Uncertainties for the CHELO nuclides

A.V.Ignatyuk
Institute of Physics and Power Engineering, Obninsk

- Unrecognized-error estimation approach;
- Uncertainties and covariancies for ^{1}H and ^{16}O;
- Uncertainties for ^{56}Fe;
- Uncertainties for actinides.

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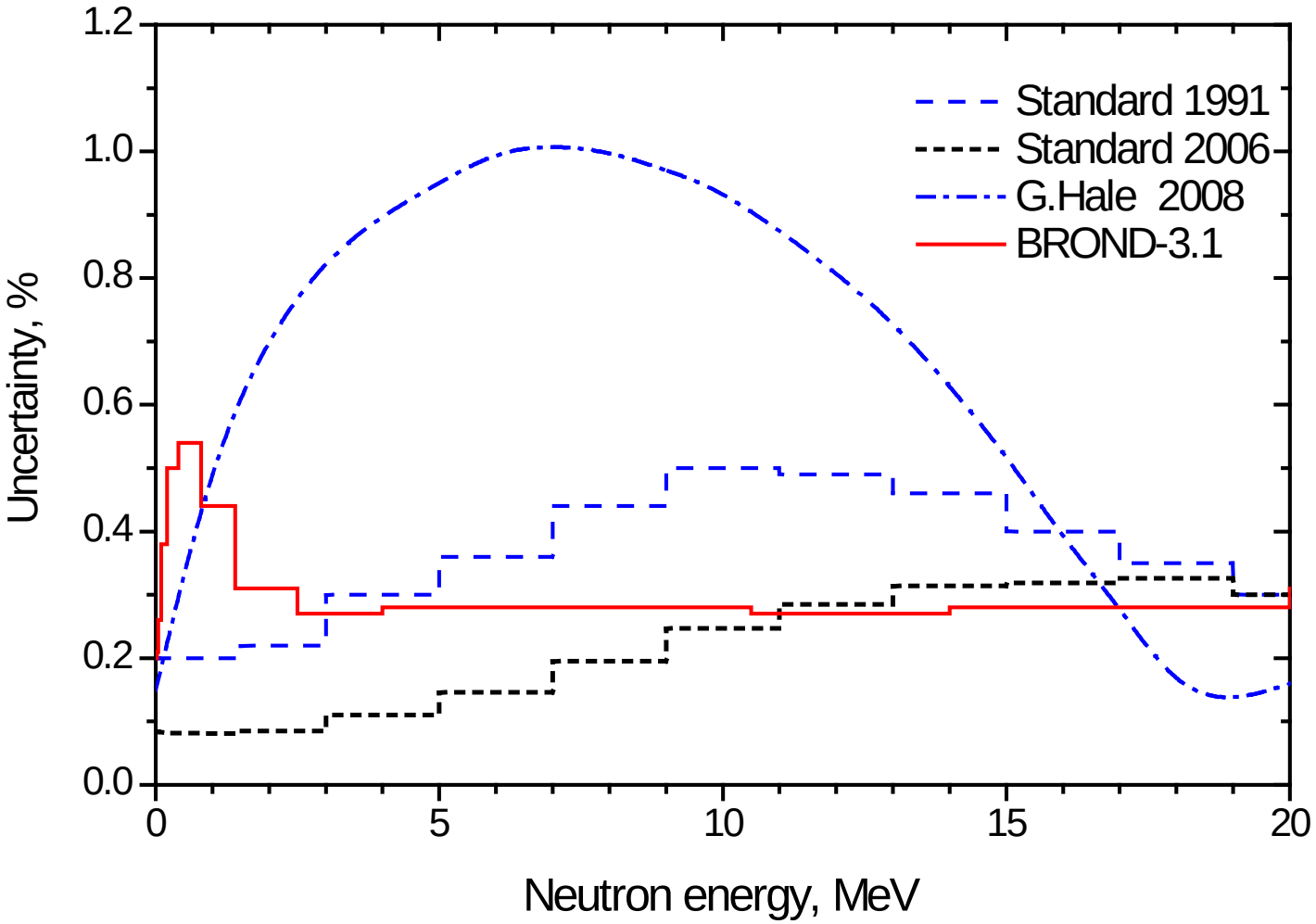
Unrecognized-error estimation method

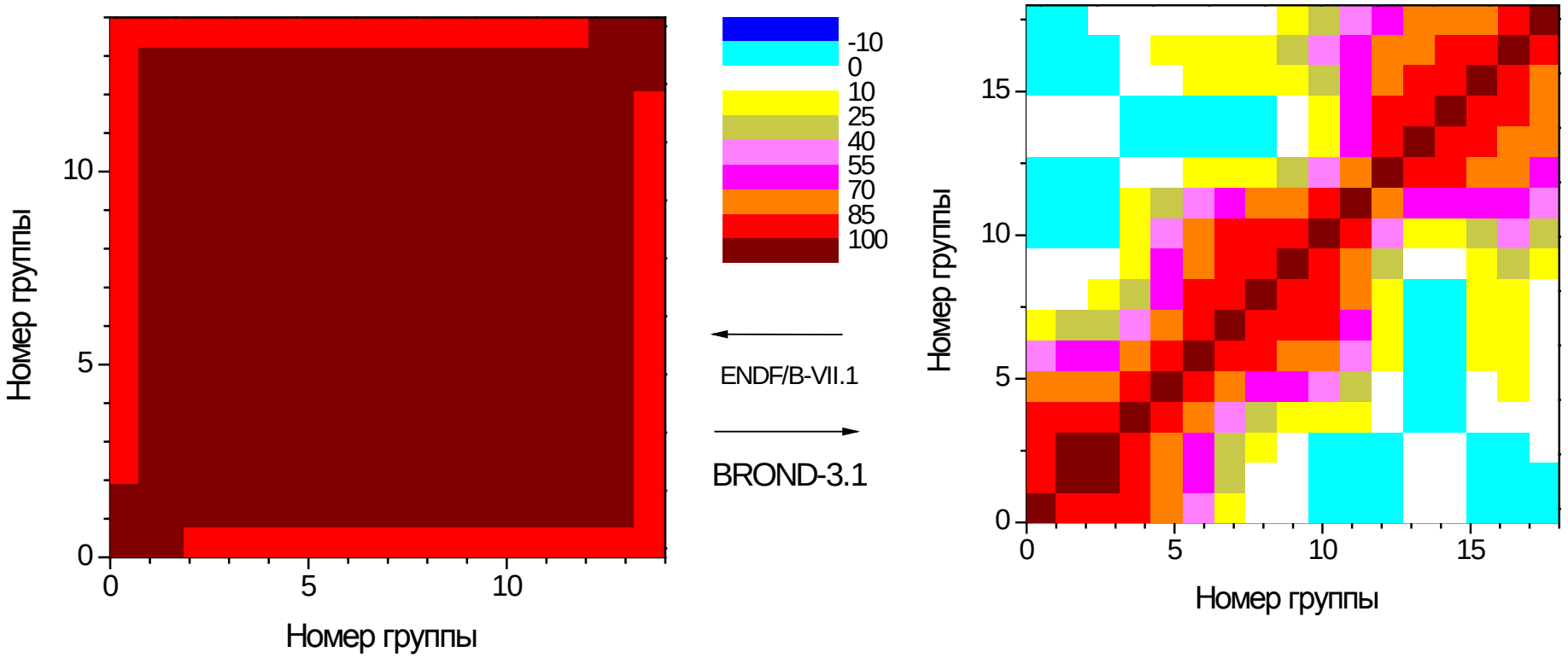
The special attention in the new BROND-3.1 was devoted to the cross-section uncertainty matrixes, which were absent in the previous Russian libraries. The analysis of uncertainties for the most cases was performed on the basis of the unrecognized-error estimation method, developed at IPPE in the last years. Along with a consistent consideration of statistical errors of experimental data the method allows to determine some systematic uncertainties, usually underestimated by the authors of data, and to establish also some implicit correlations of data. An account of systematic uncertainties is an important feature of new BROND evaluations.

Some additional advantages of the method are connected with using of the Pade approximation for data fitting. In this case we have analytical expressions on the basis of which the sensitivity coefficient can be calculated rather simply and the obtained covariance matrices can be easily transformed to any desire group structure.

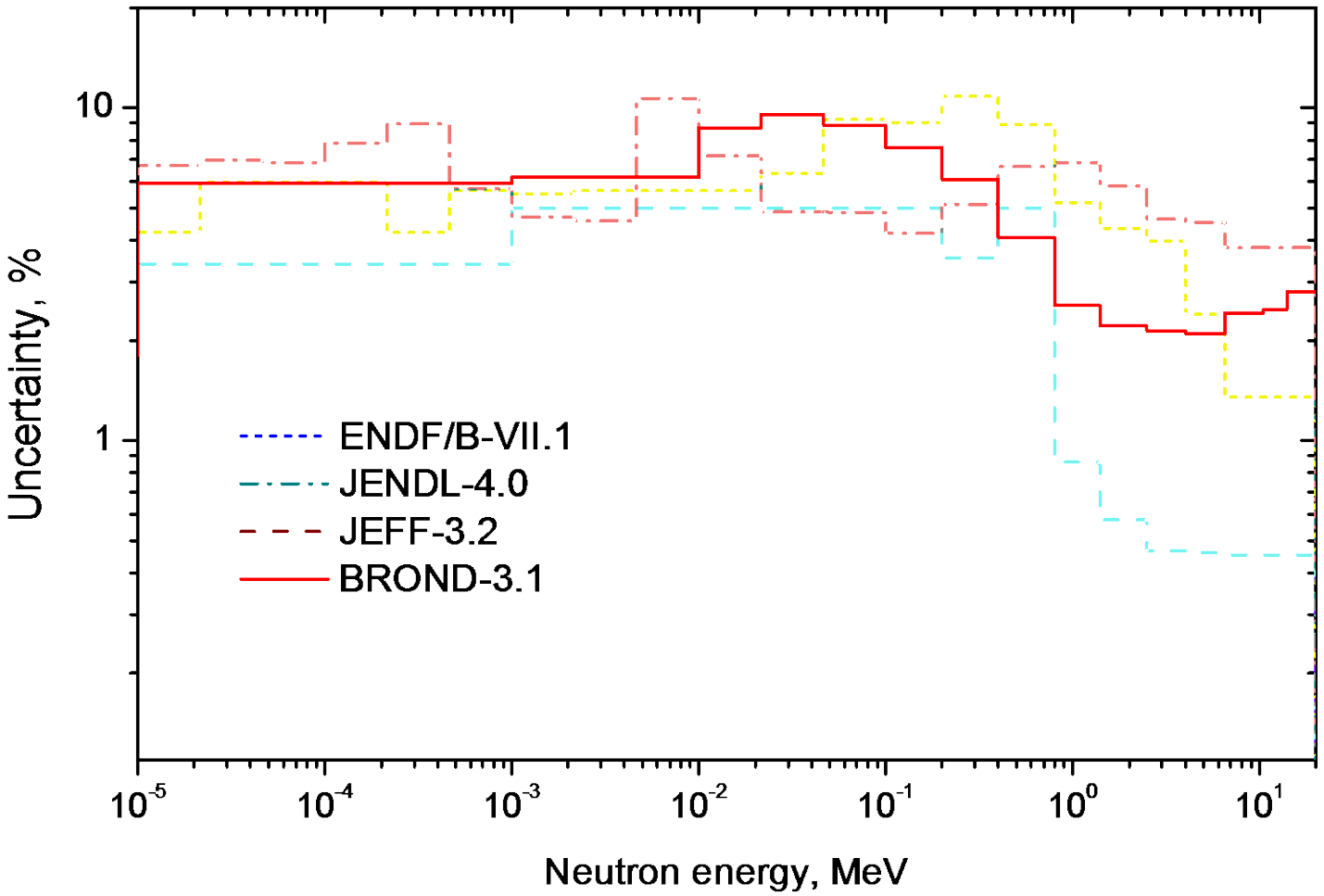
Uncertainties of the elastic scattering evaluations for ^{1}H



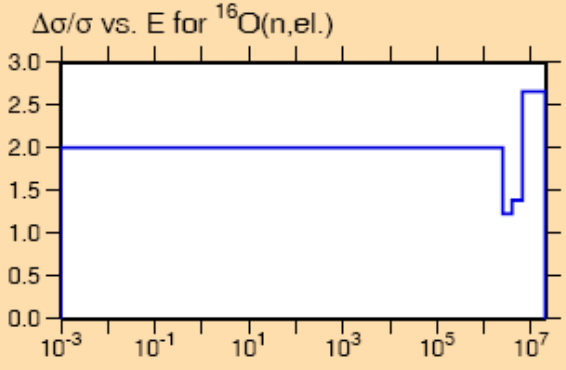
Correlation matrices of the elastic scattering uncertainties for ^{1}H



Uncertainties of the total cross-section evaluations for ^{56}Fe

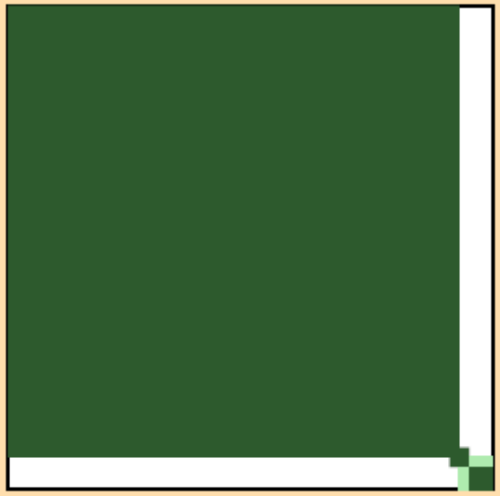


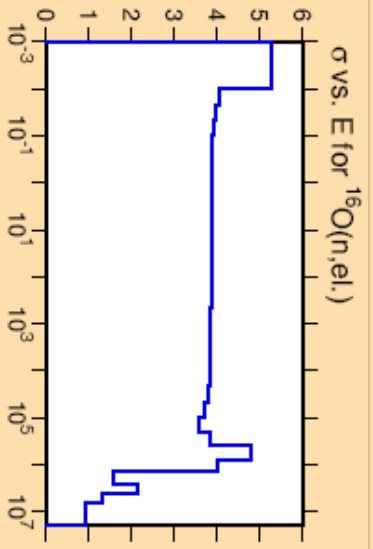
Uncertainties of the total and inelastic cross sections for ^{16}O



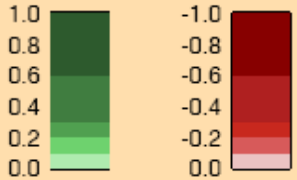
Ordinate scales are % relative standard deviation and barns.

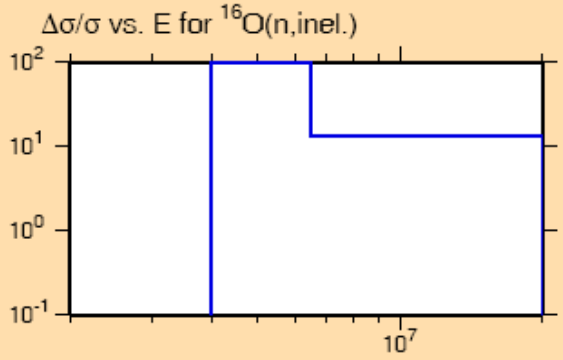
Abscissa scales are energy (eV).





Correlation Matrix

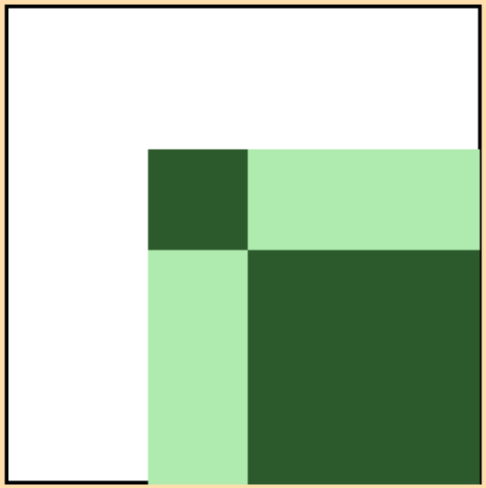


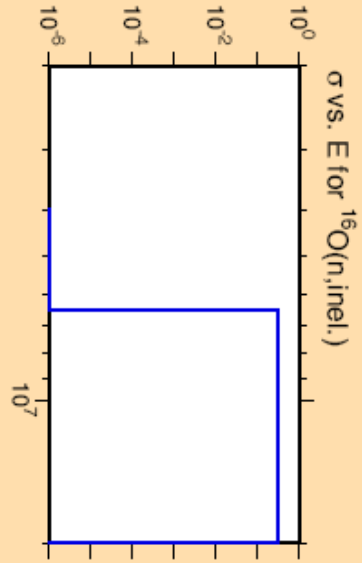


Ordinate scales are % relative standard deviation and barns.

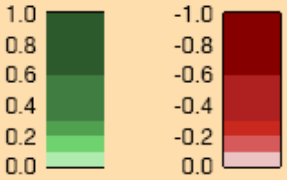
Abscissa scales are energy (eV).

Warning: some uncertainty data were suppressed.

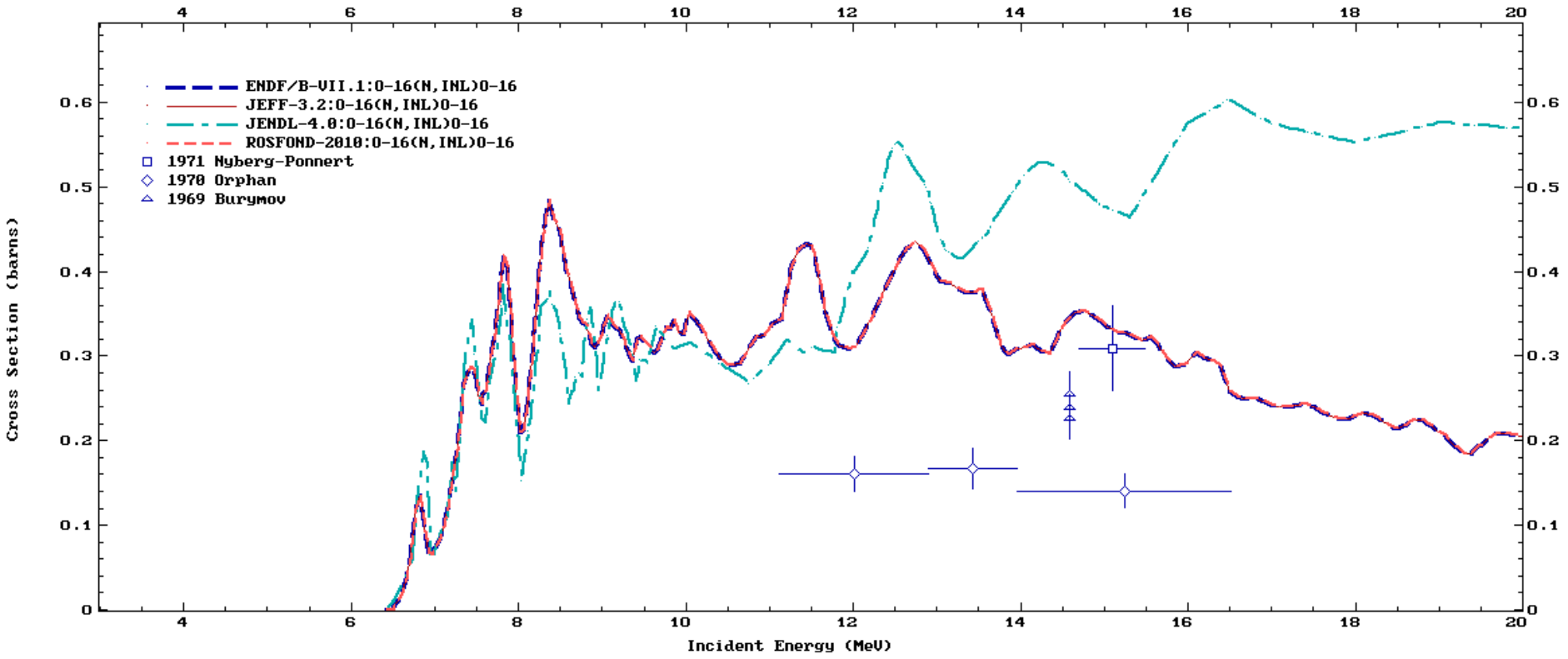




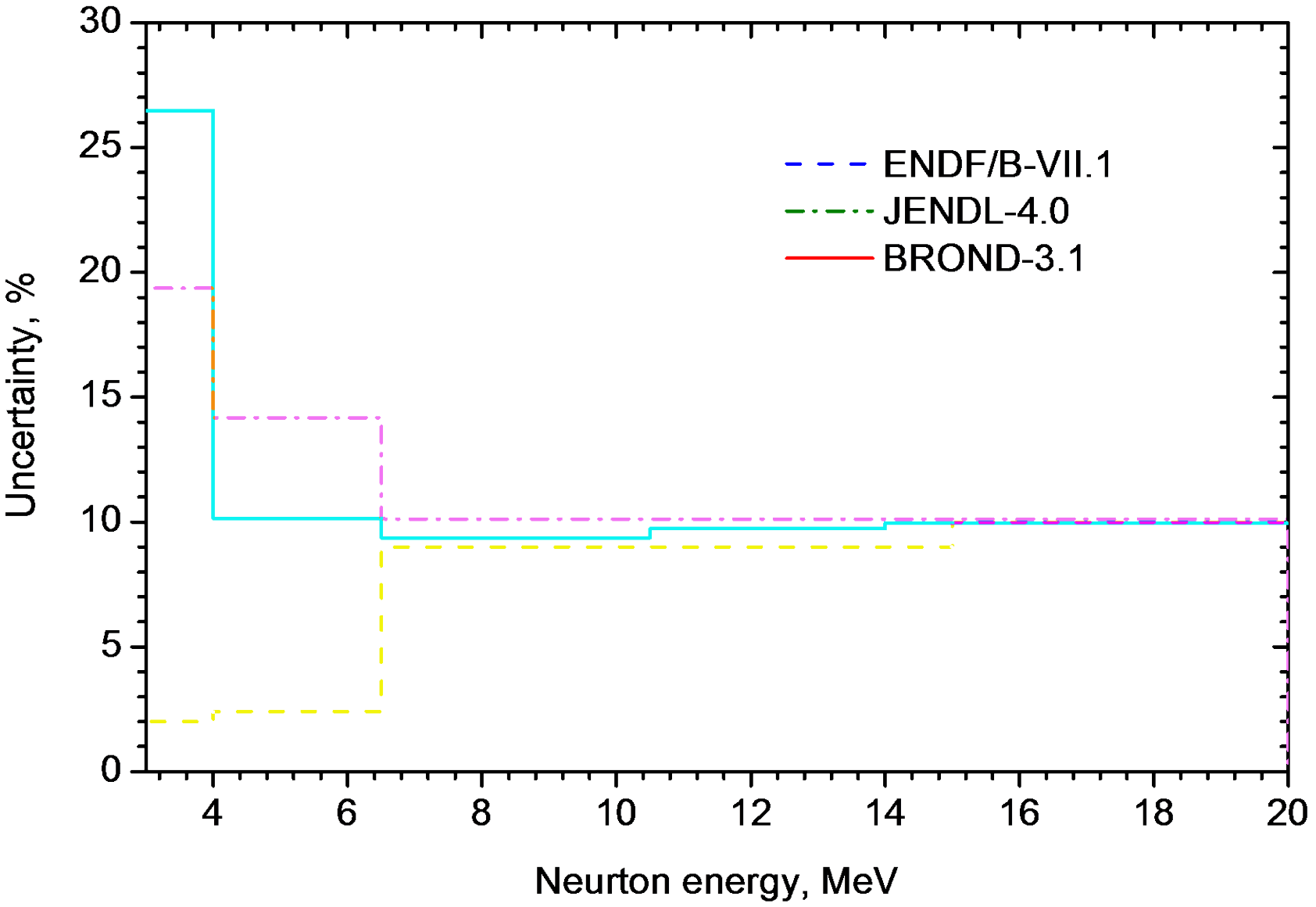
Correlation Matrix



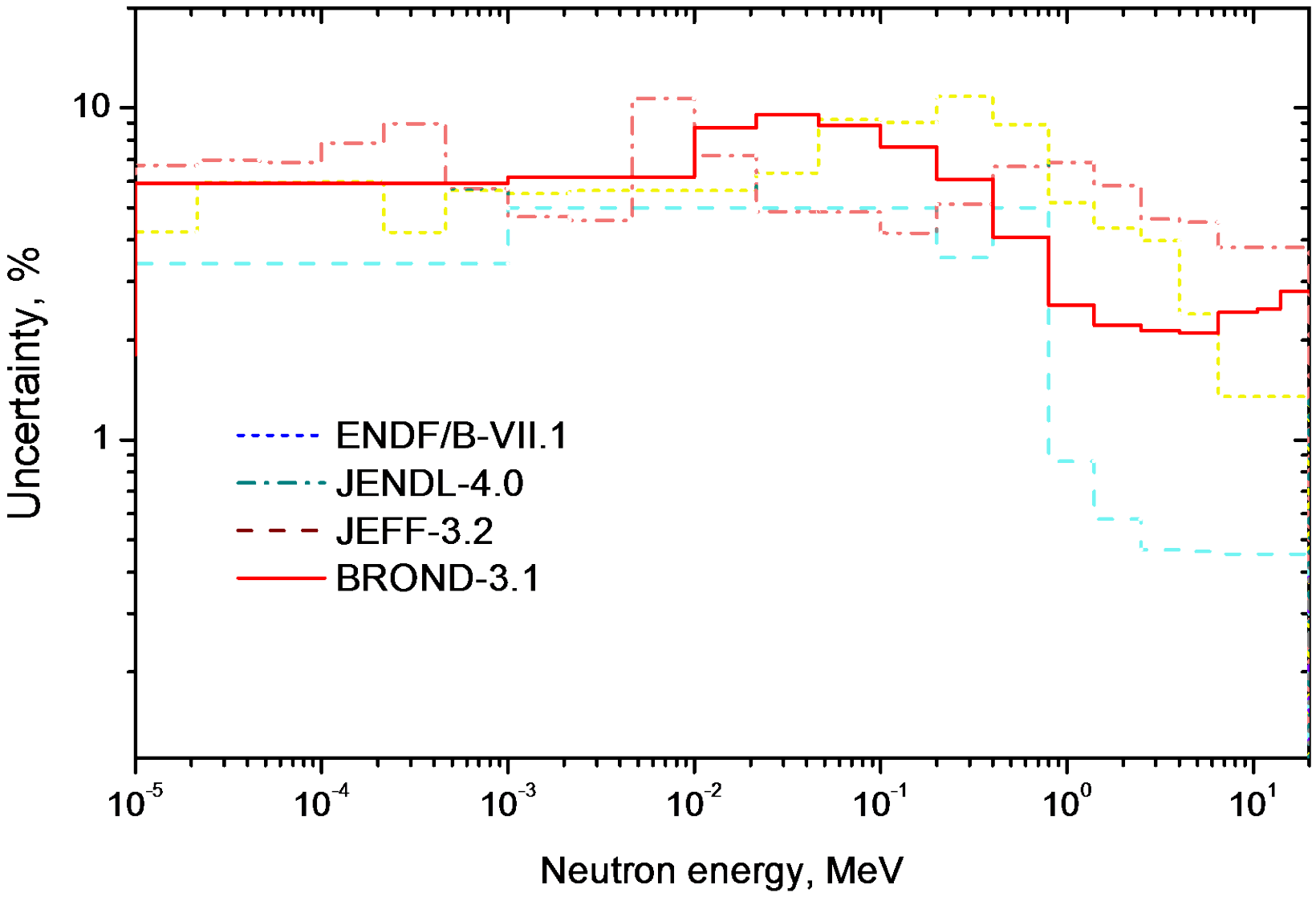
Evaluations of the inelastic cross section for ^{16}O



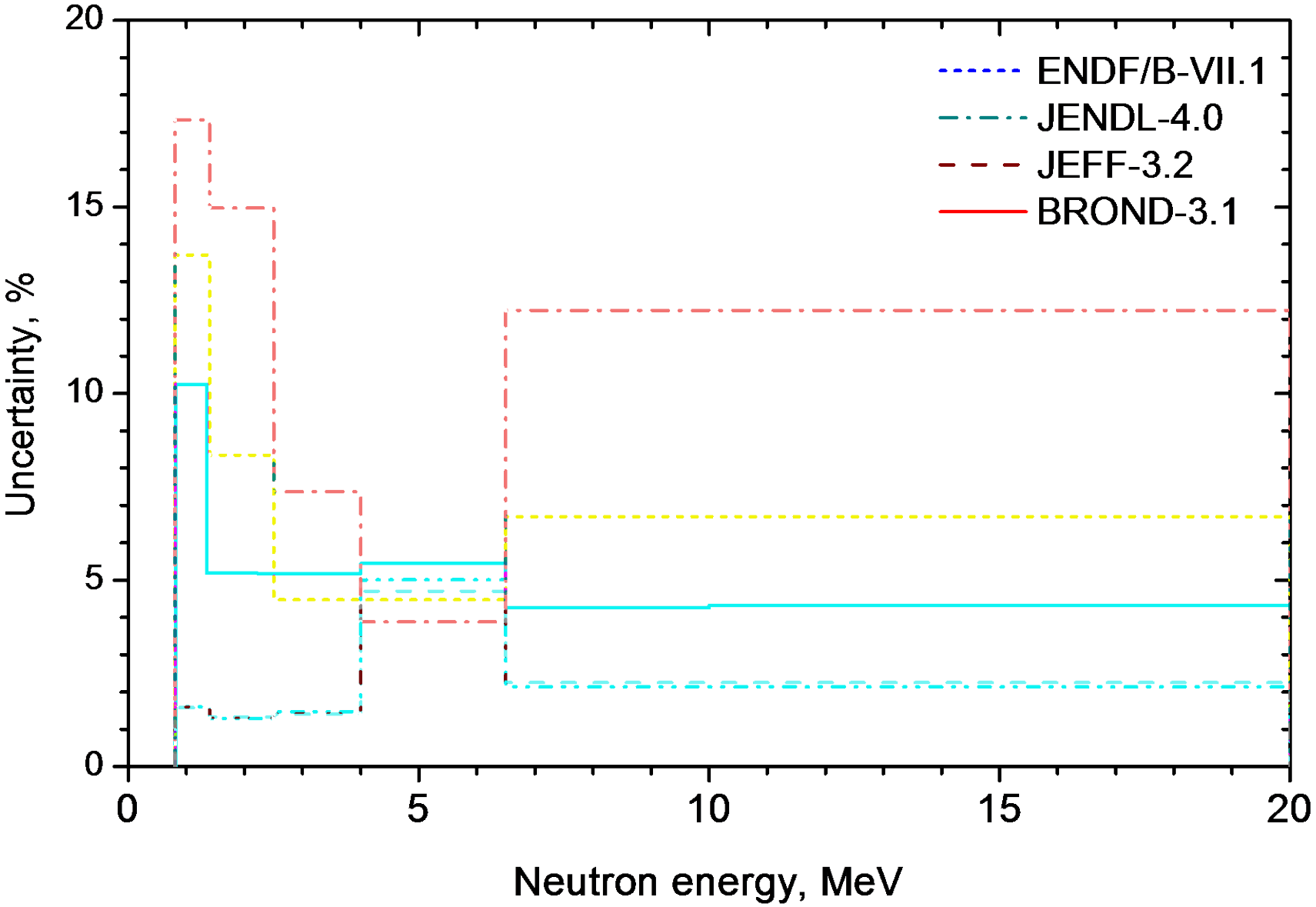
Uncertainties of the n,α cross-section evaluations for ^{16}O



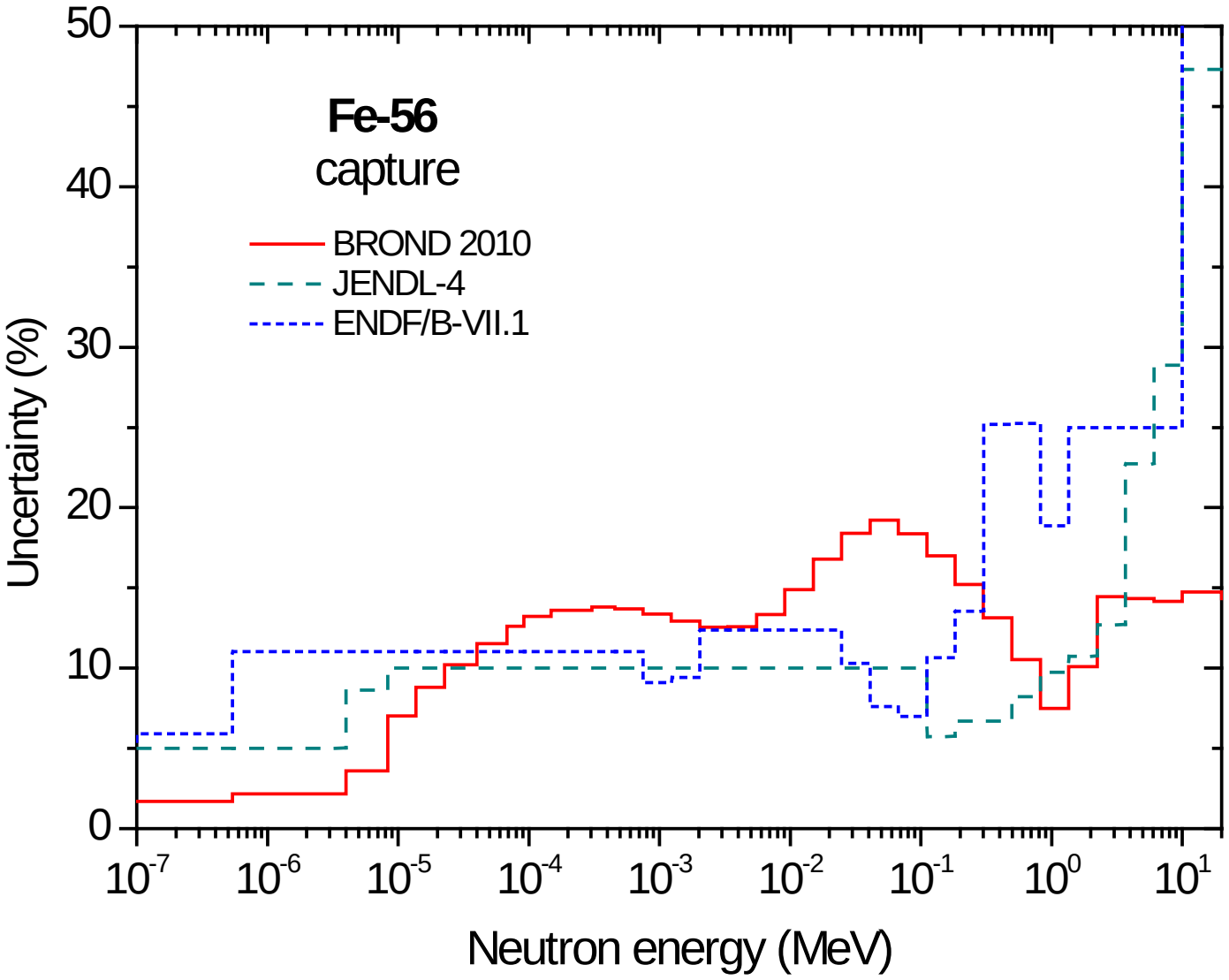
Uncertainties of the total cross-section evaluations for ^{56}Fe



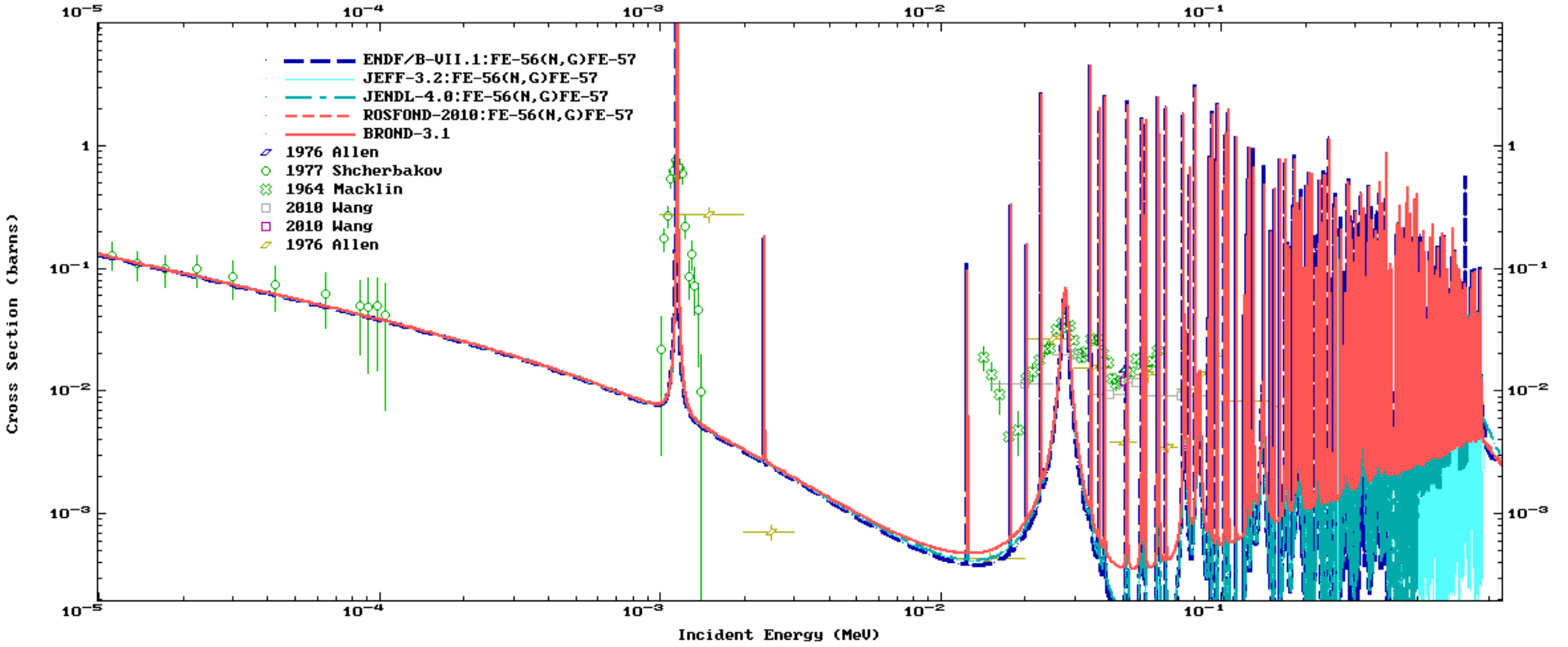
Uncertainties of the inelastic cross-section evaluations for ^{56}Fe



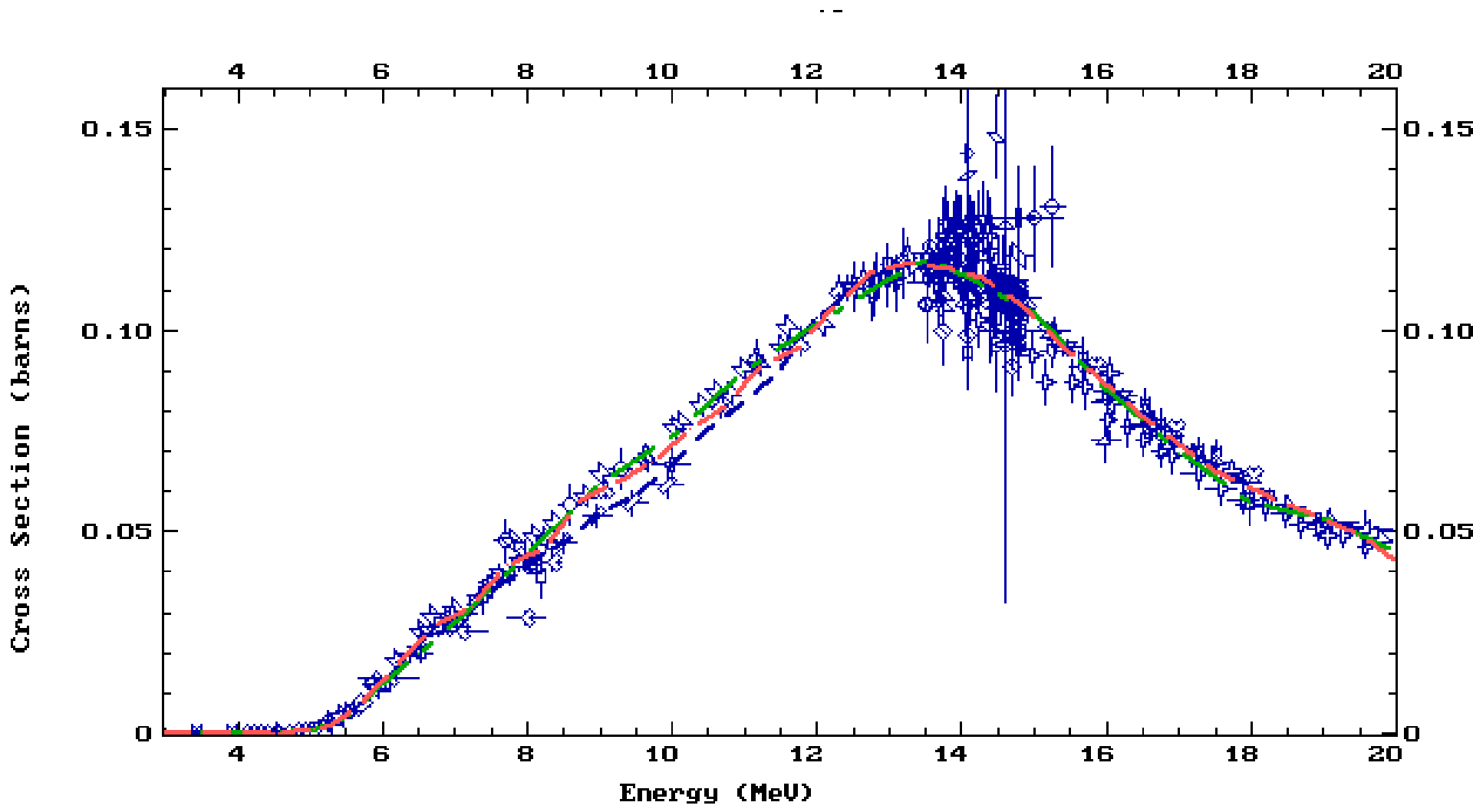
Uncertainties of the capture cross-section evaluations for ^{56}Fe



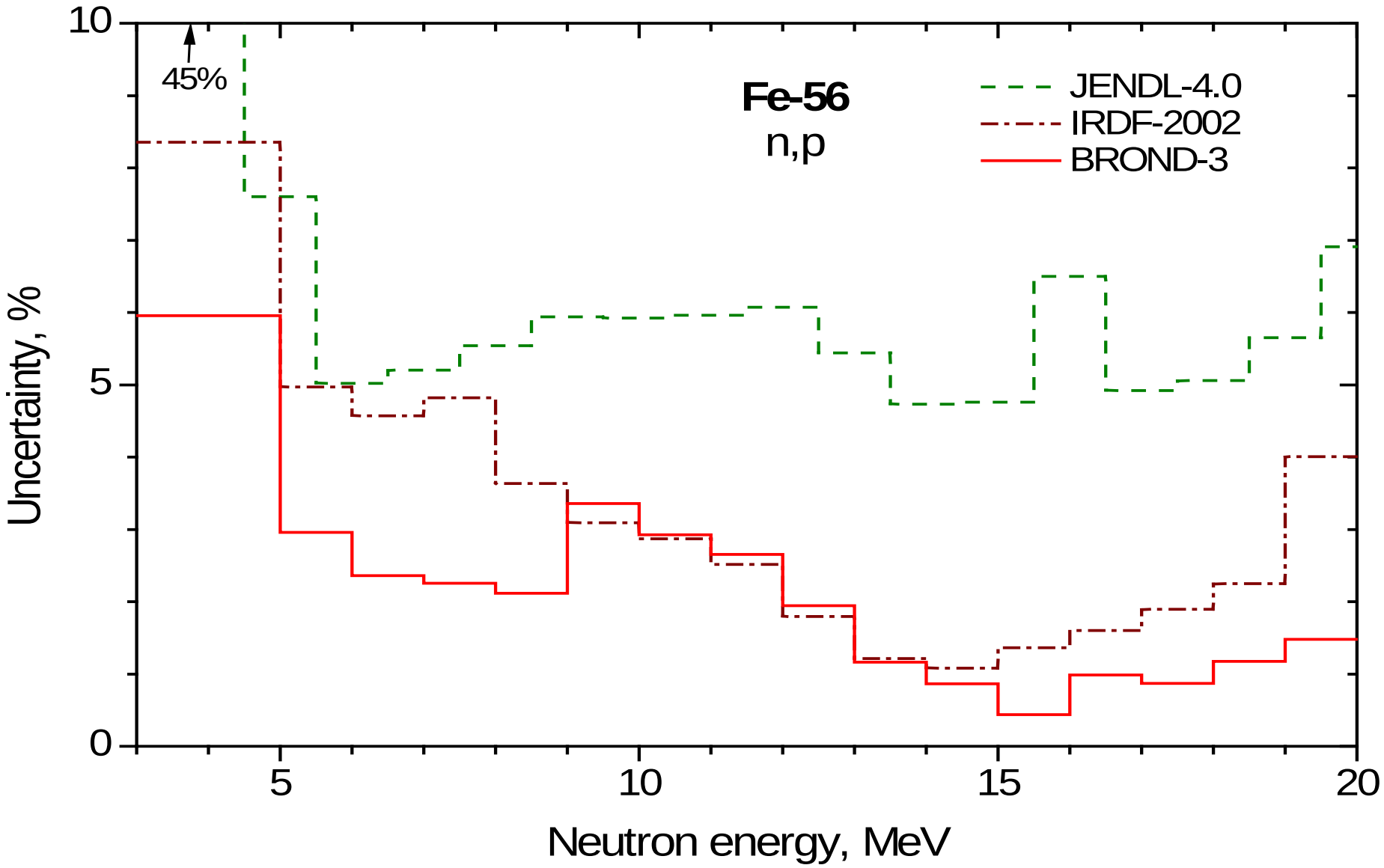
Capture cross-section evaluations for ^{56}Fe



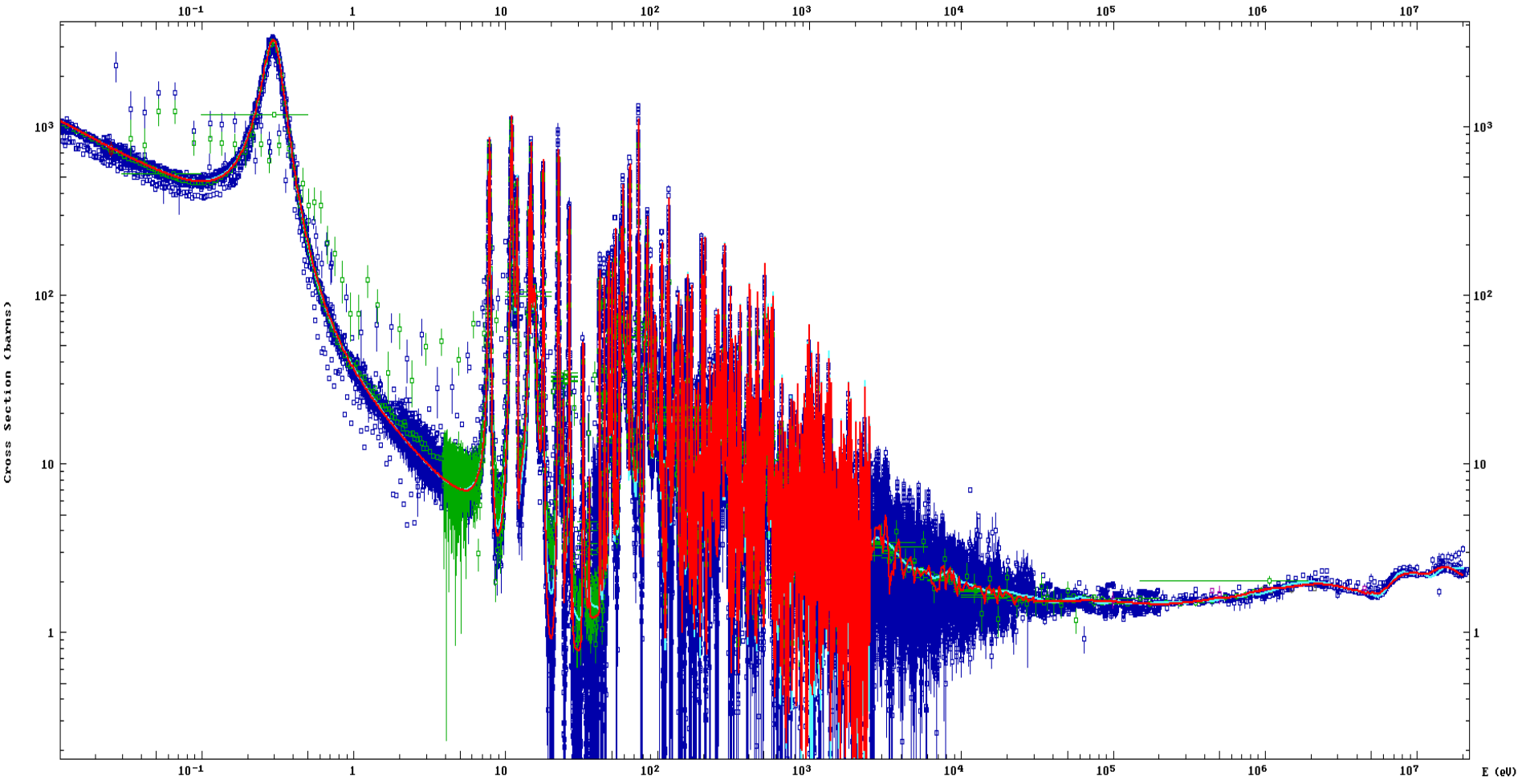
^{56}Fe(n,p) cross-section evaluations



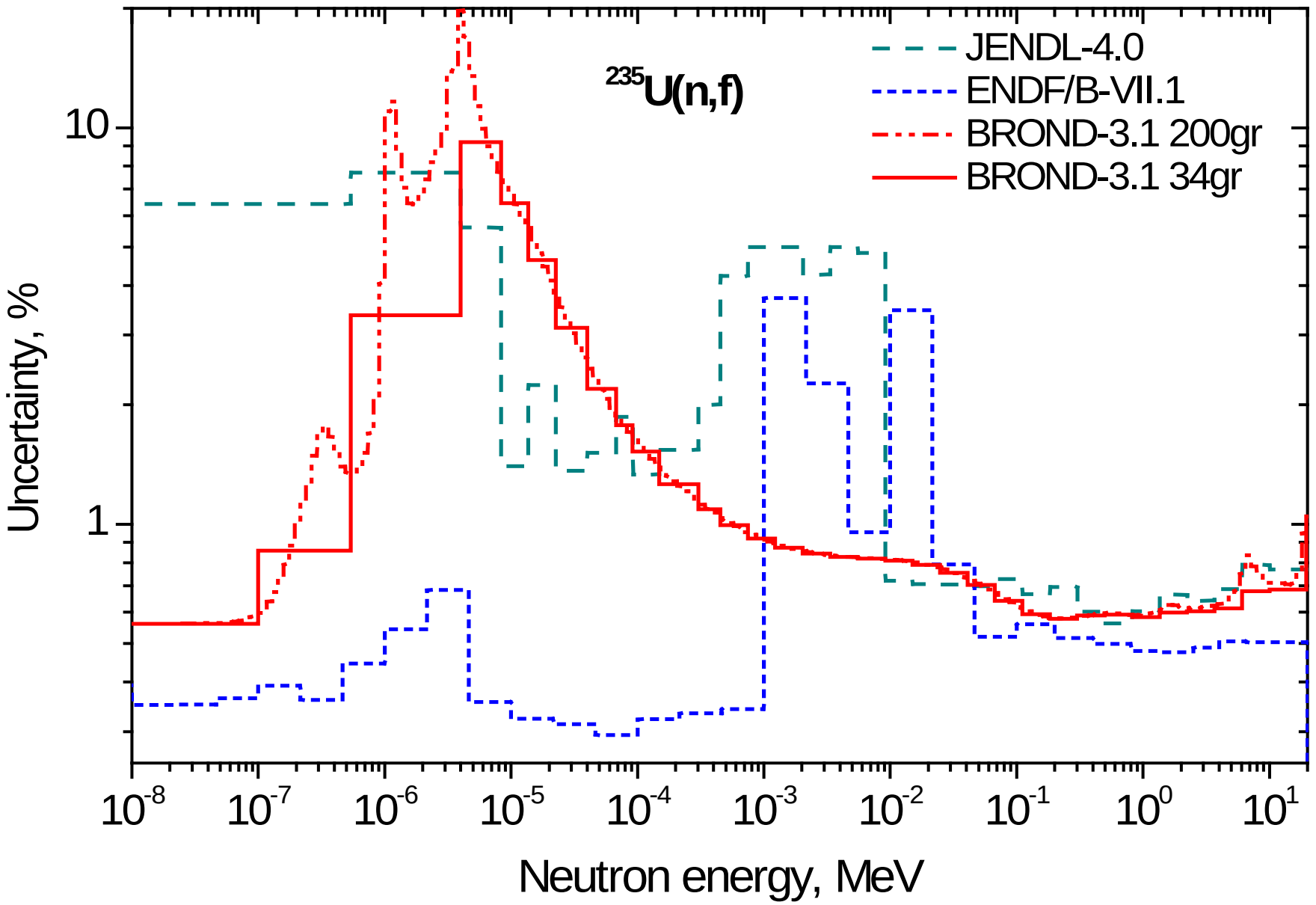
Uncertainties of the n,p cross-section evaluations for ^{56}Fe



The fission cross-section evaluations for ^{239}Pu



Uncertainties of the fission cross-section evaluations for ^{235}U



Uncertainties of the fission cross-section evaluations for ^{239}Pu

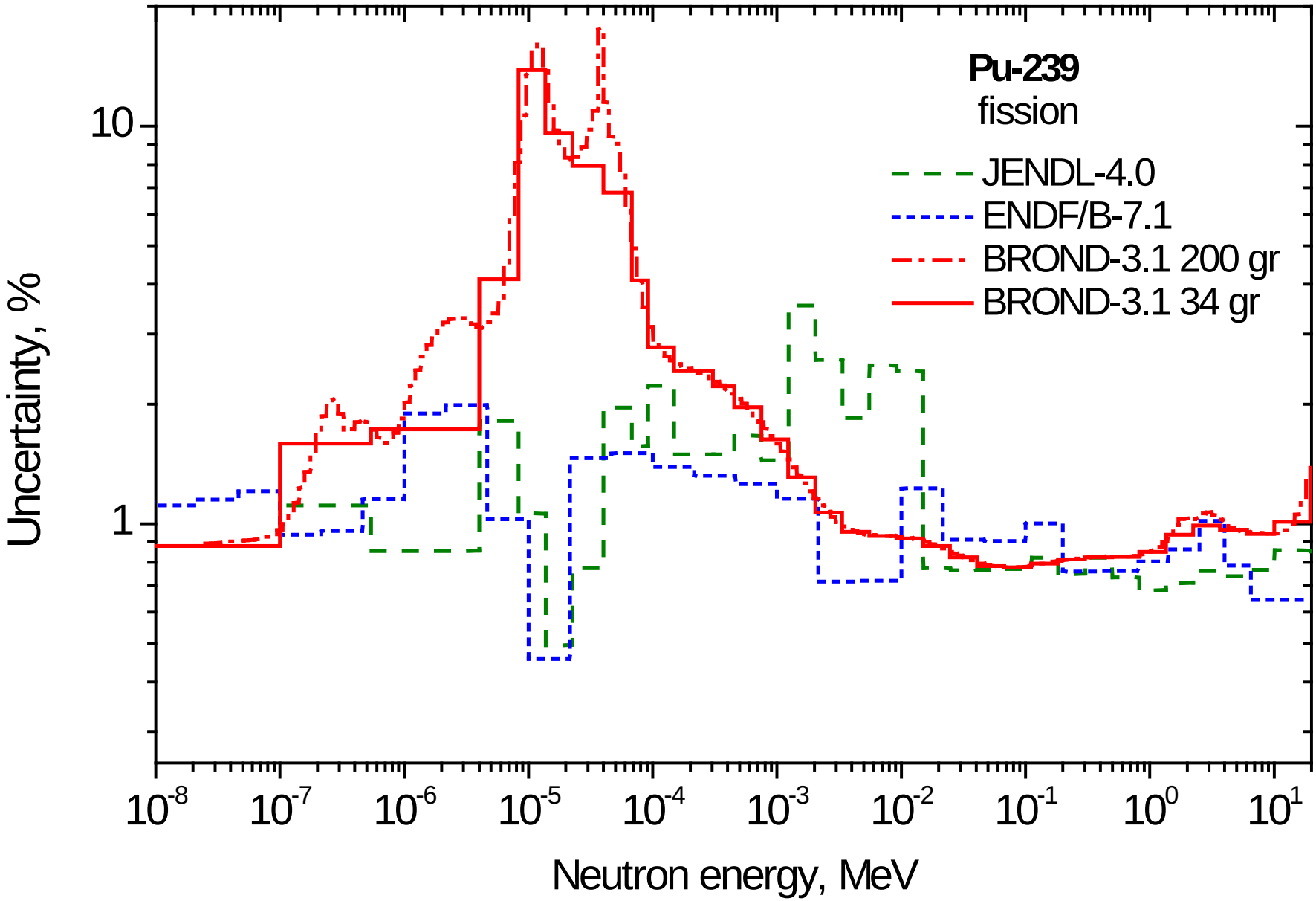


Table I. SG26 Summary Target Accuracies for Fast Reactors.

Isotope	Cross-Section	Energy Range	Current Accuracy (%)	Target Accuracy (%)	BROND (%) averaged Cf
U238	σ_{inel}	6.07 ÷ 0.498 MeV	10 ÷ 20	2 ÷ 3	6.34
	σ_{capt}	24.8 ÷ 2.04 keV	3 ÷ 9	1.5 ÷ 2	7.50
Pu241	σ_{fiss}	1.35MeV ÷ 454eV	8 ÷ 20	2 ÷ 3 (SFR,GFR,LFR) 5 ÷ 8 (ABTR,EFR)	2.93
Pu239	σ_{capt}	498 ÷ 2.04keV	7 ÷ 15	4 ÷ 7	4.86
Pu240	σ_{fiss}	1.35 ÷ 0.498 MeV	6	1.5 ÷ 2	1.43
	ν	1.35 ÷ 0.498 MeV	4	1 ÷ 3	0.56
Pu242	σ_{fiss}	2.23 ÷ 0.498 MeV	19 ÷ 21	3 ÷ 5	3.38
Pu238	σ_{fiss}	1.35 ÷ 0.183 MeV	17	3 ÷ 5	5.21
Am242m	σ_{fiss}	1.35MeV ÷ 67.4keV	17	3 ÷ 4	4.58
Am241	σ_{fiss}	6.07 ÷ 2.23 MeV	12	3	2.57
Cm244	σ_{fiss}	1.35 ÷ 0.498 MeV	50	5	3.37
Cm245	σ_{fiss}	183 ÷ 67.4keV	47	7	2.53
Fe56	σ_{inel}	2.23 ÷ 0.498 MeV	16 ÷ 25	3 ÷ 6	5.74
Na23	σ_{inel}	1.35 ÷ 0.498 MeV	28	4 ÷ 10	7.56

Experimental data for the fission cross section of ^{241}Pu compared with the recent evaluations