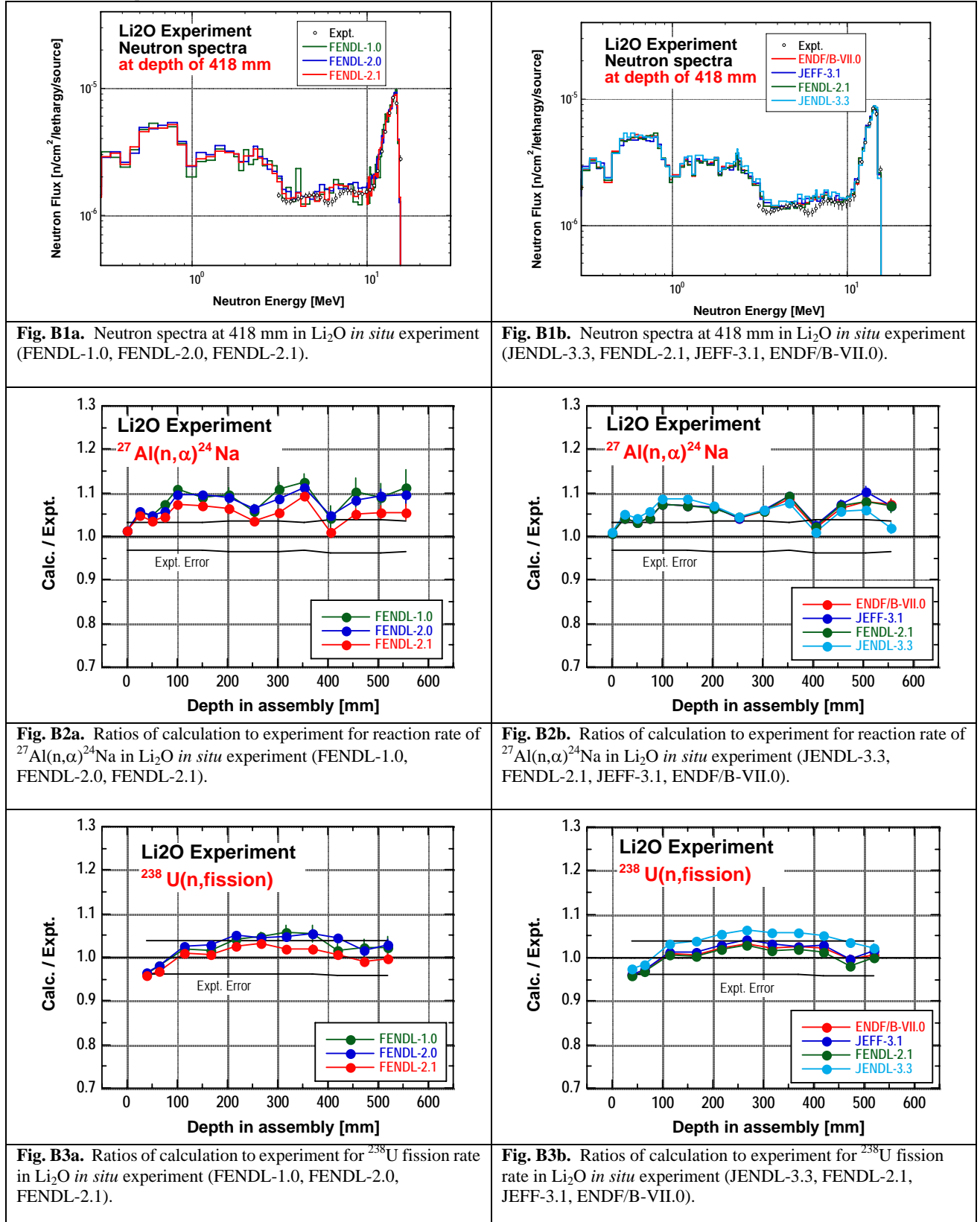
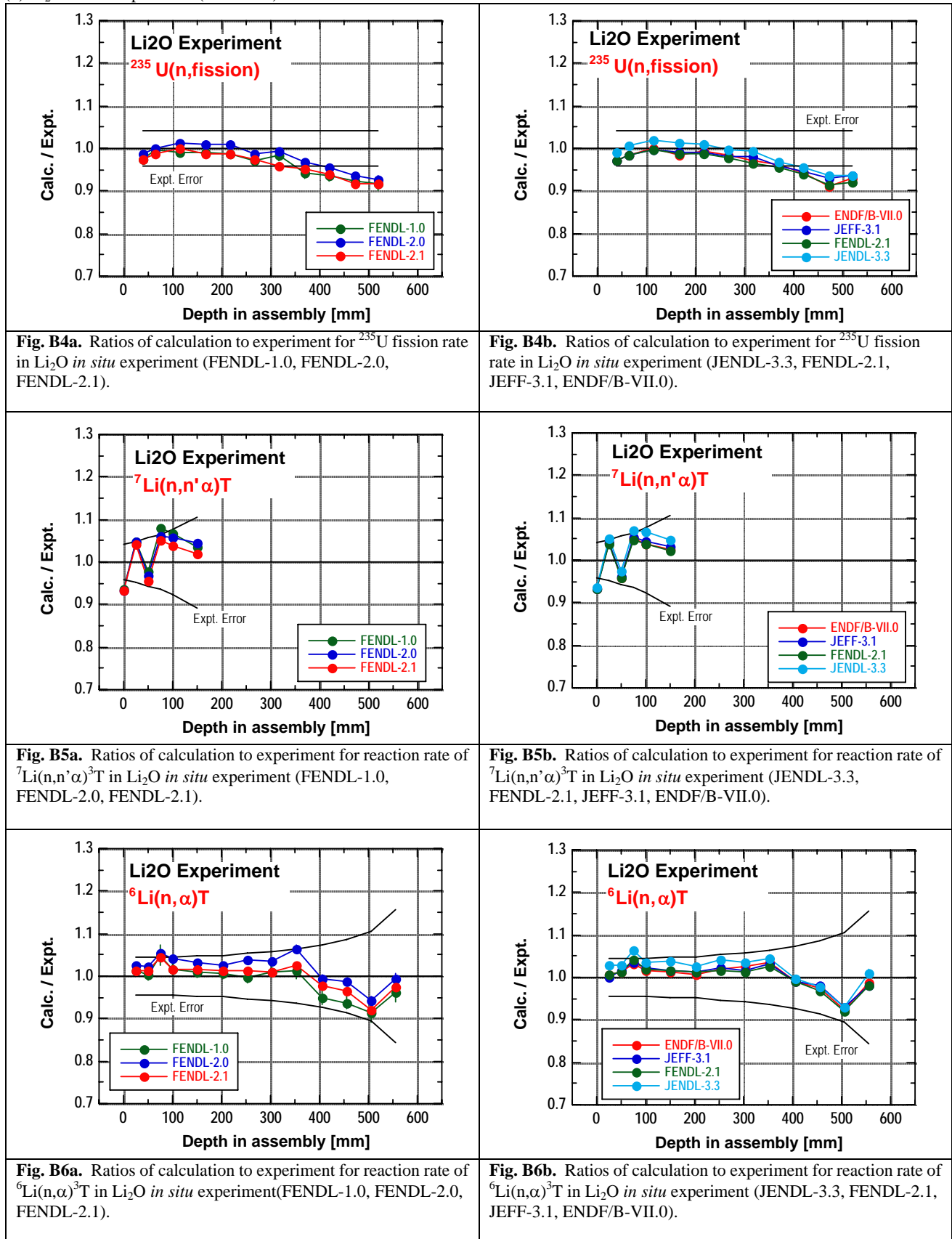


Appendix B Typical results of analyses for benchmark experiments at FNS

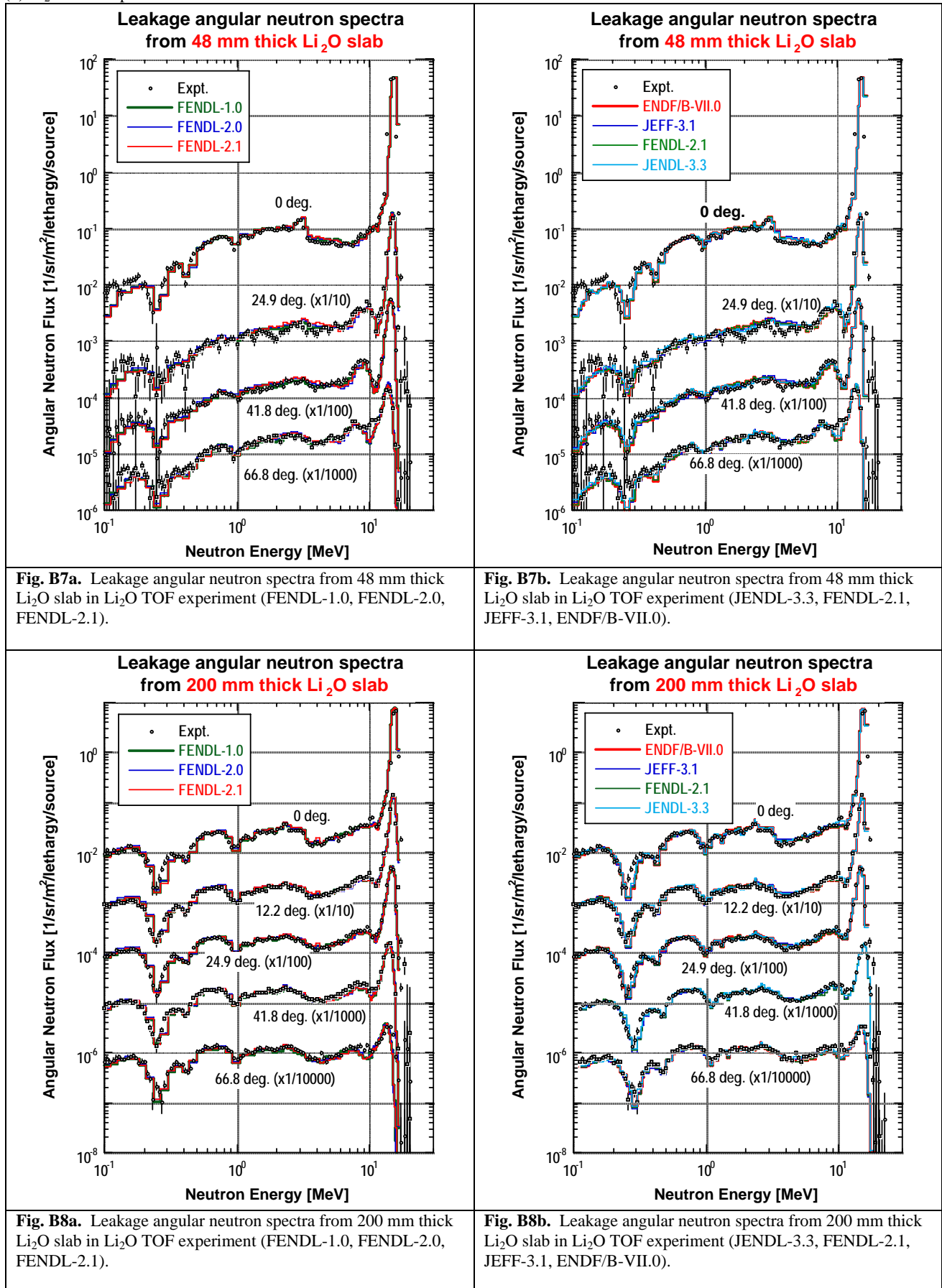
(1) Li_2O in situ experiment



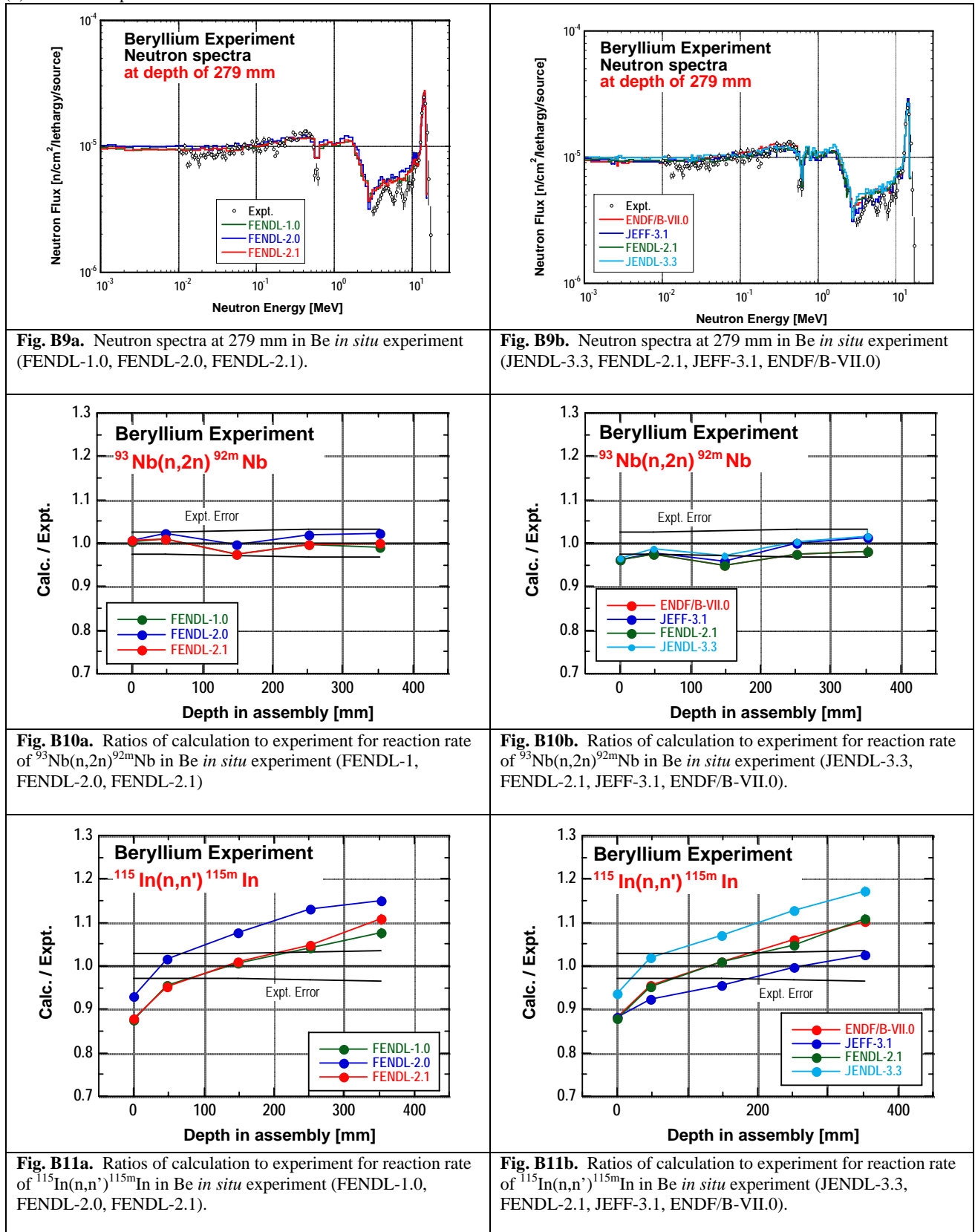
(1) Li_2O *in situ* experiment (continued)



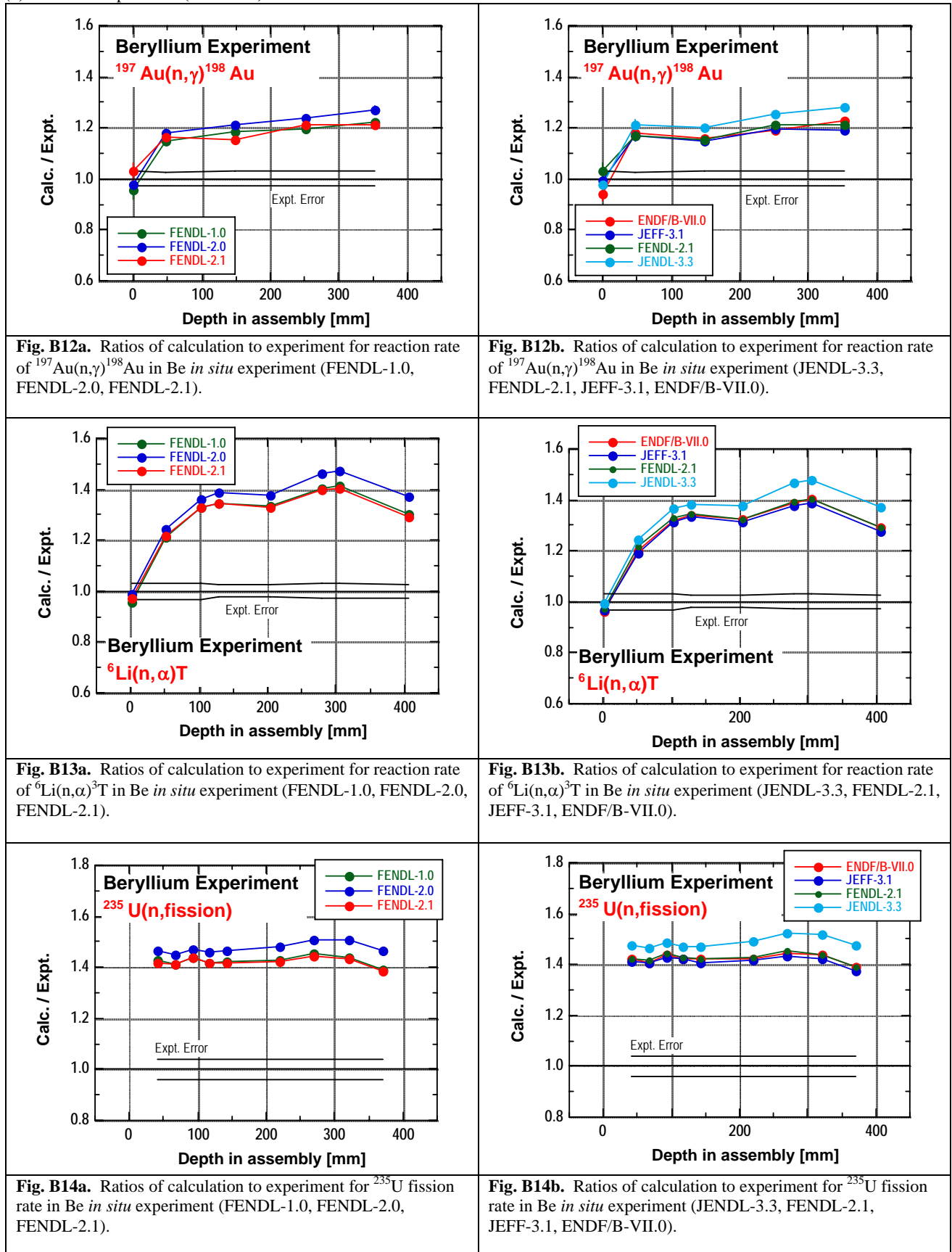
(2) Li₂O TOF experiment



(3) Be *in situ* experiment



(3) Be *in situ* experiment (continued)



(4) Be TOF experiment

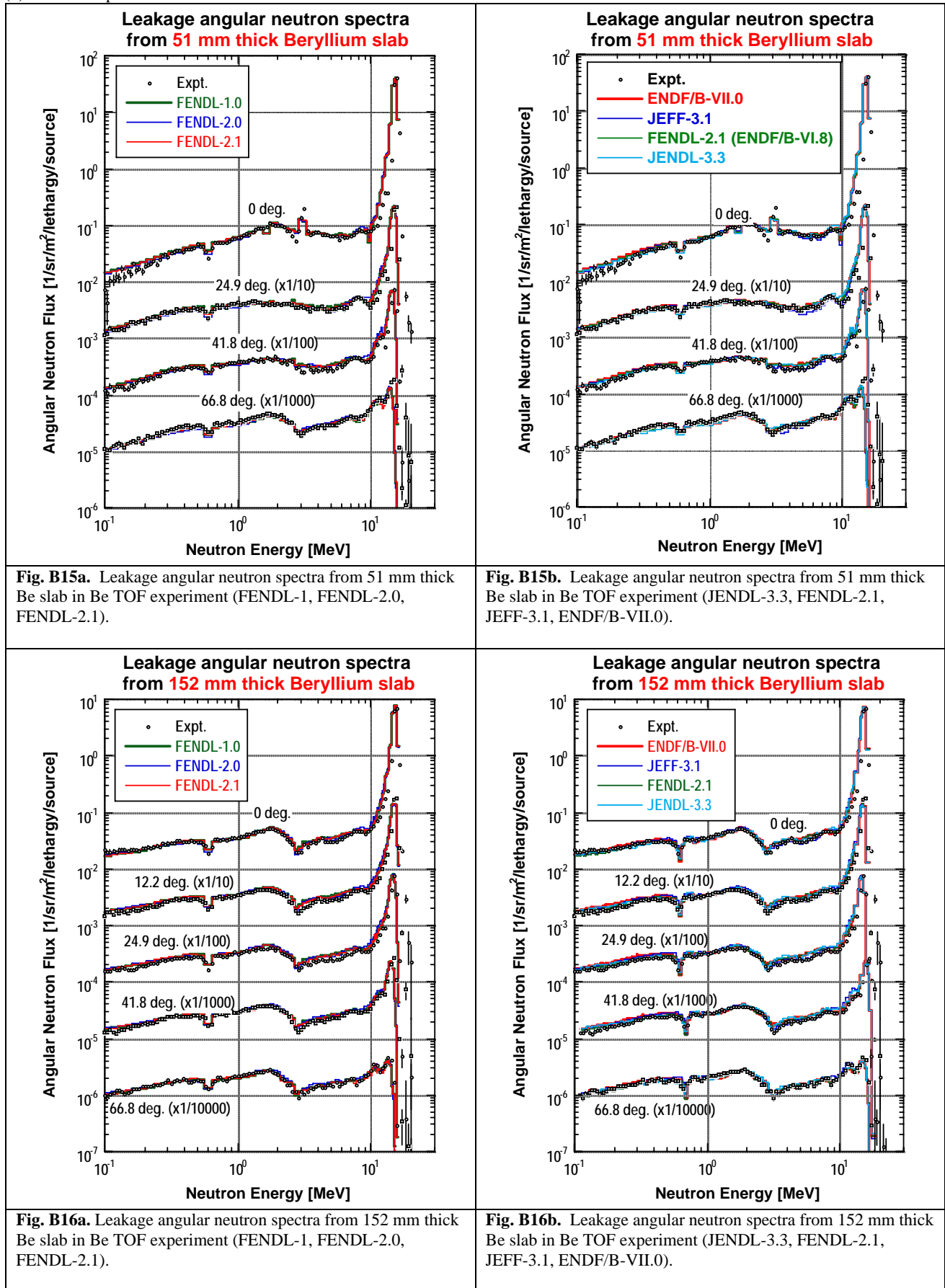


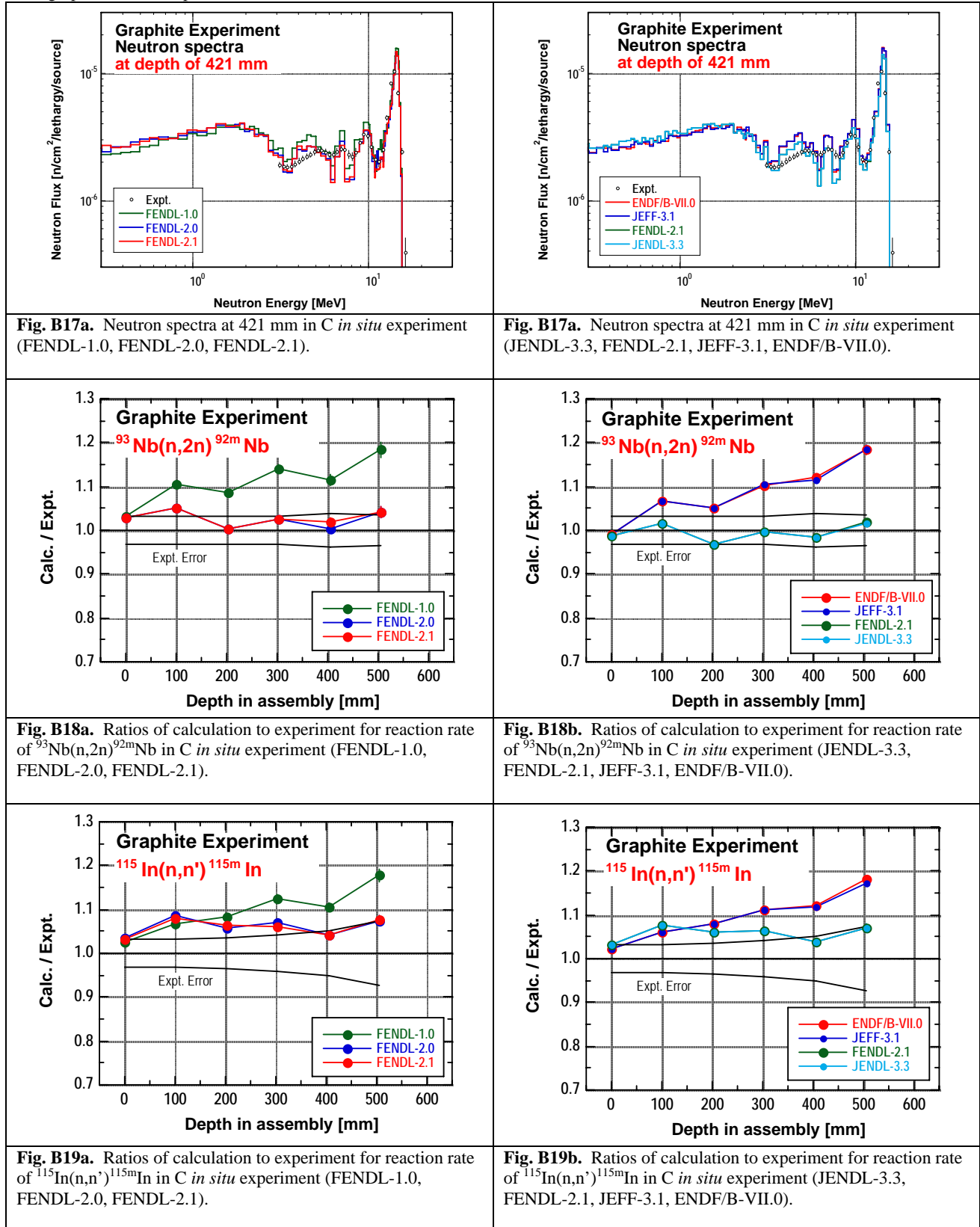
Fig. B15a. Leakage angular neutron spectra from 51 mm thick Be slab in Be TOF experiment (FENDL-1, FENDL-2.0, FENDL-2.1).

Fig. B15b. Leakage angular neutron spectra from 51 mm thick Be slab in Be TOF experiment (JENDL-3.3, FENDL-2.1, JEFF-3.1, ENDF/B-VII.0).

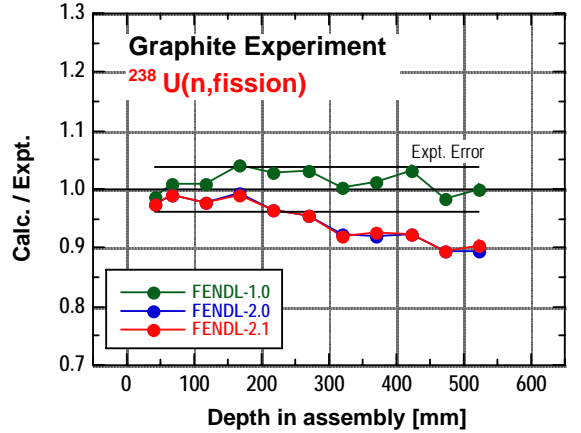
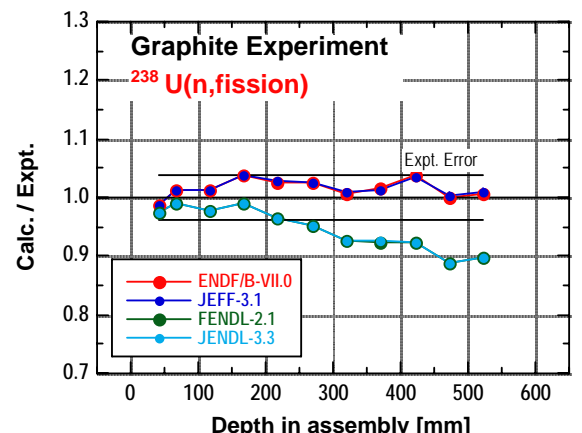
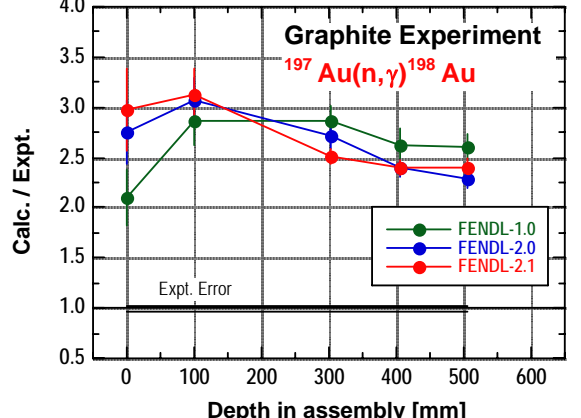
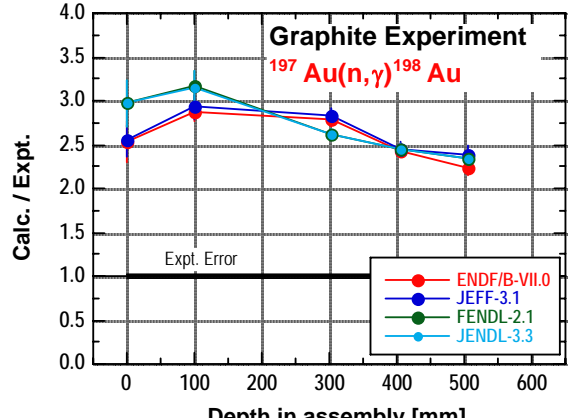
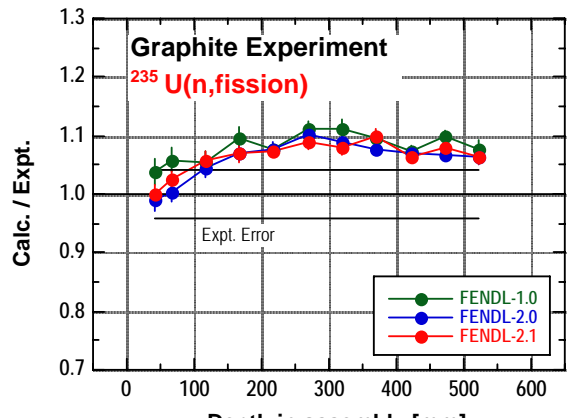
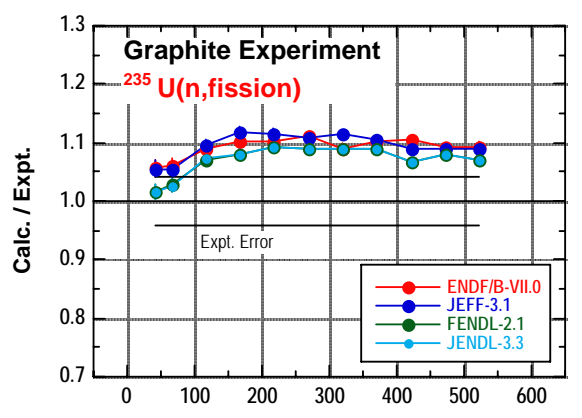
Fig. B16a. Leakage angular neutron spectra from 152 mm thick Be slab in Be TOF experiment (FENDL-1, FENDL-2.0, FENDL-2.1).

Fig. B16b. Leakage angular neutron spectra from 152 mm thick Be slab in Be TOF experiment (JENDL-3.3, FENDL-2.1, JEFF-3.1, ENDF/B-VII.0).

(5) C(graphite) *in situ* experiment



(5) C(graphite) *in situ* experiment (continued)

 <p>Graphite Experiment $^{238}\text{U}(n,\text{fission})$</p> <p>Y-axis: Calc. / Expt. (0.7 to 1.3) X-axis: Depth in assembly [mm] (0 to 600)</p> <p>Legend: FENDL-1.0 (green), FENDL-2.0 (blue), FENDL-2.1 (red)</p> <p>Expt. Error: ~1.05</p>	 <p>Graphite Experiment $^{238}\text{U}(n,\text{fission})$</p> <p>Y-axis: Calc. / Expt. (0.7 to 1.3) X-axis: Depth in assembly [mm] (0 to 600)</p> <p>Legend: ENDF/B-VII.0 (red), JEFF-3.1 (blue), FENDL-2.1 (green), JENDL-3.3 (cyan)</p> <p>Expt. Error: ~1.05</p>
<p>Fig. B1. Ratios of calculation to experiment for ^{238}U fission rate in C <i>in situ</i> experiment (FENDL-1.0, FENDL-2.0, FENDL-2.1).</p>	<p>Fig. B1. Ratios of calculation to experiment for ^{238}U fission rate in C <i>in situ</i> experiment (JENDL-3.3, FENDL-2.1, JEFF-3.1, ENDF/B-VII.0).</p>
 <p>Graphite Experiment $^{197}\text{Au}(n,\gamma)^{198}\text{Au}$</p> <p>Y-axis: Calc. / Expt. (0.5 to 4.0) X-axis: Depth in assembly [mm] (0 to 600)</p> <p>Legend: FENDL-1.0 (green), FENDL-2.0 (blue), FENDL-2.1 (red)</p> <p>Expt. Error: ~1.0</p>	 <p>Graphite Experiment $^{197}\text{Au}(n,\gamma)^{198}\text{Au}$</p> <p>Y-axis: Calc. / Expt. (0.0 to 4.0) X-axis: Depth in assembly [mm] (0 to 600)</p> <p>Legend: ENDF/B-VII.0 (red), JEFF-3.1 (blue), FENDL-2.1 (green), JENDL-3.3 (cyan)</p> <p>Expt. Error: ~1.0</p>
<p>Fig. B20a. Ratios of calculation to experiment for reaction rate of $^{197}\text{Au}(n,\gamma)^{198}\text{Au}$ in C <i>in situ</i> experiment (FENDL-1.0, FENDL-2.0, FENDL-2.1).</p>	<p>Fig. B20b. Ratios of calculation to experiment for reaction rate of $^{197}\text{Au}(n,\gamma)^{198}\text{Au}$ in C <i>in situ</i> experiment (JENDL-3.3, FENDL-2.1, JEFF-3.1, ENDF/B-VII.0).</p>
 <p>Graphite Experiment $^{235}\text{U}(n,\text{fission})$</p> <p>Y-axis: Calc. / Expt. (0.7 to 1.3) X-axis: Depth in assembly [mm] (0 to 600)</p> <p>Legend: FENDL-1.0 (green), FENDL-2.0 (blue), FENDL-2.1 (red)</p> <p>Expt. Error: ~1.0</p>	 <p>Graphite Experiment $^{235}\text{U}(n,\text{fission})$</p> <p>Y-axis: Calc. / Expt. (0.7 to 1.3) X-axis: Depth in assembly [mm] (0 to 600)</p> <p>Legend: ENDF/B-VII.0 (red), JEFF-3.1 (blue), FENDL-2.1 (green), JENDL-3.3 (cyan)</p> <p>Expt. Error: ~1.0</p>
<p>Fig. B21a. Ratios of calculation to experiment for ^{235}U fission rate in C <i>in situ</i> experiment (FENDL-1.0, FENDL-2.0, FENDL-2.1).</p>	<p>Fig. B21b. Ratios of calculation to experiment for ^{235}U fission rate in C <i>in situ</i> experiment (JENDL-3.3, FENDL-2.1, JEFF-3.1, ENDF/B-VII.0).</p>

(6) C(graphite) TOF experiment

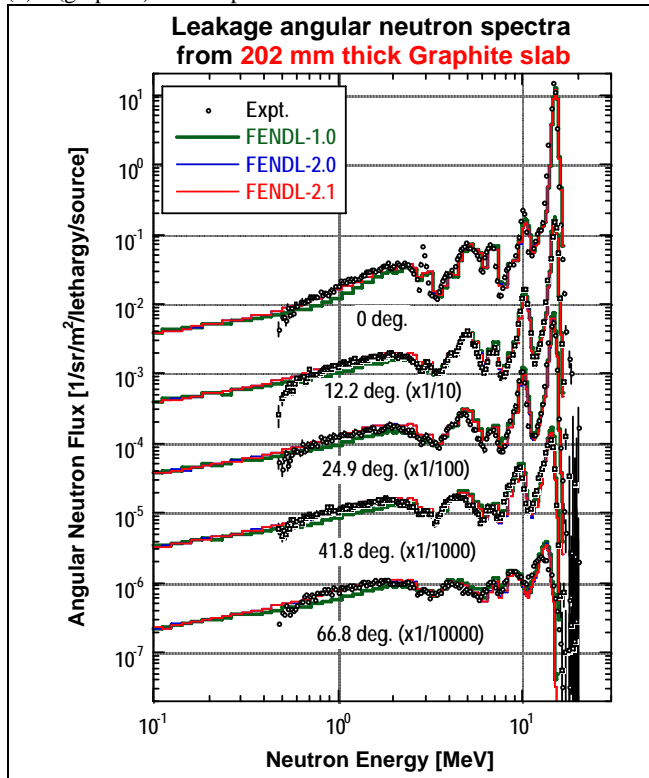


Fig. B22a. Leakage angular neutron spectra from 203 mm thick C slab in C TOF experiment (FENDL-1.0, FENDL-2.0, FENDL-2.1).

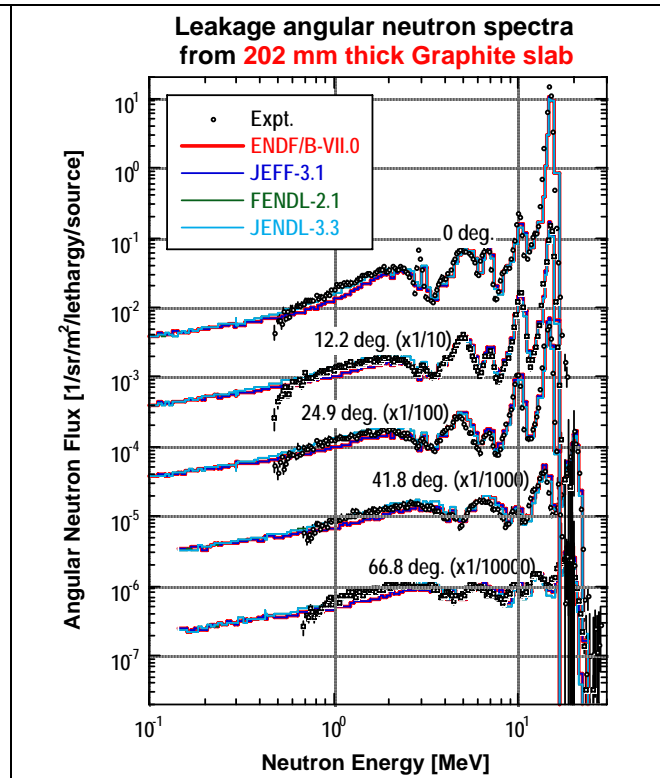


Fig. B22b. Leakage angular neutron spectra from 203 mm thick C slab in C TOF experiment (JENDL-3.3, FENDL-2.1, JEFF-3.1, ENDF/B-VII.0).

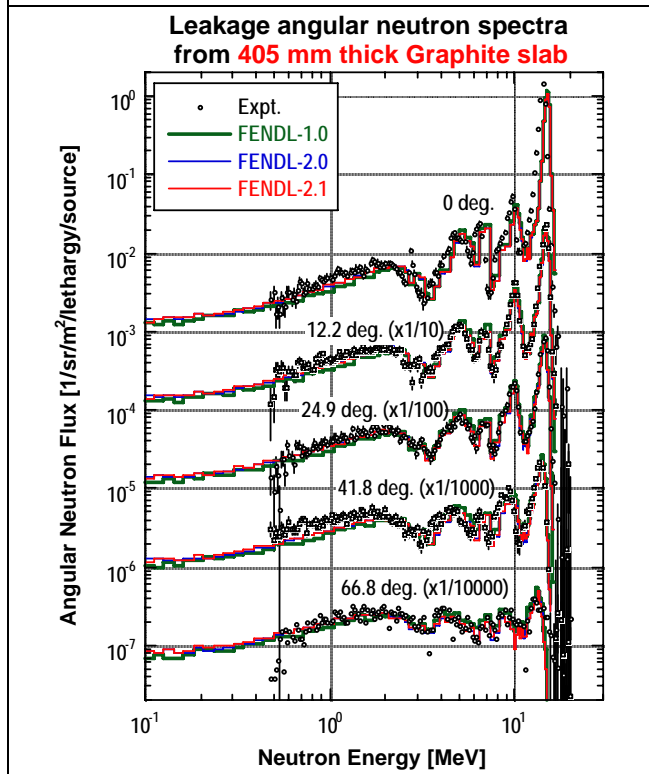


Fig. B23a. Leakage angular neutron spectra from 408 mm thick C slab in C TOF experiment (FENDL-1.0, FENDL-2.0, FENDL-2.1).

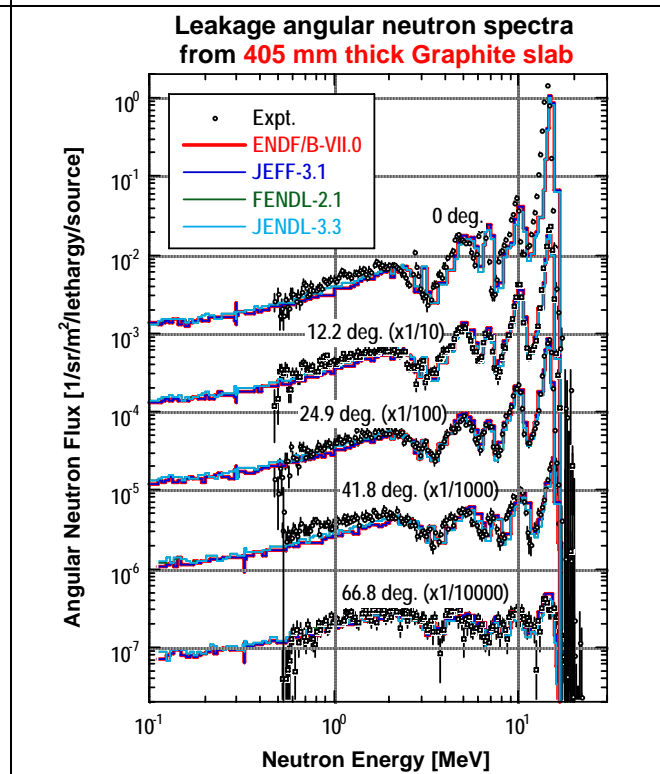


Fig. B23b. Leakage angular neutron spectra from 408 mm thick C slab in C TOF experiment (JENDL-3.3, FENDL-2.1, JEFF-3.1, ENDF/B-VII.0).

(7) Liquid N₂ TOF experiment

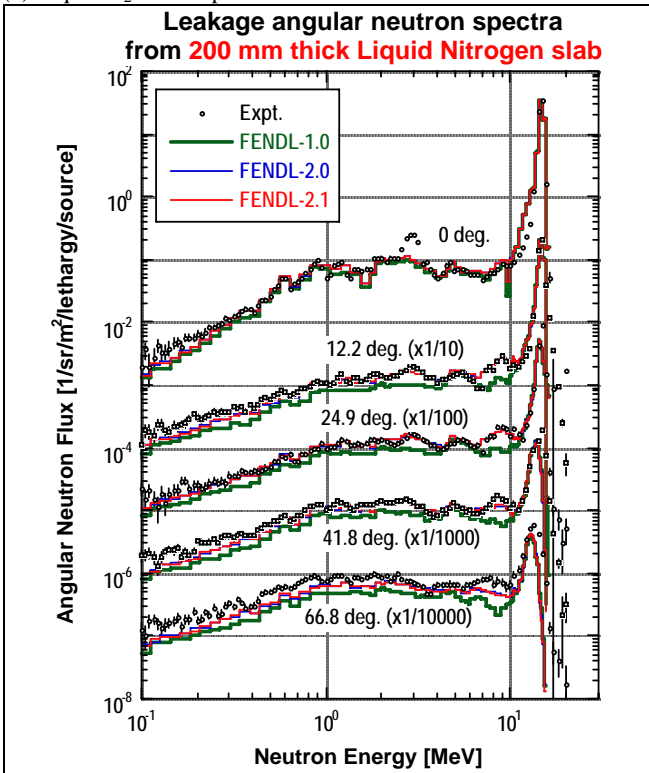


Fig. B24a. Leakage angular neutron spectra from 200 mm thick Liquid N₂ slab in Liquid N₂ TOF experiment (FENDL-1.0, FENDL-2.0, FENDL-2.1).

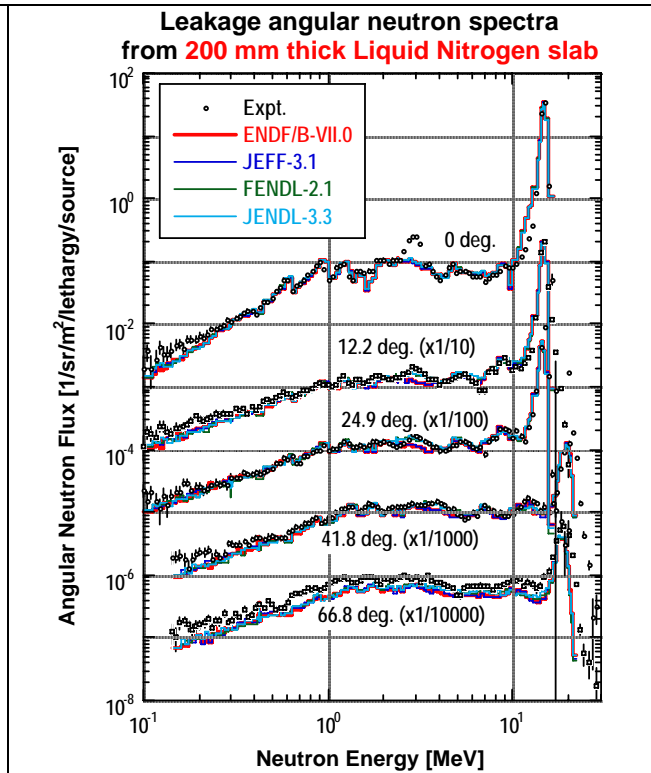


Fig. B24b. Leakage angular neutron spectra from 200 mm thick Liquid N₂ slab in Liquid N₂ TOF experiment (JENDL-3.3, FENDL-2.1, JEFF-3.1, ENDF/B-VII.0).

(8) Liquid O₂ TOF experiment

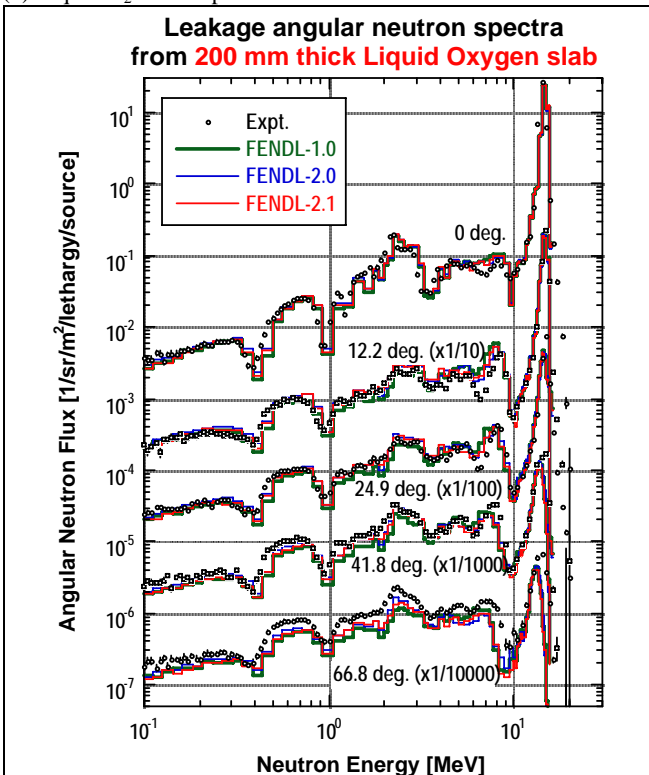


Fig. B25a. Leakage angular neutron spectra from 200 mm thick Liquid O₂ slab in Liquid O₂ TOF experiment (FENDL-1.0, FENDL-2.0, FENDL-2.1).

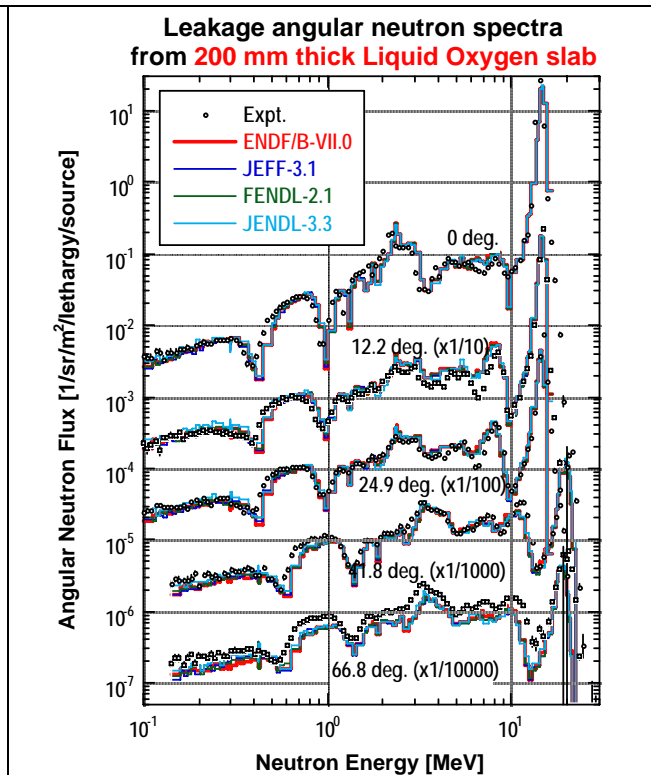


Fig. B25b. Leakage angular neutron spectra from 200 mm thick Liquid O₂ slab in Liquid O₂ TOF experiment (JENDL-3.3, FENDL-2.1, JEFF-3.1, ENDF/B-VII.0).

(9) SiC *in situ* experiment

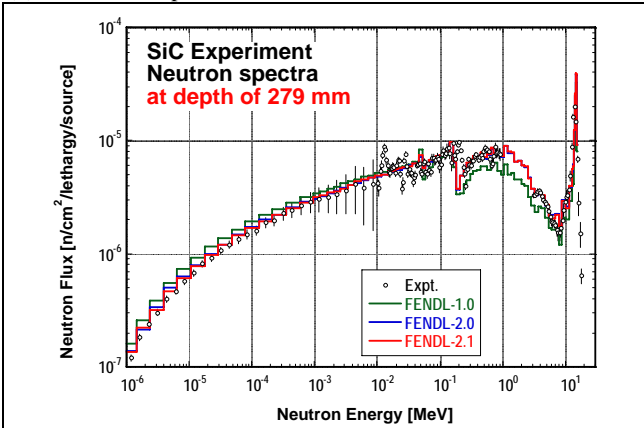


Fig. B26a. Neutron spectra at 279 mm in SiC *in situ* experiment (FENDL-1.0, FENDL-2.0, FENDL-2.1).

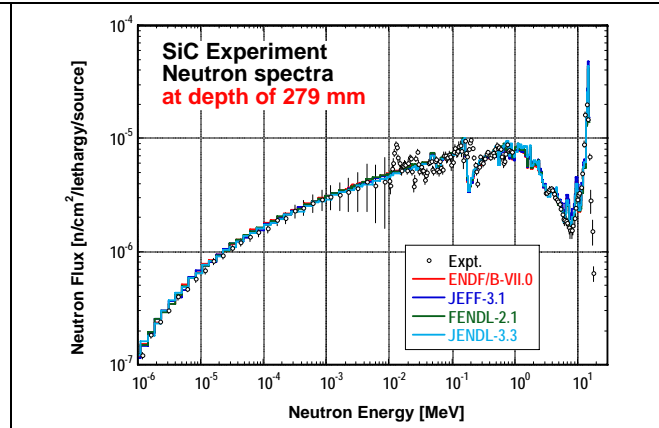


Fig. B26b. Neutron spectra at 279 mm in SiC *in situ* experiment (JENDL-3.3, FENDL-2.1, JEFF-3.1, ENDF/B-VII.0)

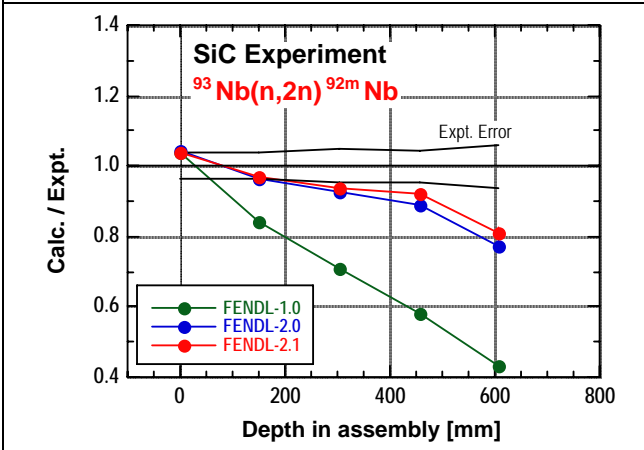


Fig. B27a. Ratios of calculation to experiment for reaction rate of $^{93}\text{Nb}(n,2n)^{92m}\text{Nb}$ in SiC *in situ* experiment (FENDL-1.0, FENDL-2.0, FENDL-2.1).

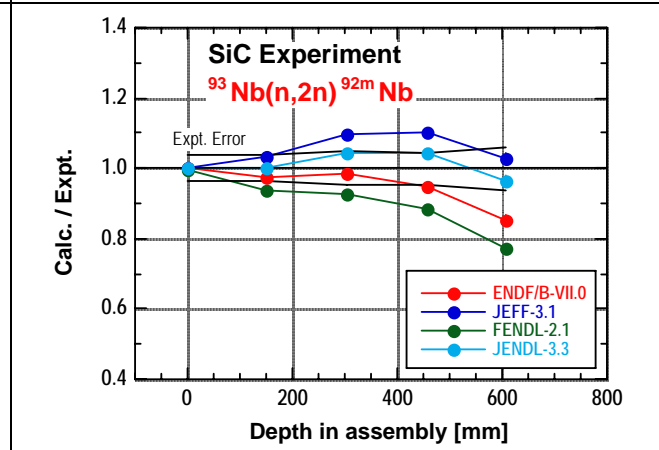


Fig. B27b. Ratios of calculation to experiment for reaction rate of $^{93}\text{Nb}(n,2n)^{92m}\text{Nb}$ in SiC *in situ* experiment (JENDL-3.3, FENDL-2.1, JEFF-3.1, ENDF/B-VII.0).

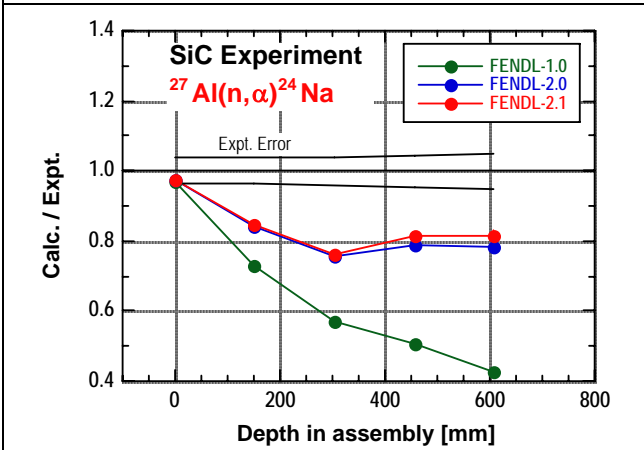


Fig. B28a. Ratios of calculation to experiment for reaction rate of $^{27}\text{Al}(n,\alpha)^{24}\text{Na}$ in SiC *in situ* experiment (FENDL-1.0, FENDL-2.0, FENDL-2.1).

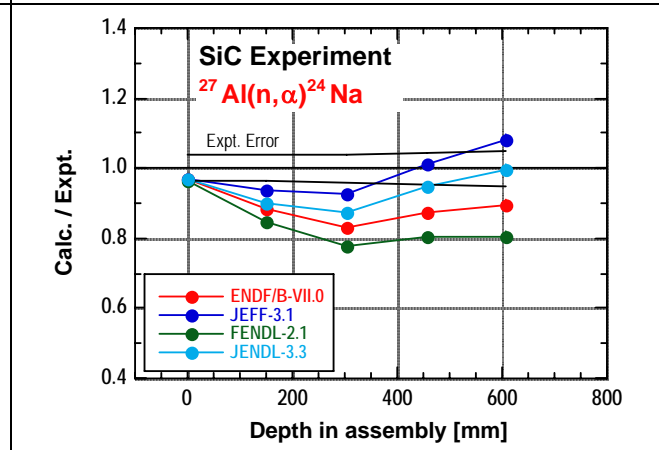
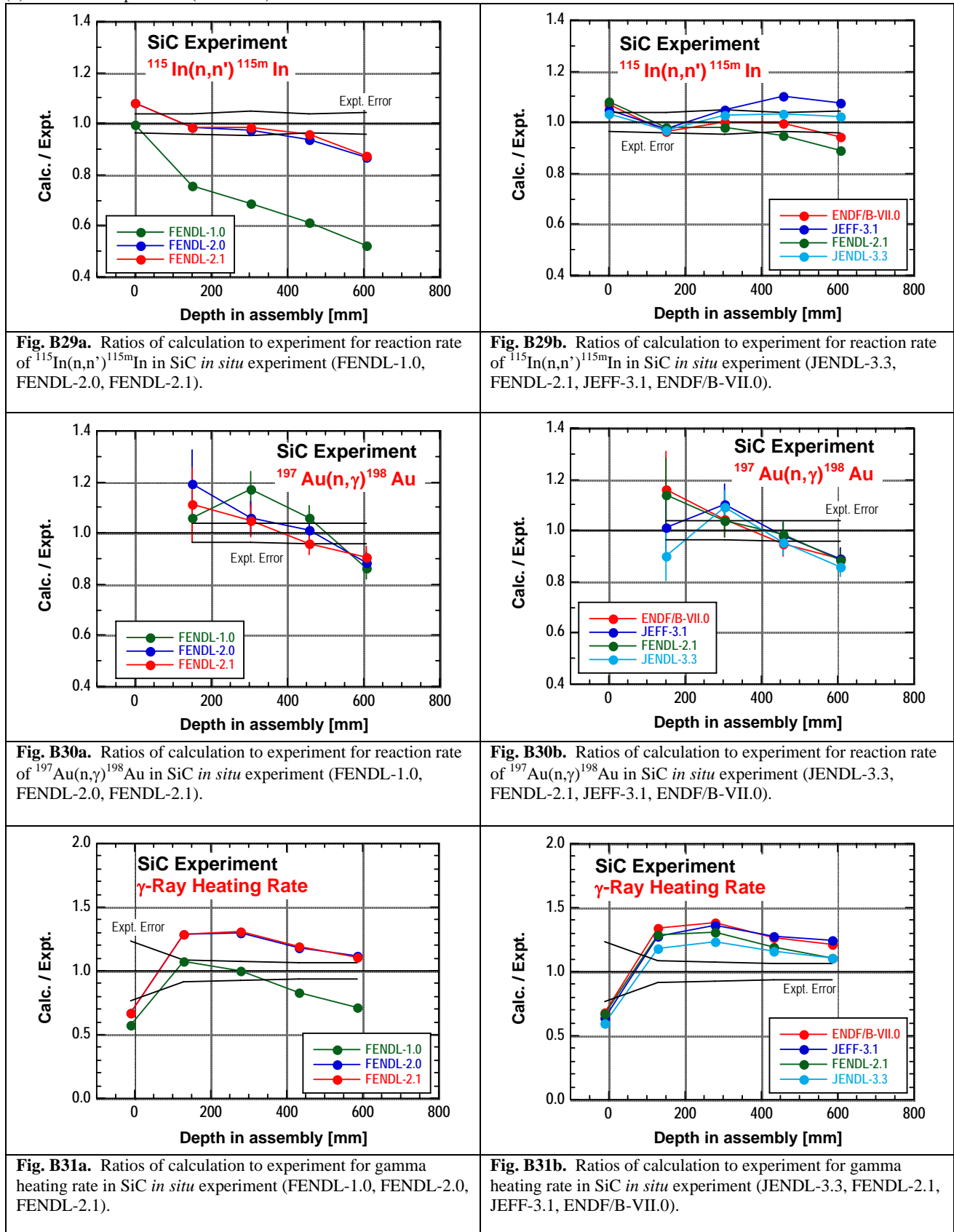


Fig. B28b. Ratios of calculation to experiment for reaction rate of $^{27}\text{Al}(n,\alpha)^{24}\text{Na}$ in SiC *in situ* experiment (JENDL-3.3, FENDL-2.1, JEFF-3.1, ENDF/B-VII.0).

(9) SiC *in situ* experiment (continued)



(10) V *in situ* experiment

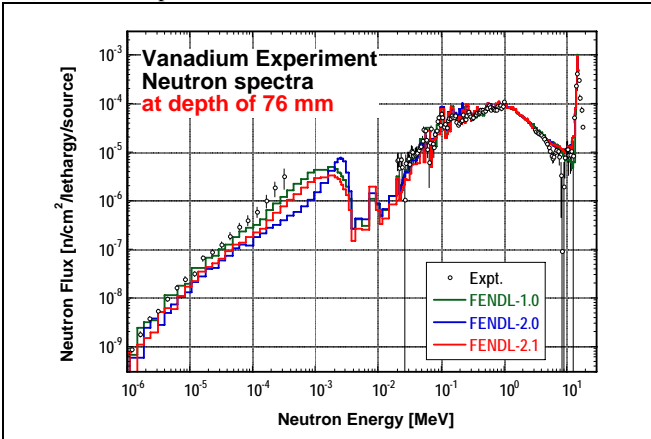


Fig. B32a. Neutron spectra at 76 mm in V *in situ* experiment (FENDL-1.0, FENDL-2.0, FENDL-2.1).

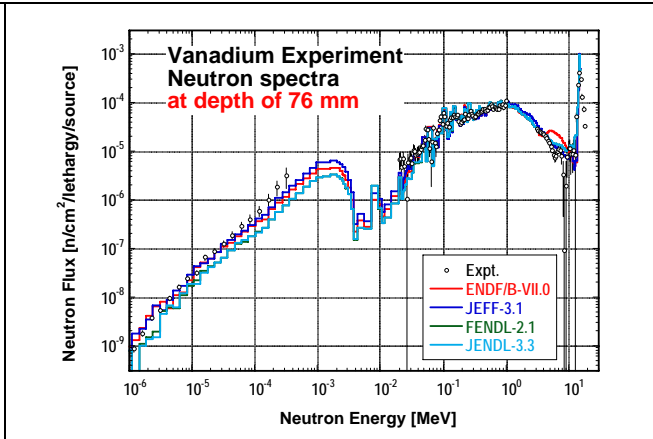


Fig. B32b. Neutron spectra at 76 mm in V *in situ* experiment (JENDL-3.3, FENDL-2.1, JEFF-3.1, ENDF/B-VII.0).

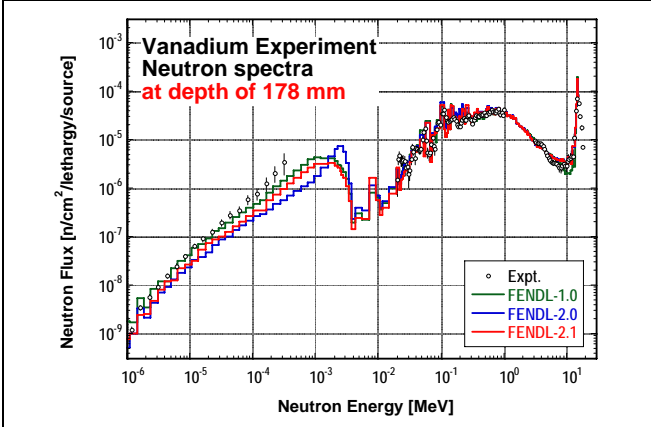


Fig. B33a. Neutron spectra at 178 mm in V *in situ* experiment (FENDL-1.0, FENDL-2.0, FENDL-2.1).

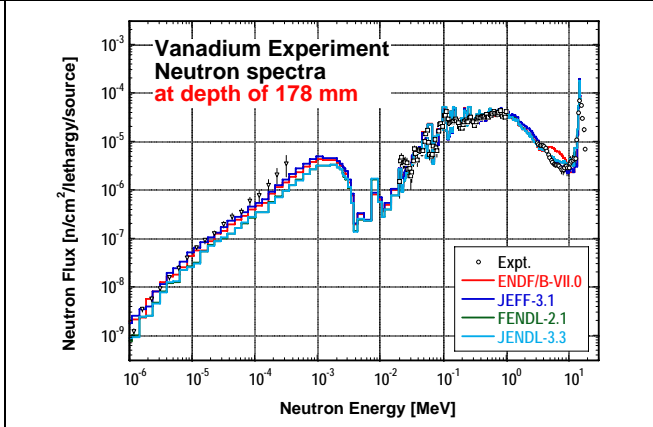


Fig. B33b. Neutron spectra at 178 mm in V *in situ* experiment (JENDL-3.3, FENDL-2.1, JEFF-3.1, ENDF/B-VII.0).

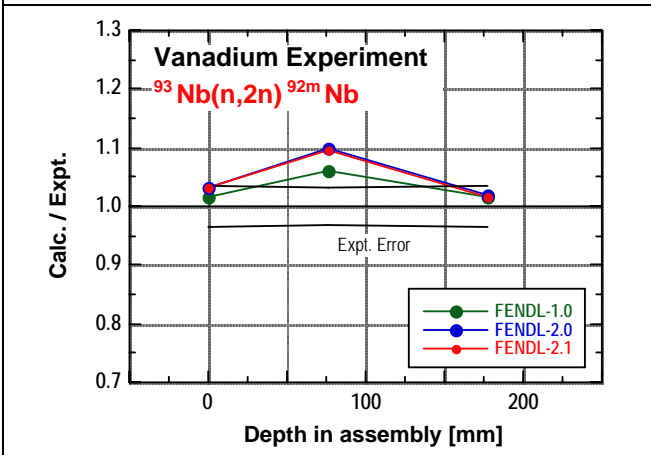


Fig. B34a. Ratios of calculation to experiment for reaction rate of $^{93}\text{Nb}(n,2n)^{92m}\text{Nb}$ in V *in situ* experiment (FENDL-1.0, FENDL-2.0, FENDL-2.1).

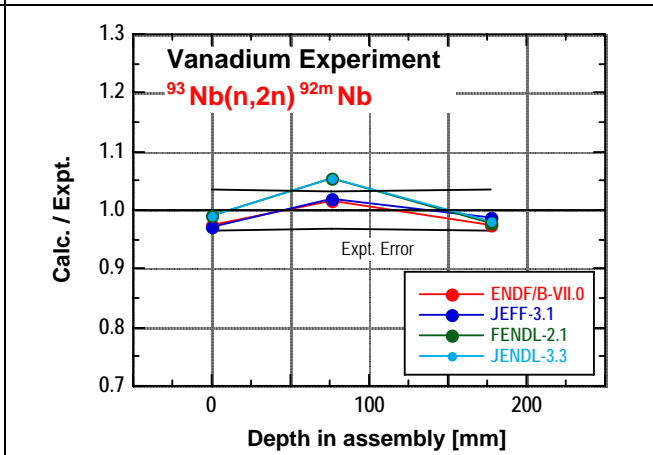


Fig. B34b. Ratios of calculation to experiment for reaction rate of $^{93}\text{Nb}(n,2n)^{92m}\text{Nb}$ in V *in situ* experiment (JENDL-3.3, FENDL-2.1, JEFF-3.1, ENDF/B-VII.0).

(10) V *in situ* experiment (continued)

<p>Fig. B35a. Ratios of calculation to experiment for reaction rate of $^{115}\text{In}(n,n')^{115m}\text{In}$ in V <i>in situ</i> experiment (FENDL-1.0, FENDL-2.0, FENDL-2.1).</p>	<p>Fig. B35b. Ratios of calculation to experiment for reaction rate of $^{115}\text{In}(n,n')^{115m}\text{In}$ in V <i>in situ</i> experiment (JENDL-3.3, FENDL-2.1, JEFF-3.1, ENDF/B-VII.0).</p>
<p>Fig. B36a. Ratios of calculation to experiment for reaction rate of $^{197}\text{Au}(n,\gamma)^{198}\text{Au}$ in V <i>in situ</i> experiment (FENDL-1.0, FENDL-2.0, FENDL-2.1).</p>	<p>Fig. B36b. Ratios of calculation to experiment for reaction rate of $^{197}\text{Au}(n,\gamma)^{198}\text{Au}$ in V <i>in situ</i> experiment (JENDL-3.3, FENDL-2.1, JEFF-3.1, ENDF/B-VII.0).</p>
<p>Fig. B37a. Ratios of calculation to experiment for reaction rate of $^{10}\text{B}(n,\alpha)^7\text{Li}$ in V <i>in situ</i> experiment (FENDL-1.0, FENDL-2.0, FENDL-2.1).</p>	<p>Fig. B37b. Ratios of calculation to experiment for reaction rate of $^{10}\text{B}(n,\alpha)^7\text{Li}$ in V <i>in situ</i> experiment (JENDL-3.3, FENDL-2.1, JEFF-3.1, ENDF/B-VII.0).</p>

(11) Fe *in situ* experiment

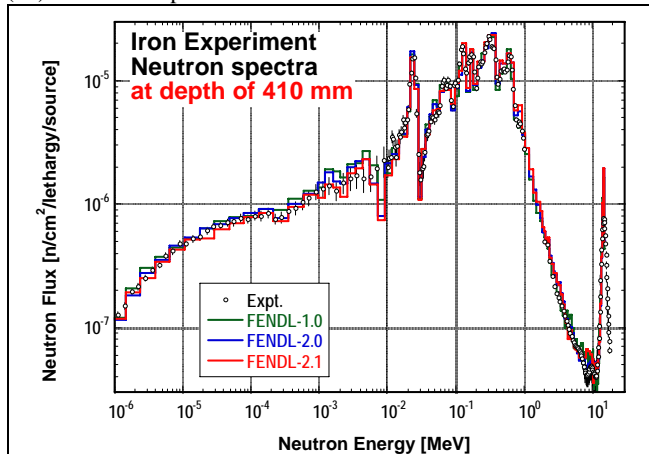


Fig. B38a. Neutron spectra at 410 mm in Fe *in situ* experiment (FENDL-1.0, FENDL-2.0, FENDL-2.1).

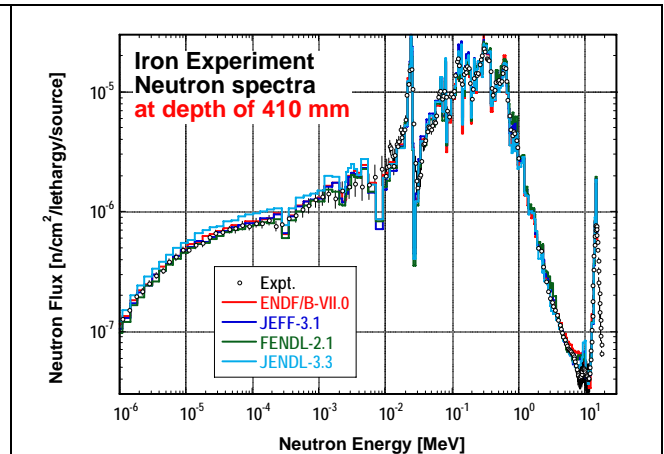


Fig. B38b. Neutron spectra at 410 mm in Fe *in situ* experiment (JENDL-3.3, FENDL-2.1, JEFF-3.1, ENDF/B-VII.0).

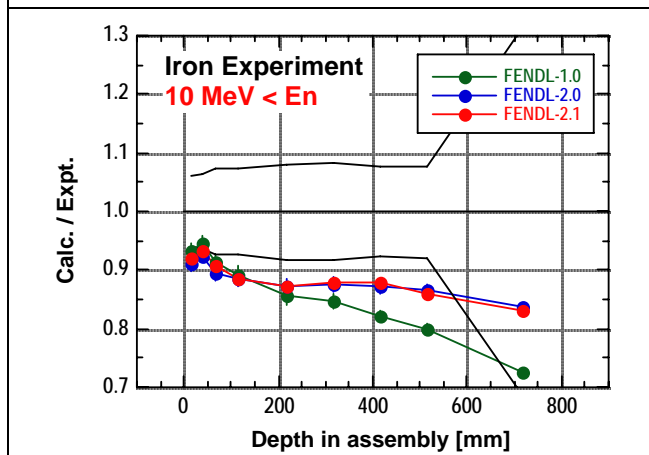


Fig. B39a. Ratios of calculation to experiment for reaction rate of neutron flux above 10 MeV in Fe *in situ* experiment (FENDL-1.0, FENDL-2.0, FENDL-2.1).

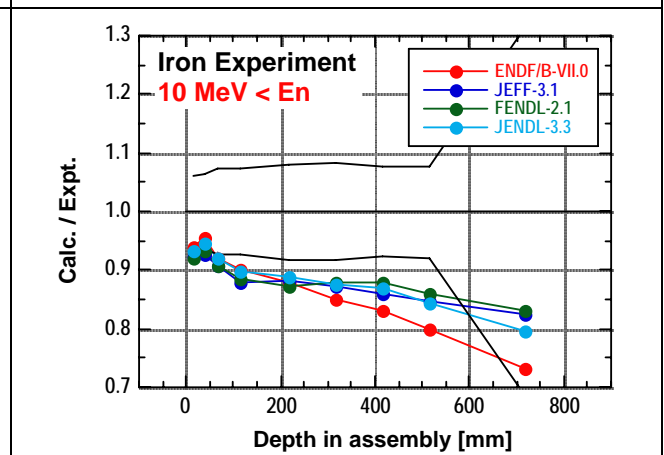


Fig. B39b. Ratios of calculation to experiment for reaction rate of neutron flux above 10 MeV in Fe *in situ* experiment (JENDL-3.3, FENDL-2.1, JEFF-3.1, ENDF/B-VII.0).

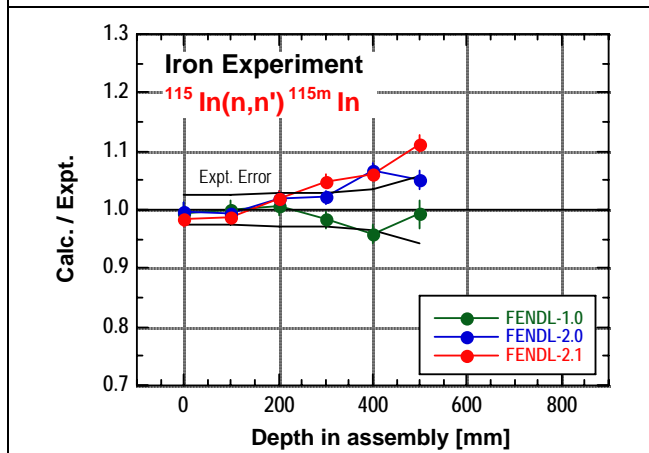


Fig. B40a. Ratios of calculation to experiment for reaction rate of $^{115}\text{In}(n,n')^{115m}\text{In}$ in Fe *in situ* experiment (FENDL-1.0, FENDL-2.0, FENDL-2.1).

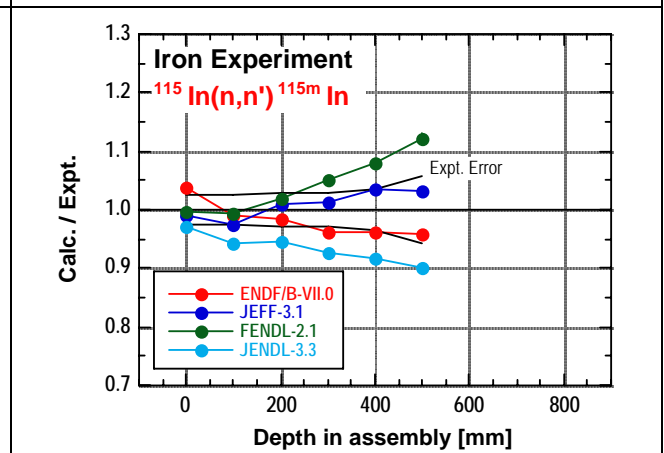
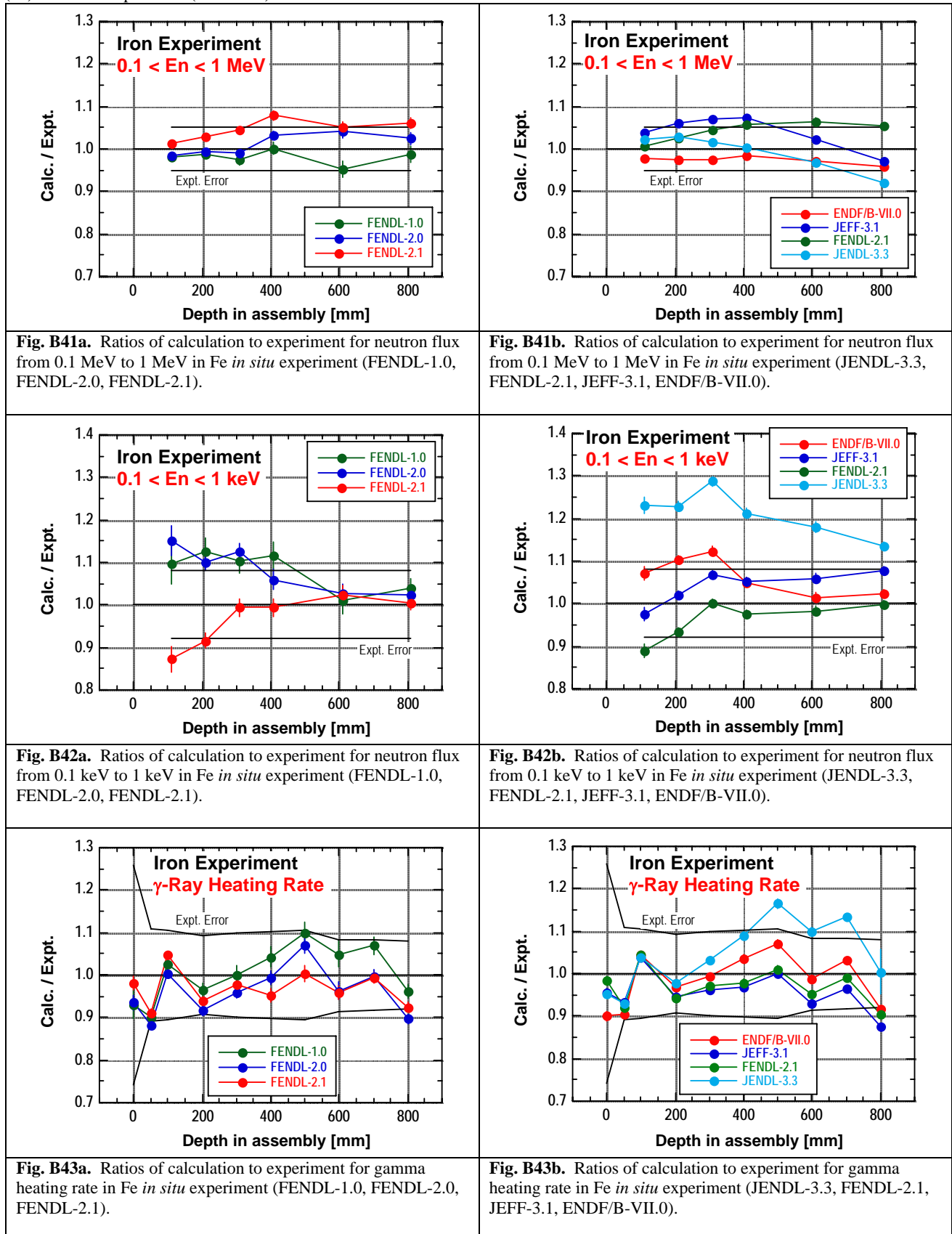


Fig. B40b. Ratios of calculation to experiment for reaction rate of $^{115}\text{In}(n,n')^{115m}\text{In}$ in Fe *in situ* experiment (JENDL-3.3, FENDL-2.1, JEFF-3.1, ENDF/B-VII.0).

(11) Fe *in situ* experiment (continued)



(12) Fe TOF experiment

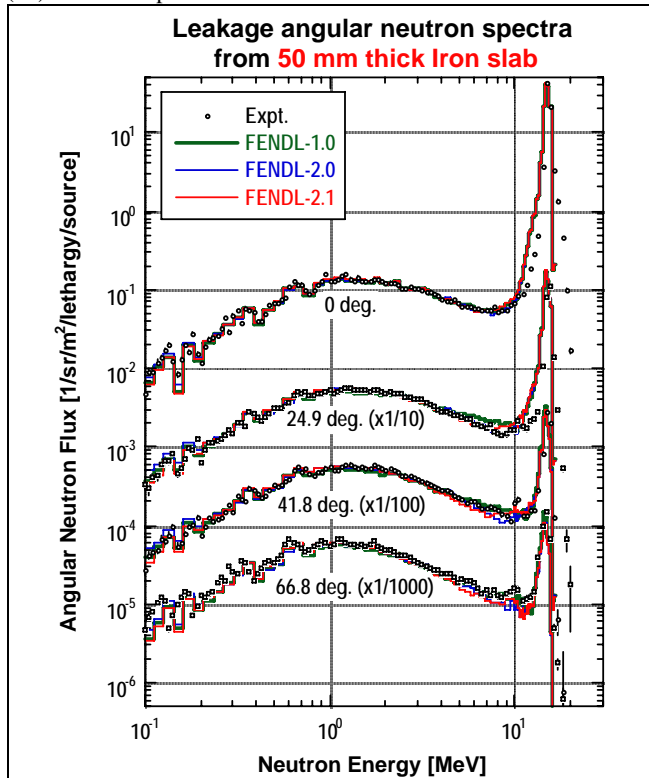


Fig. B44a. Leakage angular neutron spectra from 50 mm thick Fe slab in Fe TOF experiment (FENDL-1.0, FENDL-2.0, FENDL-2.1).

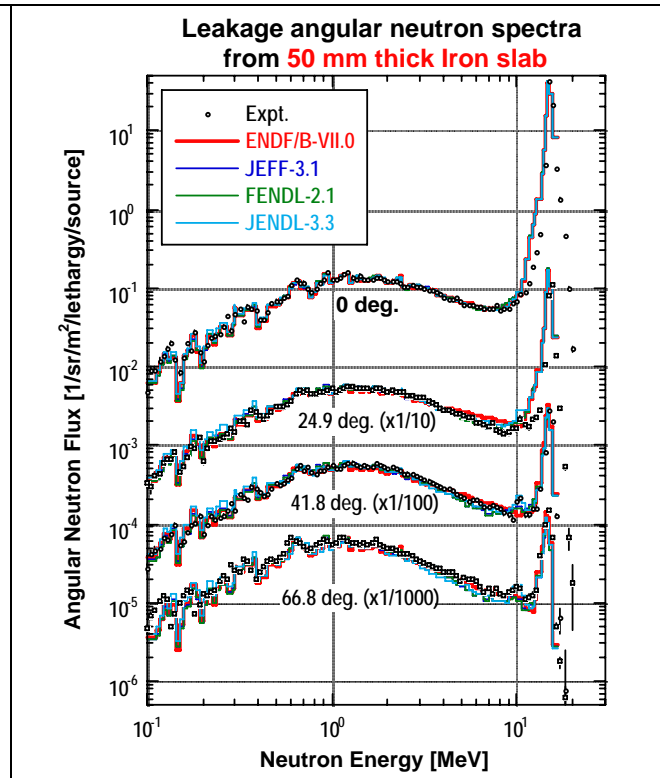


Fig. B44b. Leakage angular neutron spectra from 50 mm thick Fe slab in Fe TOF experiment (JENDL-3.3, FENDL-2.1, JEFF-3.1, ENDF/B-VII.0).

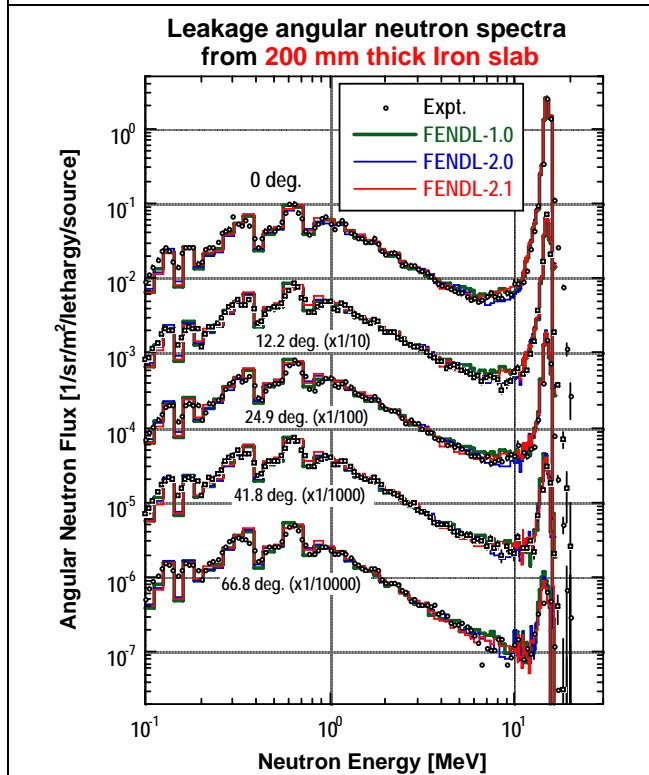


Fig. B45a. Leakage angular neutron spectra from 200 mm thick Fe slab in Fe TOF experiment (FENDL-1.0, FENDL-2.0, FENDL-2.1).

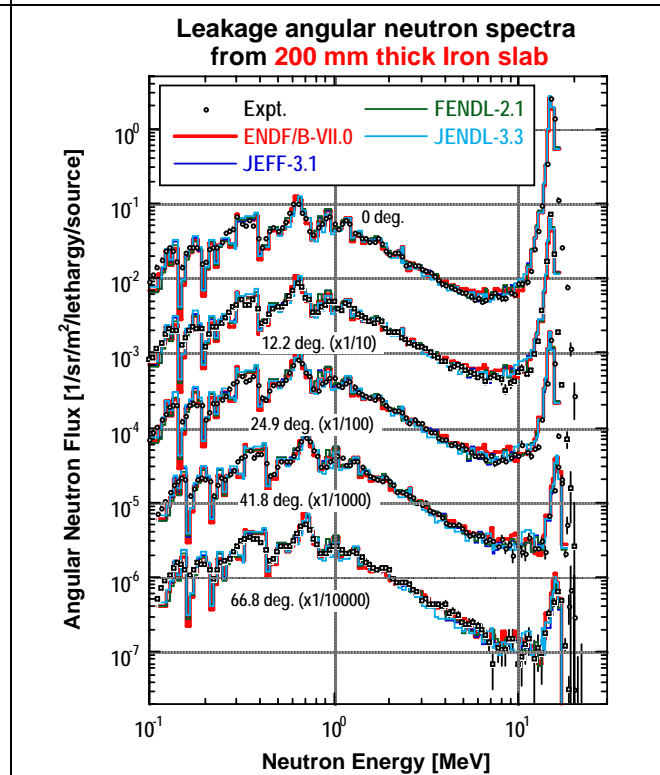


Fig. B45b. Leakage angular neutron spectra from 200 mm thick Fe slab in Fe TOF experiment (JENDL-3.3, FENDL-2.1, JEFF-3.1, ENDF/B-VII.0).

(12) Fe TOF experiment (continued)

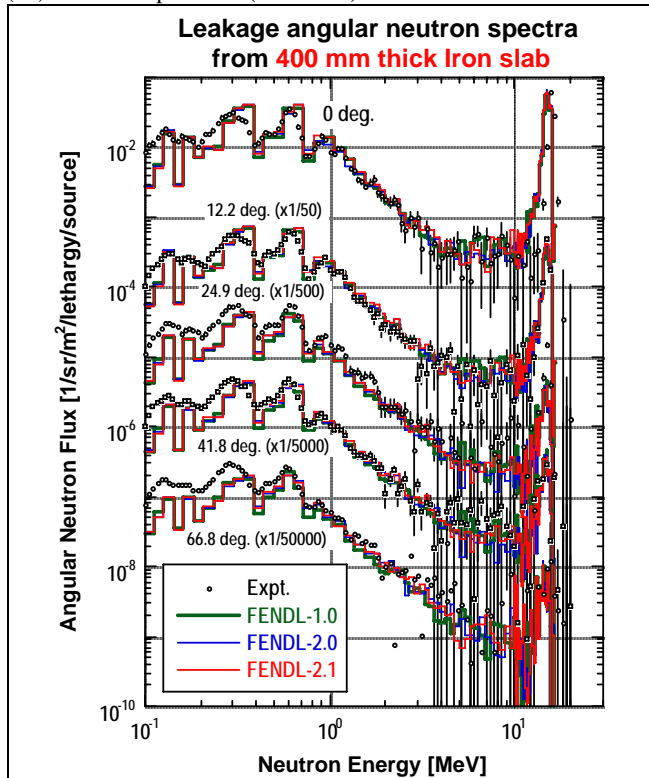


Fig. B46a. Leakage angular neutron spectra from 400 mm thick Fe slab in Fe TOF experiment (FENDL-1.0, FENDL-2.0, FENDL-2.1).

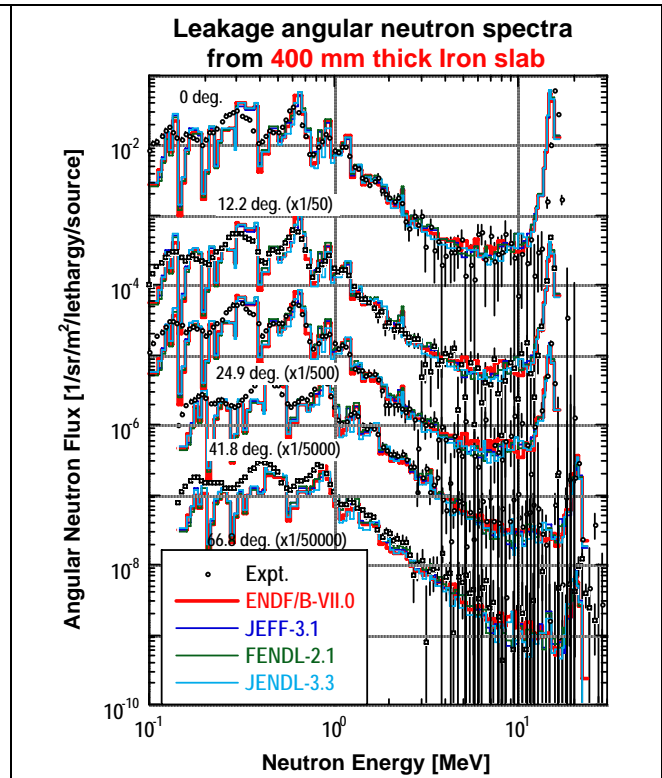


Fig. B46b. Leakage angular neutron spectra from 400 mm thick Fe slab in Fe TOF experiment (JENDL-3.3, FENDL-2.1, JEFF-3.1, ENDF/B-VII.0).

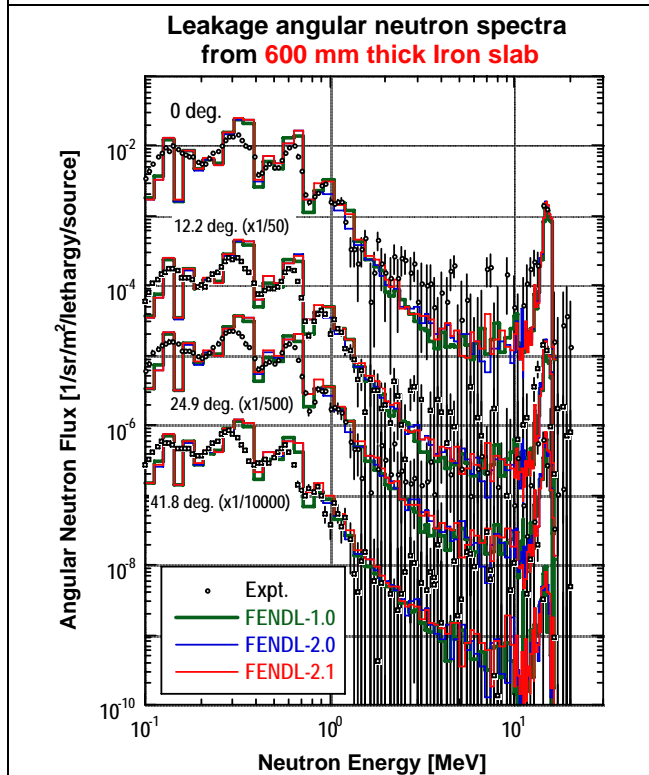


Fig. B47a. Leakage angular neutron spectra from 600 mm thick Fe slab in Fe TOF experiment (FENDL-1.0, FENDL-2.0, FENDL-2.1).

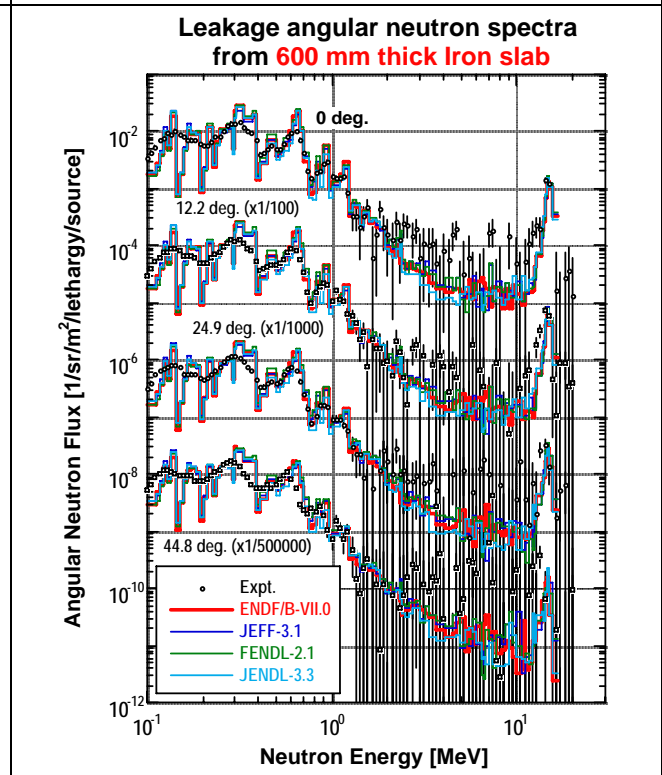


Fig. B47b. Leakage angular neutron spectra from 600 mm thick Fe slab in Fe TOF experiment (JENDL-3.3, FENDL-2.1, JEFF-3.1, ENDF/B-VII.0).

(13) SS316 *in situ* experiment

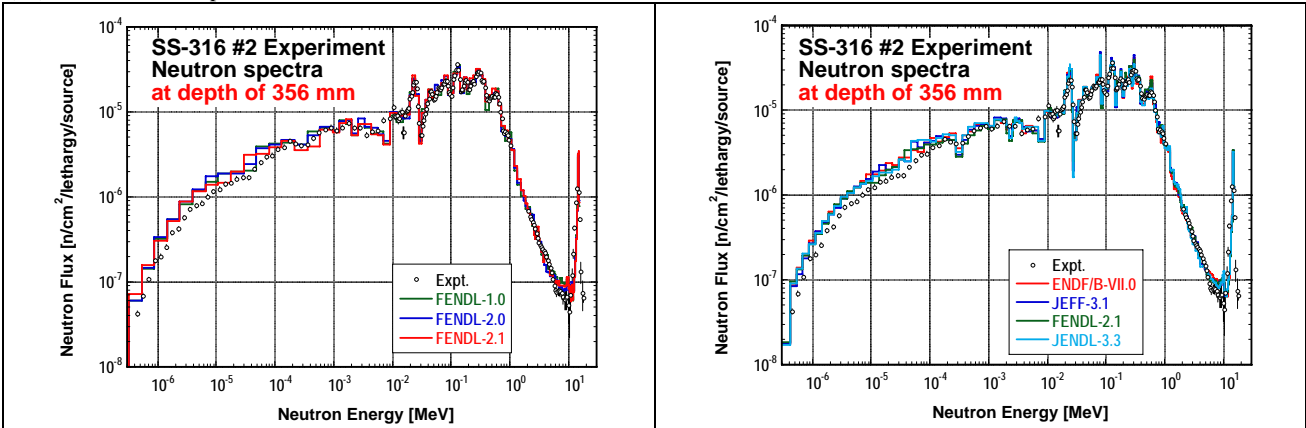


Fig. B48a. Neutron spectra at 356 mm in SS316 *in situ* experiment (FENDL-1.0, FENDL-2.0, FENDL-2.1).

Fig. B48b. Neutron spectra at 356 mm in SS316 *in situ* experiment (JENDL-3.3, FENDL-2.1, JEFF-3.1, ENDF/B-VII.0).

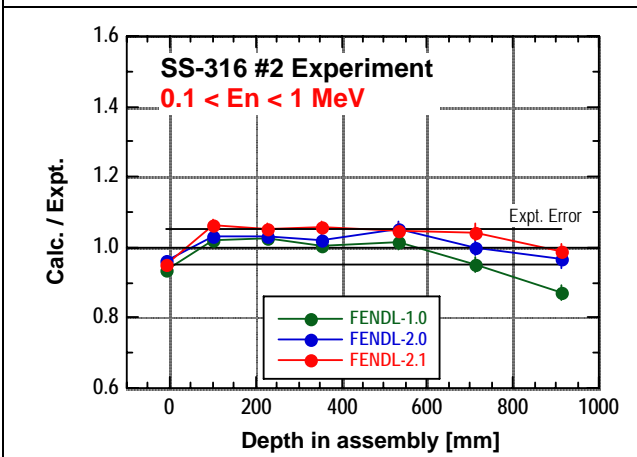


Fig. B49a. Ratios of calculation to experiment for neutron flux from 100 keV to 1 MeV in SS316 *in situ* experiment (FENDL-1.0, FENDL-2.0, FENDL-2.1).

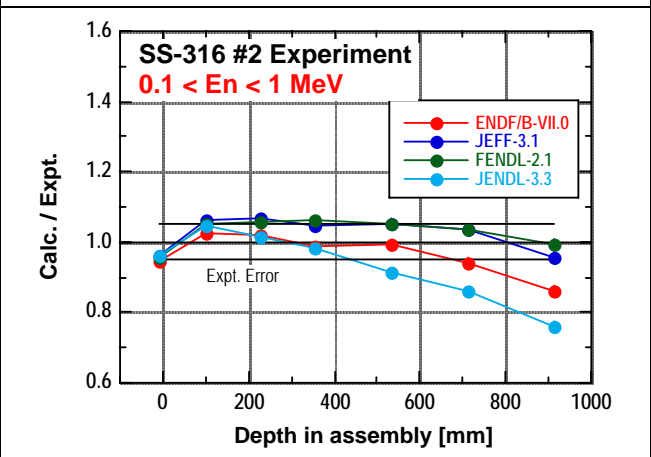


Fig. B49b. Ratios of calculation to experiment for neutron flux from 100 keV to 1 MeV in SS316 *in situ* experiment (JENDL-3.3, FENDL-2.1, JEFF-3.1, ENDF/B-VII.0).

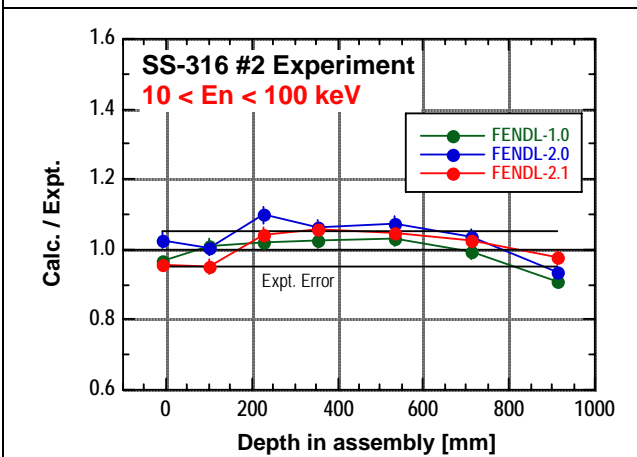


Fig. B50a. Ratios of calculation to experiment for neutron flux from 10 keV to 100 keV in SS316 *in situ* experiment (FENDL-1.0, FENDL-2.0, FENDL-2.1).

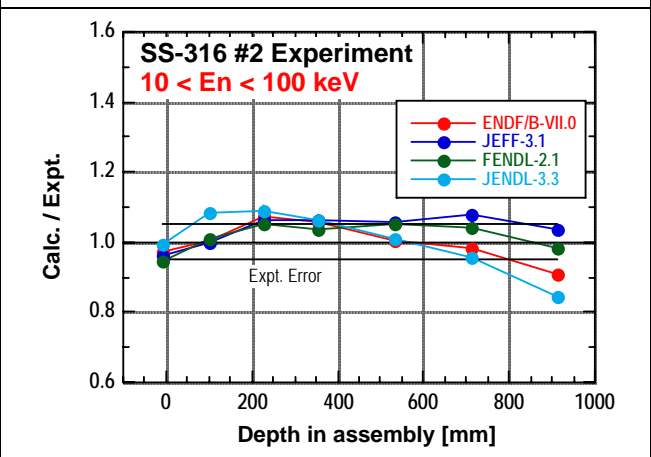
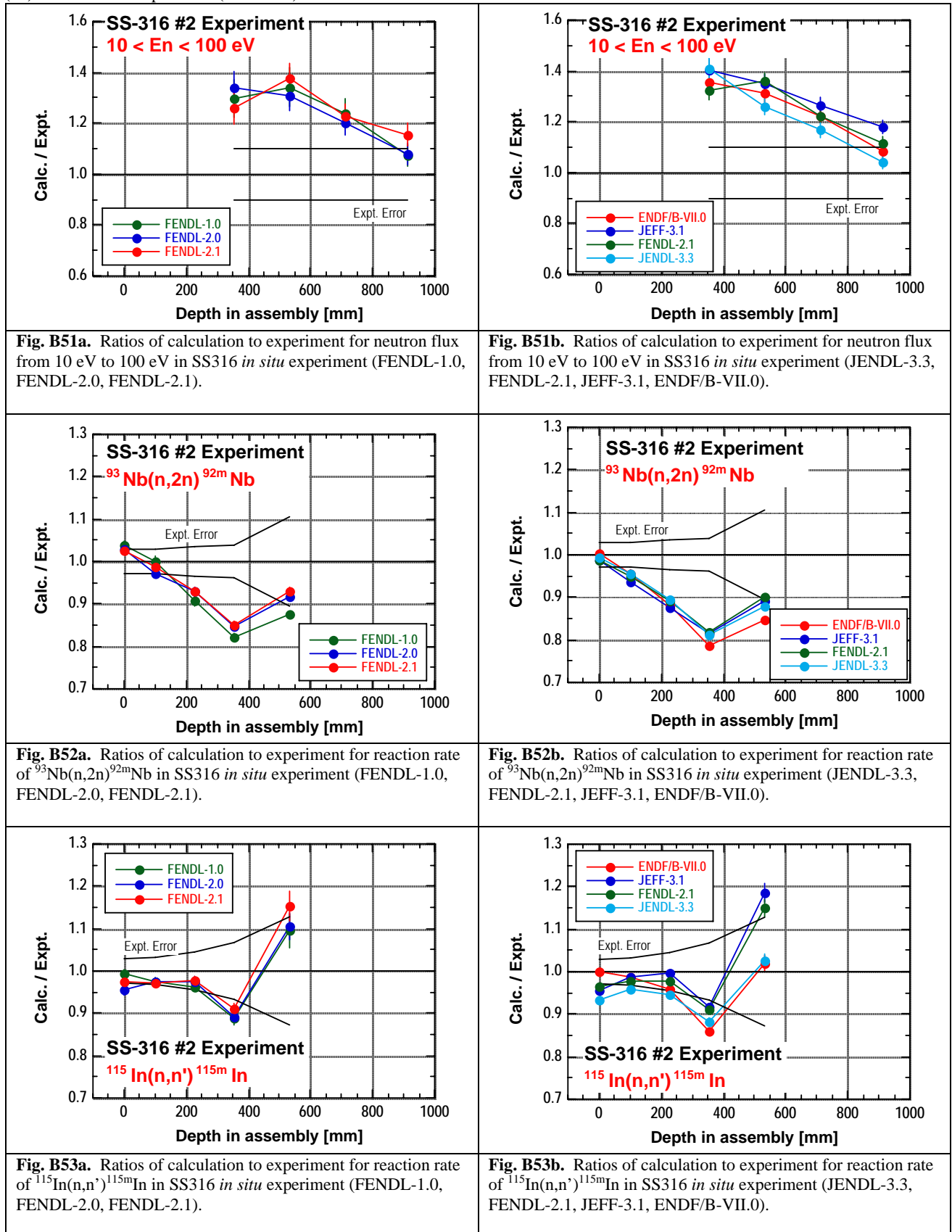
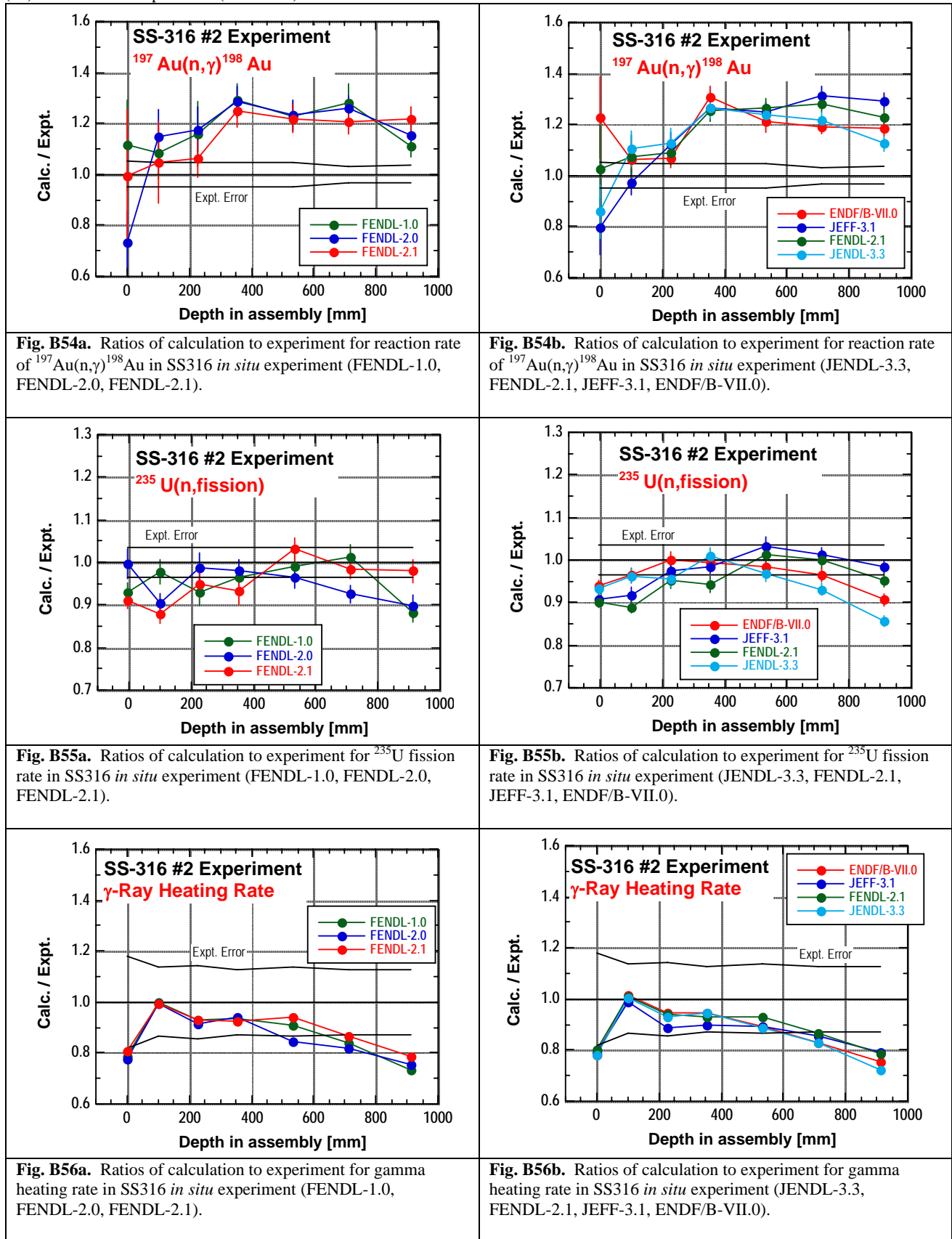


Fig. B50b. Ratios of calculation to experiment for neutron flux from 10 keV to 100 keV in SS316 *in situ* experiment (JENDL-3.3, FENDL-2.1, JEFF-3.1, ENDF/B-VII.0).

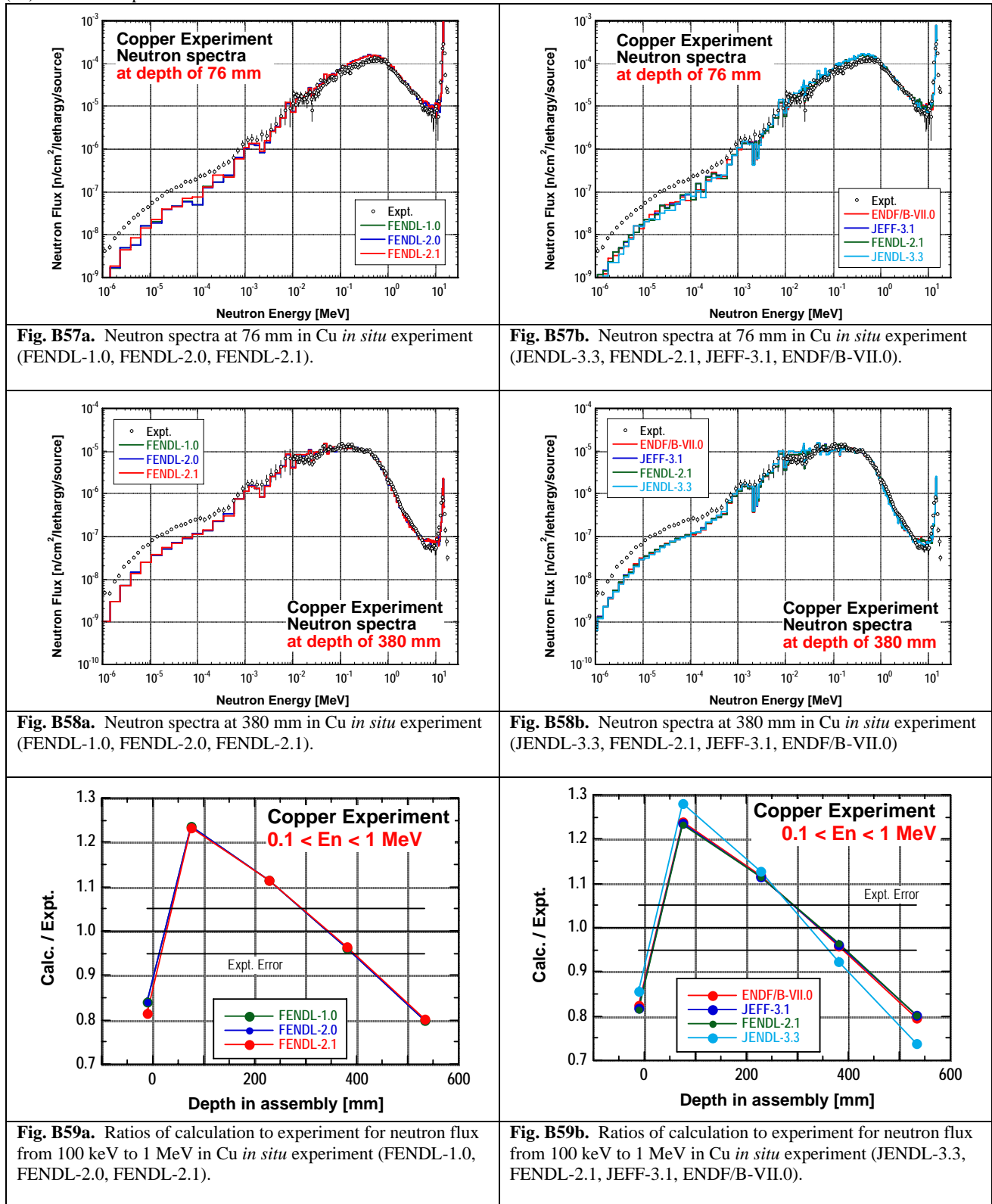
(13) SS316 *in situ* experiment (continued)



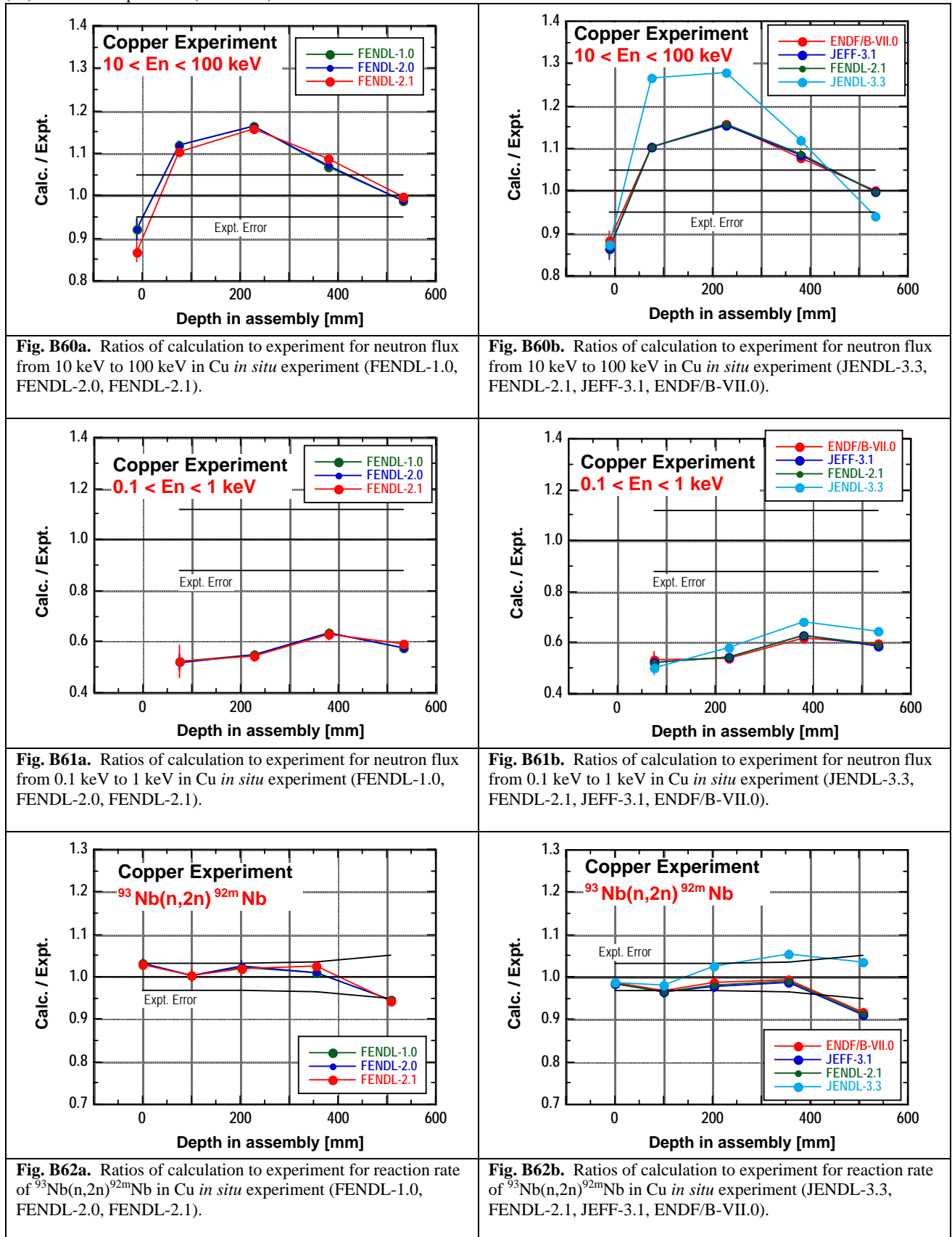
(13) SS316 *in situ* experiment (continued)



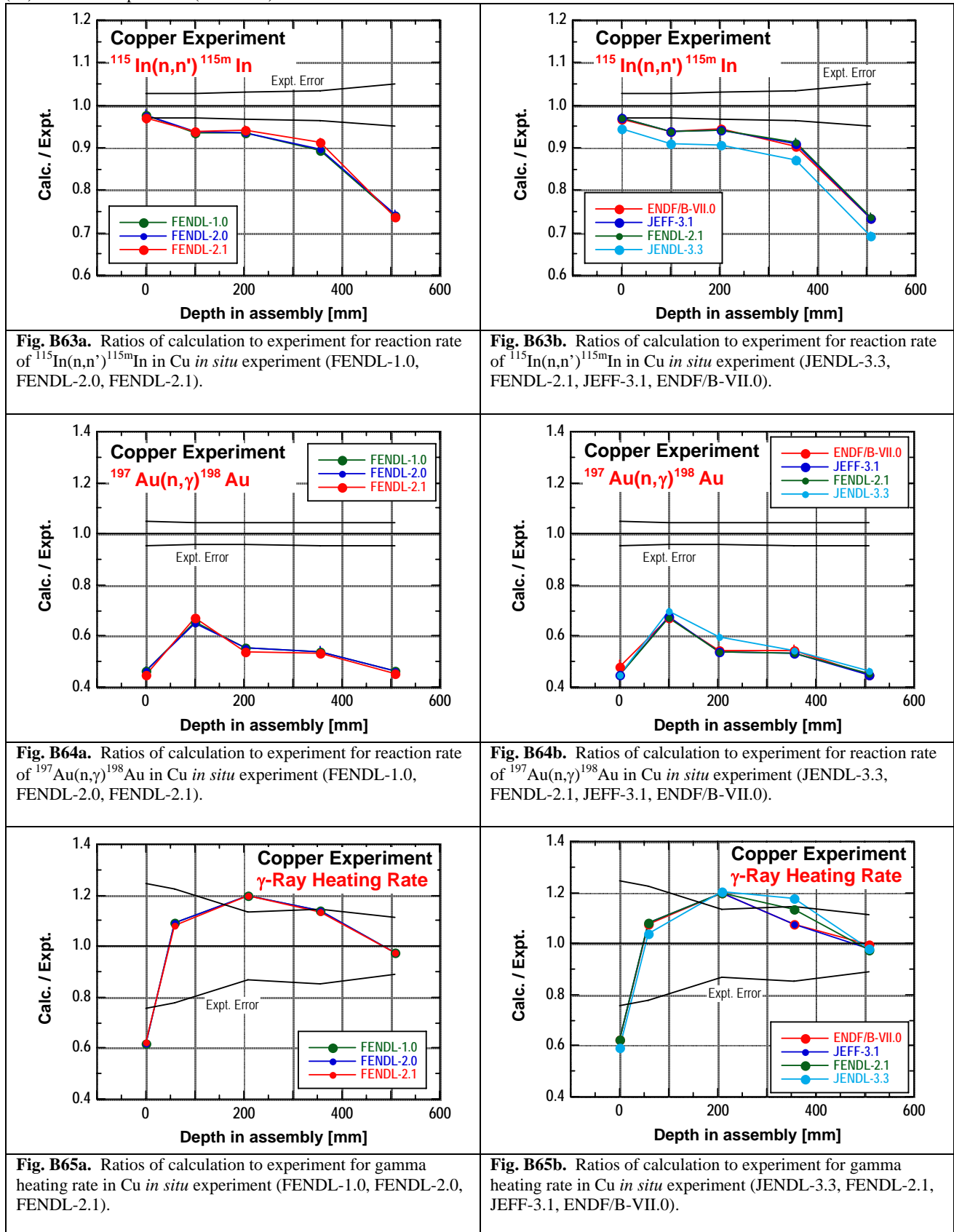
(14) Cu *in situ* experiment



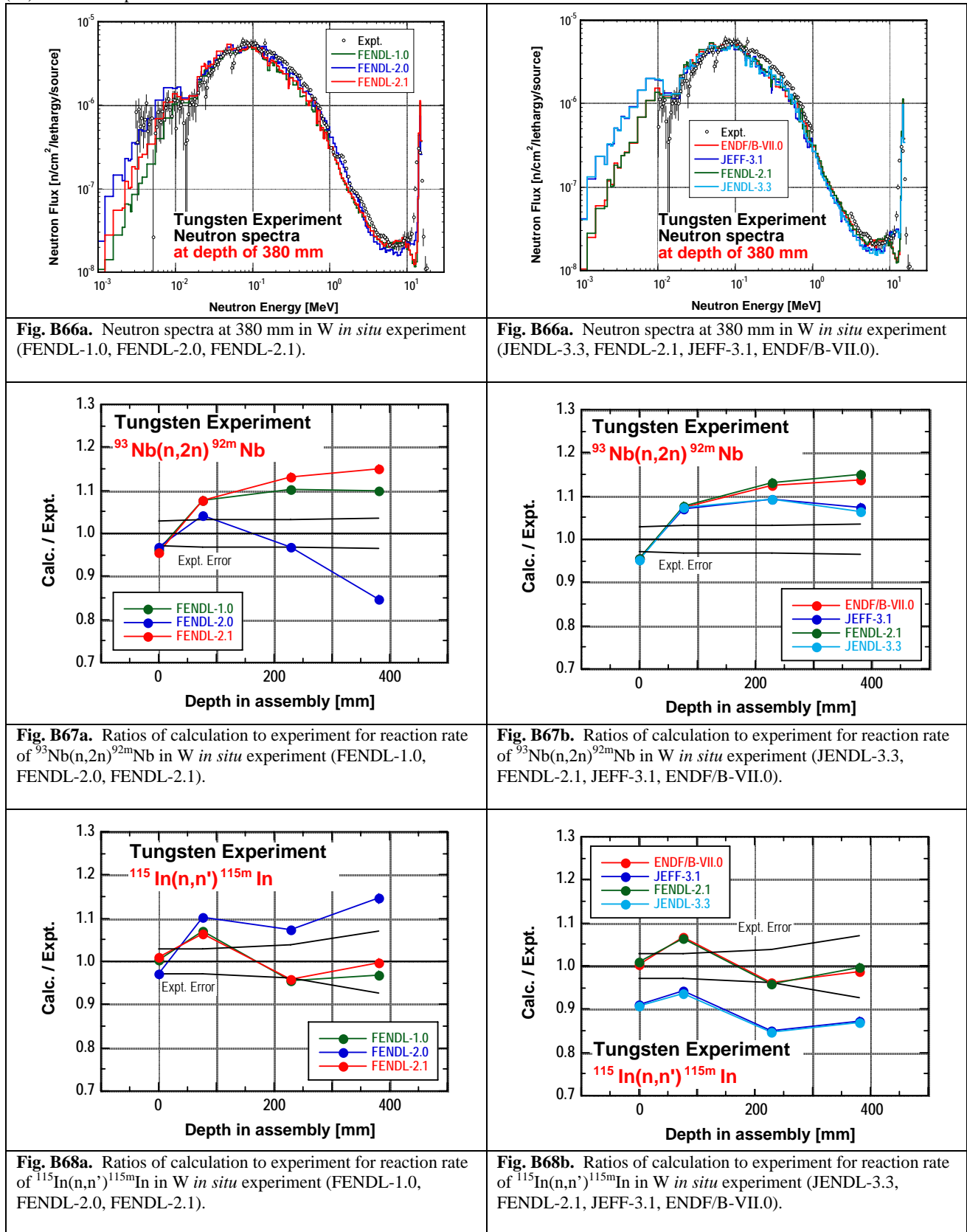
(14) Cu *in situ* experiment (continued)



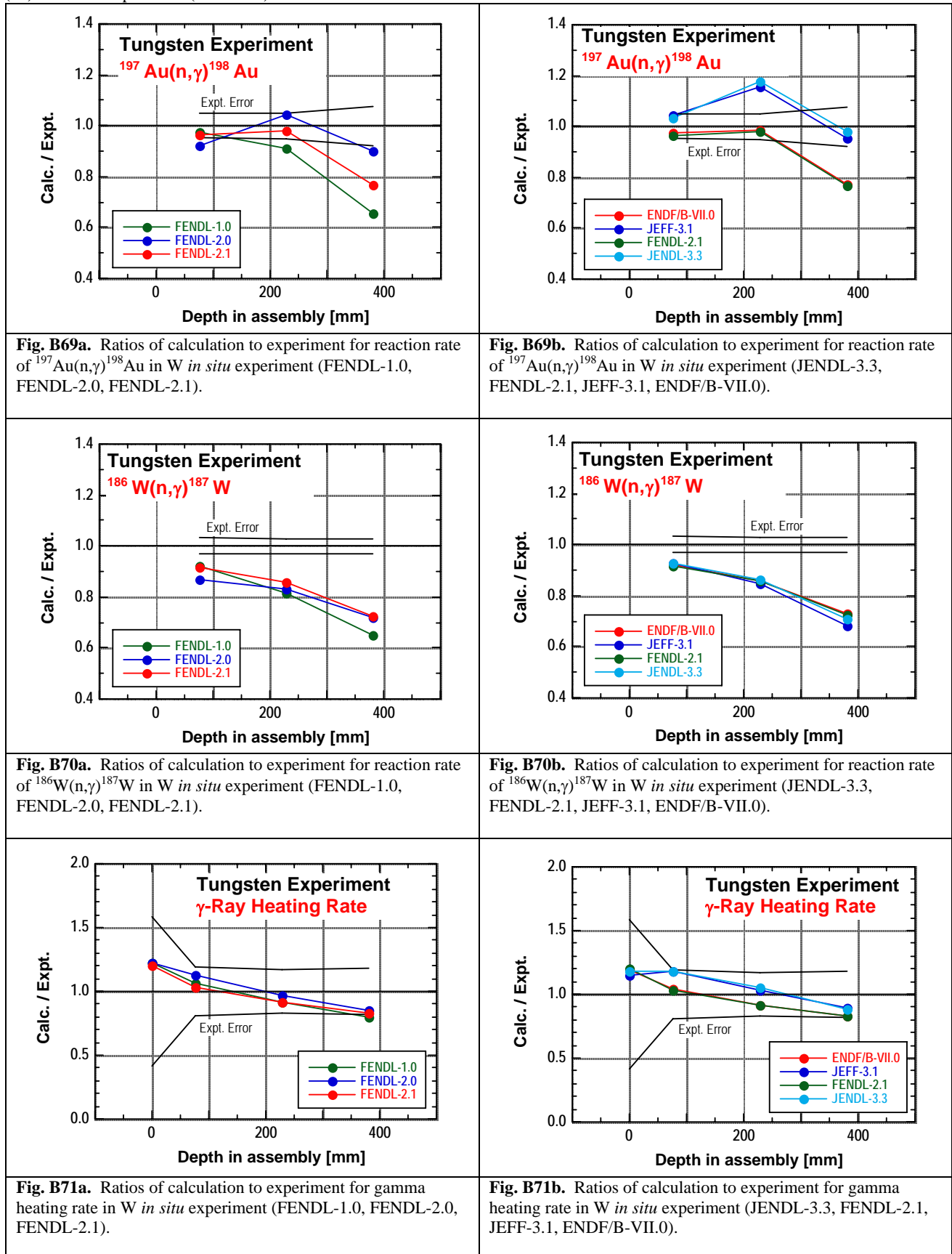
(14) Cu *in situ* experiment (continued)



(15) W *in situ* experiment



(15) W *in situ* experiment (continued)



(16) Pb TOF experiment

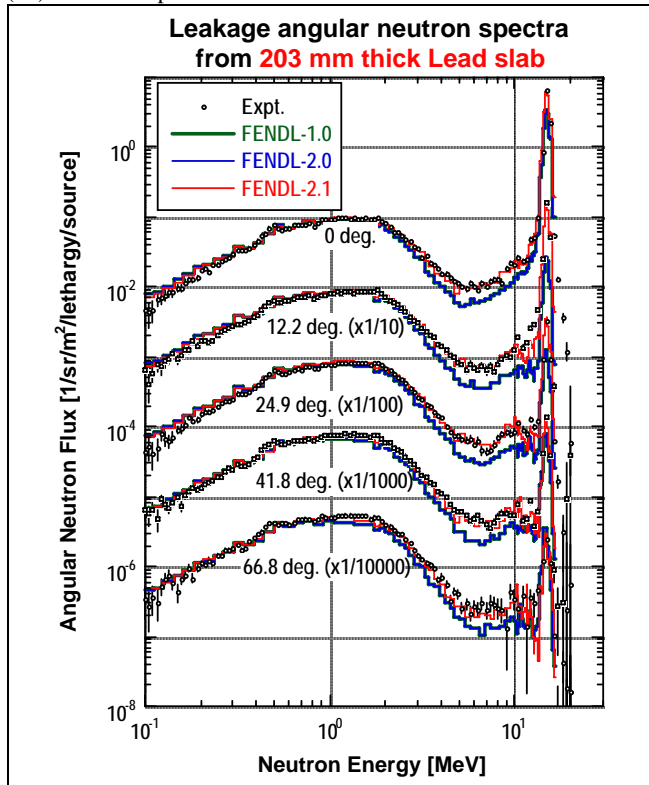


Fig. B72a. Leakage angular neutron spectra from 203 mm thick Pb slab in Pb TOF experiment (FENDL-1.0, FENDL-2.0, FENDL-2.1).

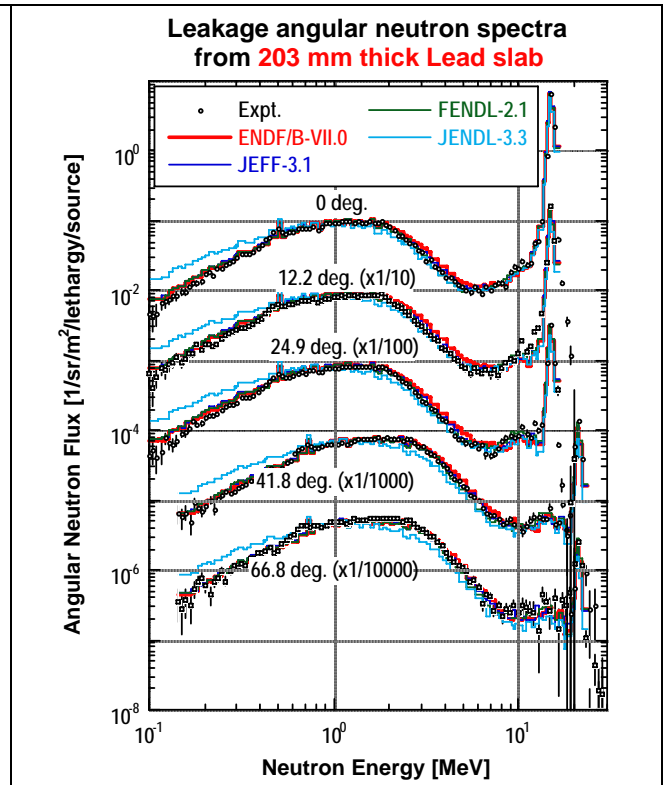


Fig. B72b. Leakage angular neutron spectra from 203 mm thick Pb slab in Pb TOF experiment (JENDL-3.3, FENDL-2.1, JEFF-3.1, ENDF/B-VII.0).

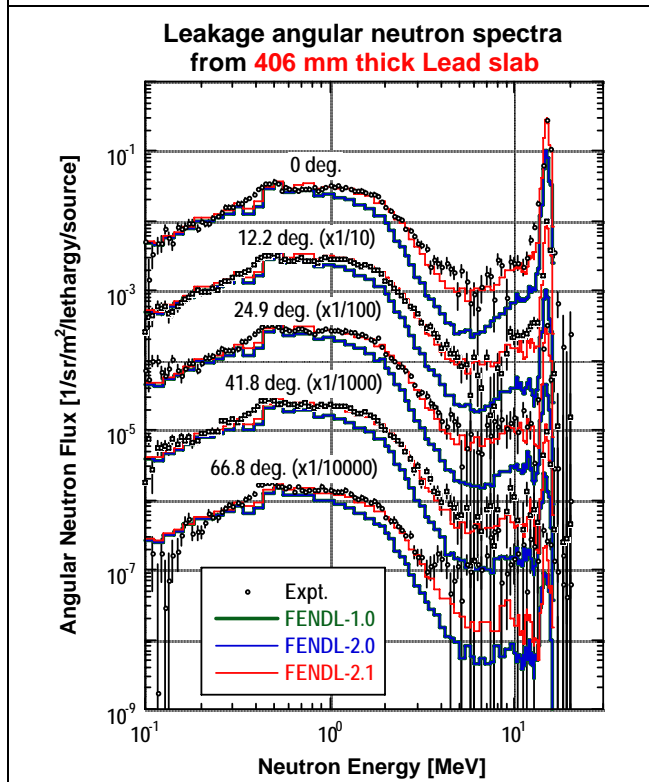


Fig. B73a. Leakage angular neutron spectra from 406 mm thick Pb slab in Pb TOF experiment (FENDL-1.0, FENDL-2.0, FENDL-2.1).

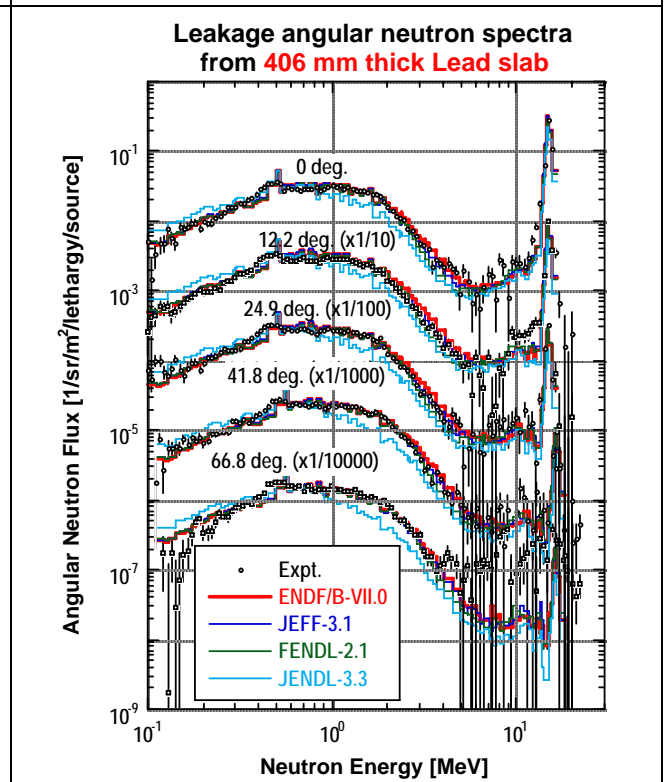


Fig. B73b. Leakage angular neutron spectra from 406 mm thick Pb slab in Pb TOF experiment (JENDL-3.3, FENDL-2.1, JEFF-3.1, ENDF/B-VII.0).