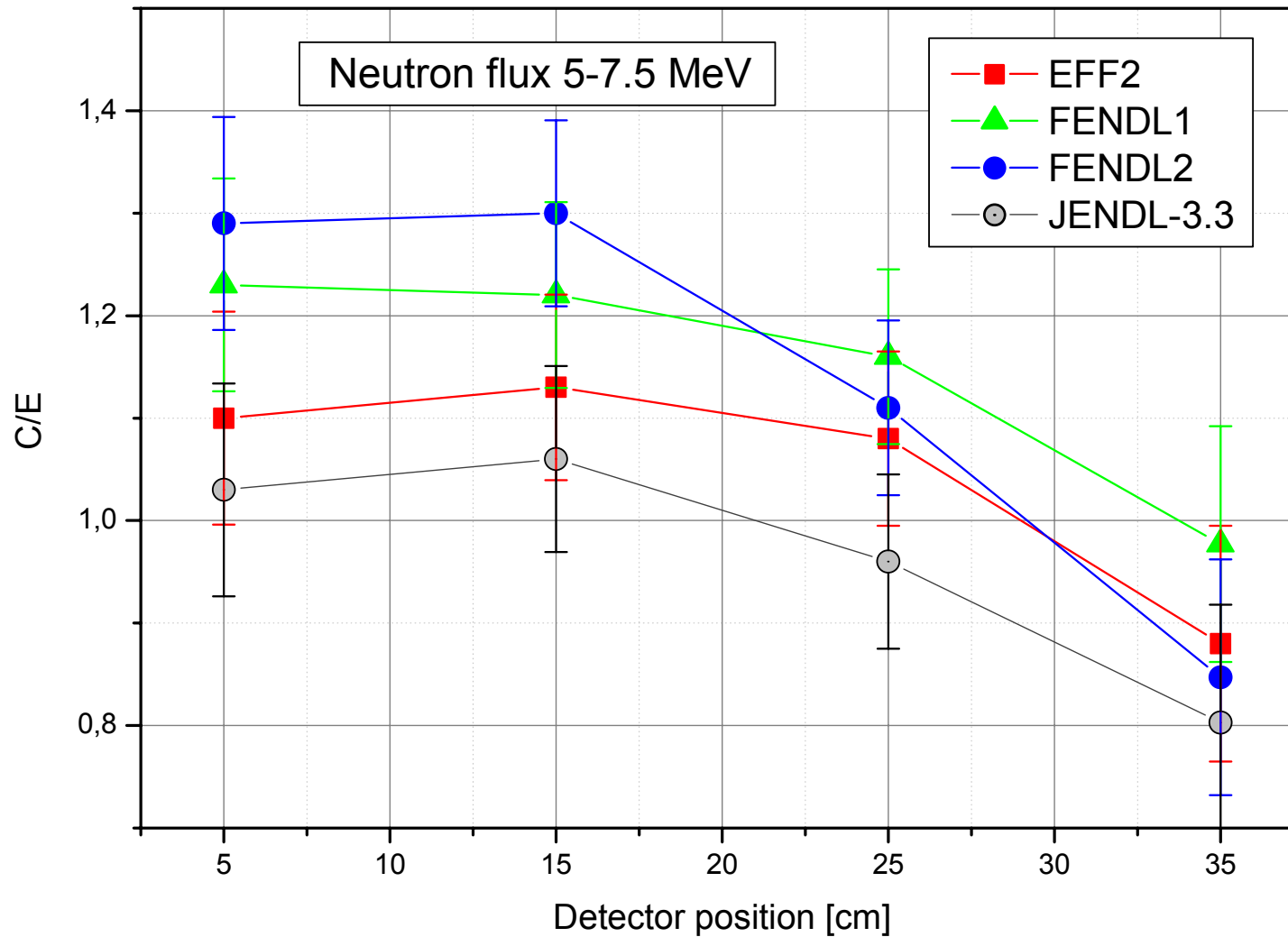
C/E comparison of neutron flux integrals



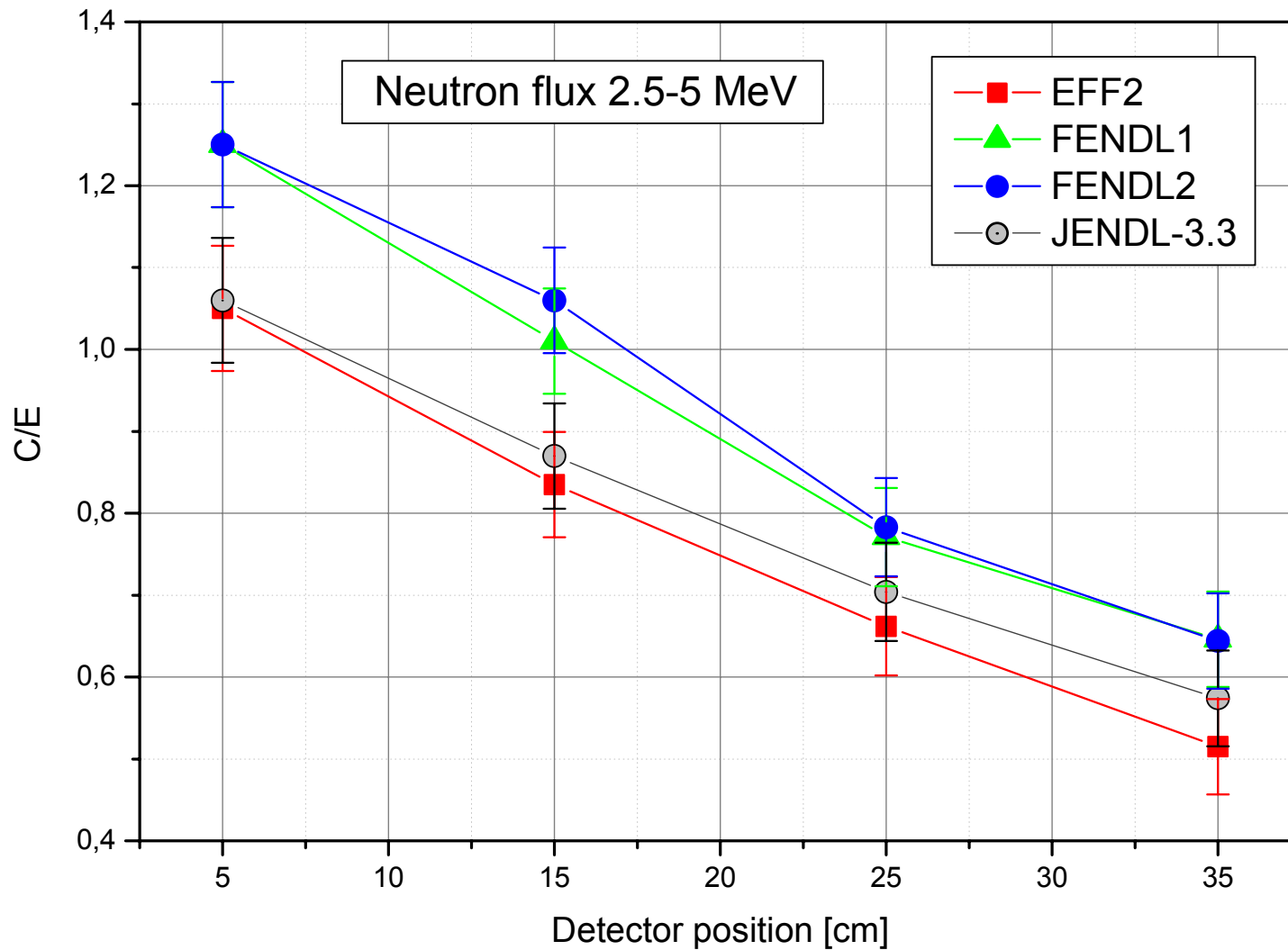
C/E comparison of neutron flux integrals



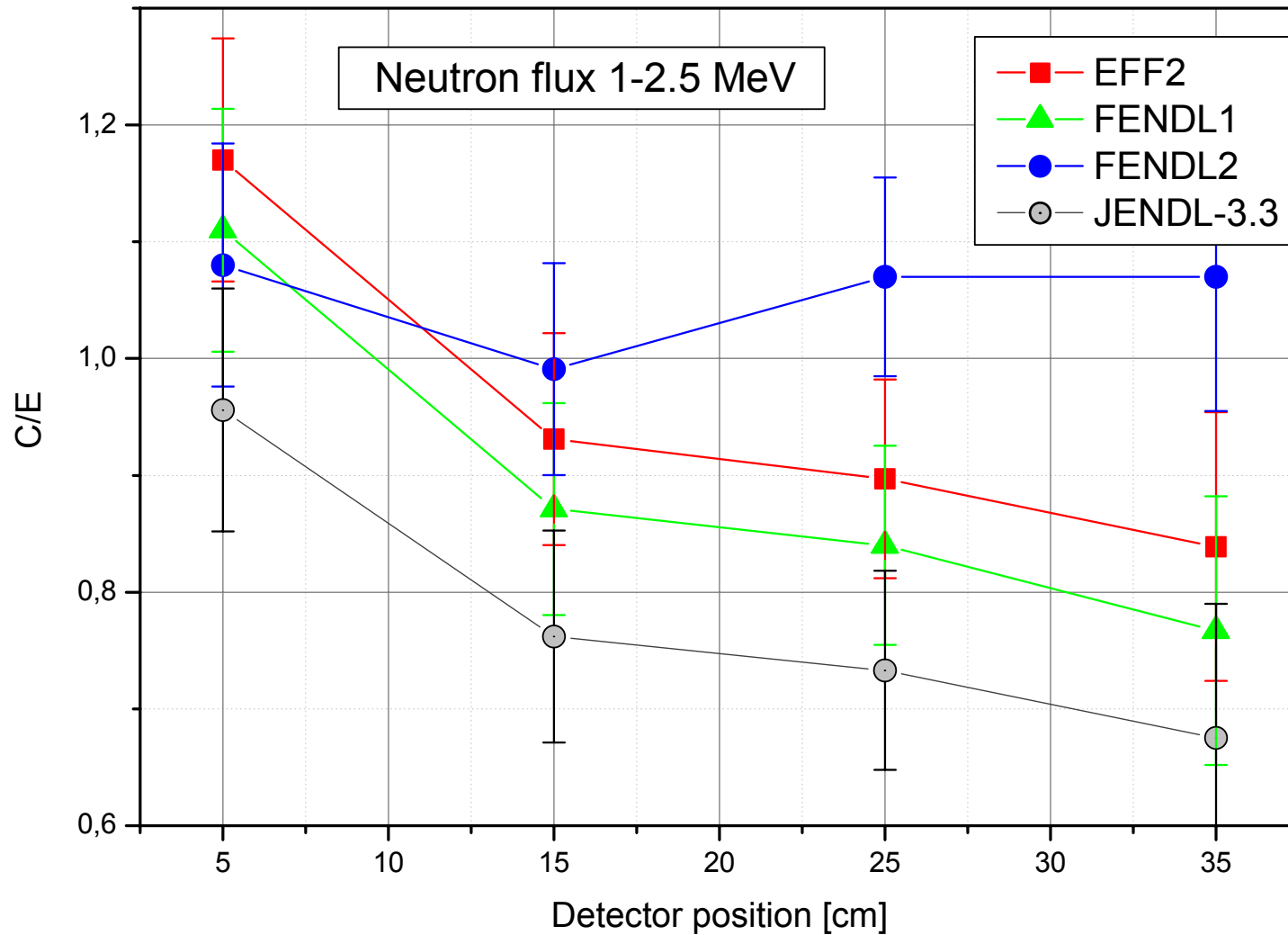
C/E comparison of neutron flux integrals



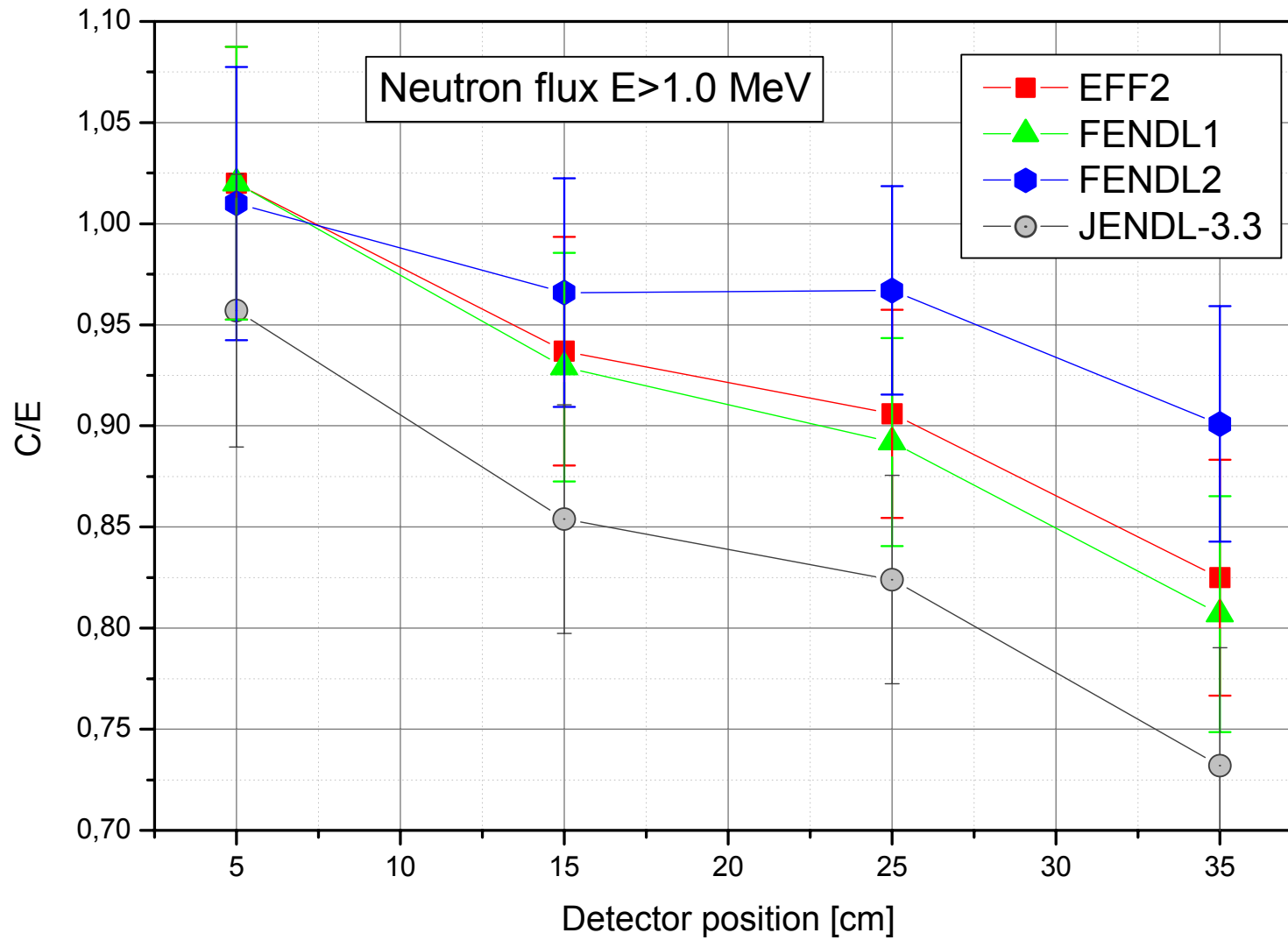
C/E comparison of neutron flux integrals



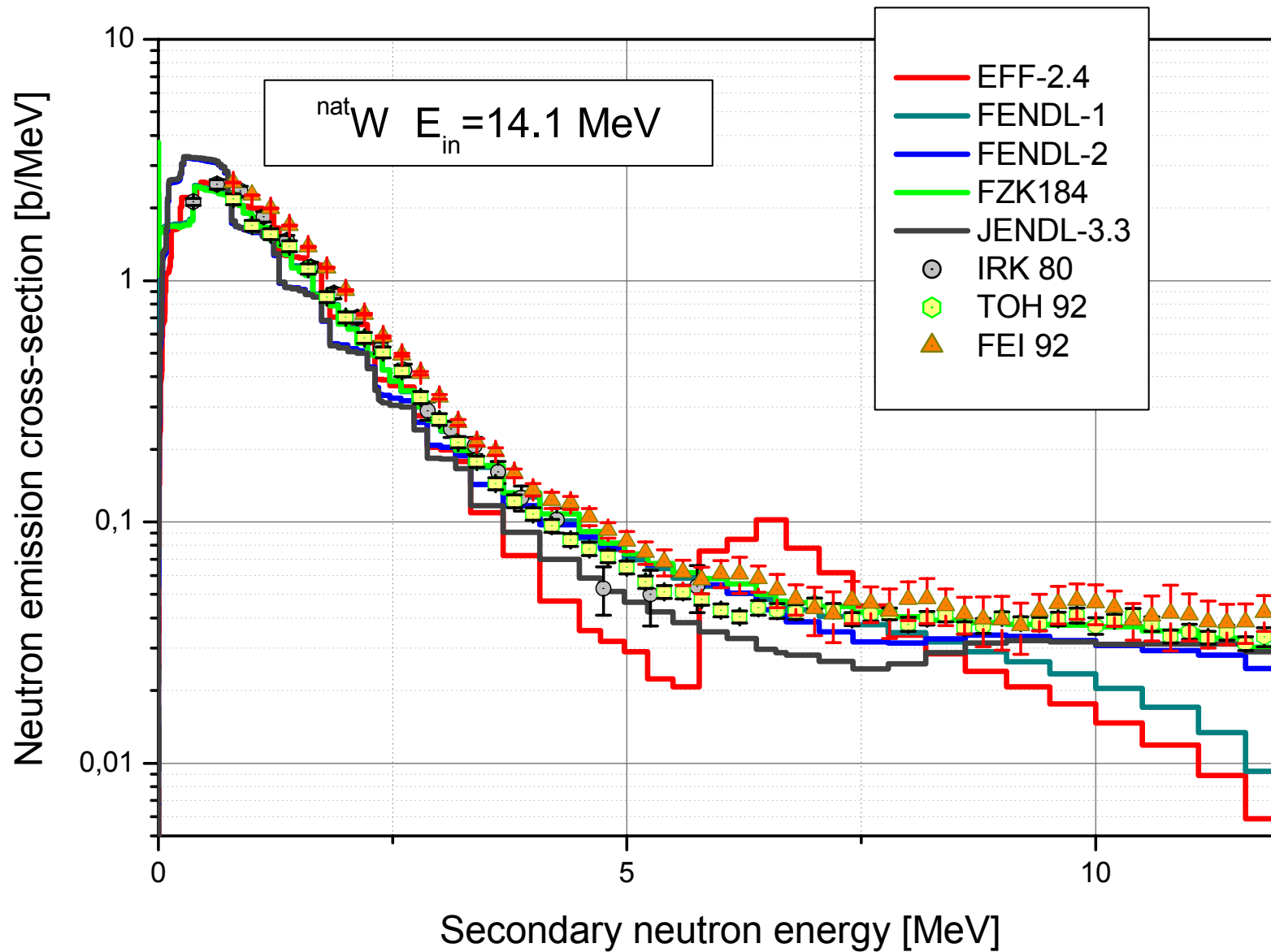
C/E comparison of neutron flux integrals



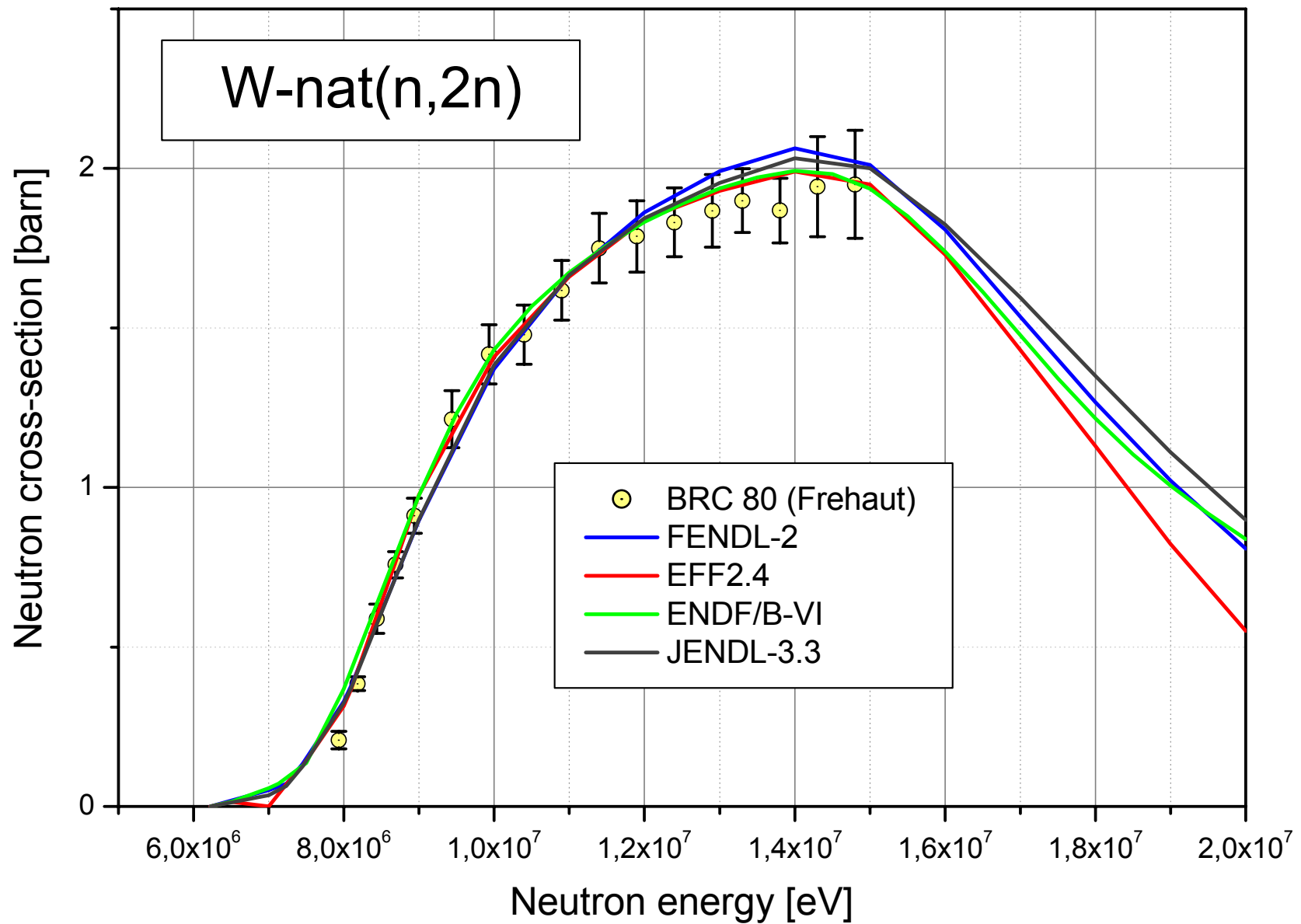
C/E comparison of neutron flux integrals



^{nat}W neutron emission cross-section



$^{nat}\text{W}(n,2n)$ cross-section



Conclusions

- JENDL-3.3 vs. FENDL-2 (=JENDL-FF)
 - Isotopic evaluation
 - Reduction of (n,2n) cross-section around 14 MeV
 - ⇒ *Better agreement for high energy flux above 12.5 MeV*
 - Soft neutron emission spectrum
 - ⇒ *Strong underestimation of neutron flux in 1 - 5 MeV range*
 - ⇒ *Underestimation of fast ($E > 1$ MeV) neutron flux up to 25 % (more than other available W evaluations)*
 - ⇒ *Overestimation of low energy neutron flux indicated (cf. also I. Kodeli, EFF-DOC-885, November 2003)*
- JENDL-3.3 W data not optimal choice for fusion applications
 - ⇒ *Improvements expected with ongoing EFF evaluation*