

# ***Nuclear Data Measurements in Russia***

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- Measurements of the (n,  $\alpha$ ) cross sections;
- Measurements of the fission cross sections for highly radioactive minor actinides.

# The cross sections of (n, $\alpha$ ) reactions

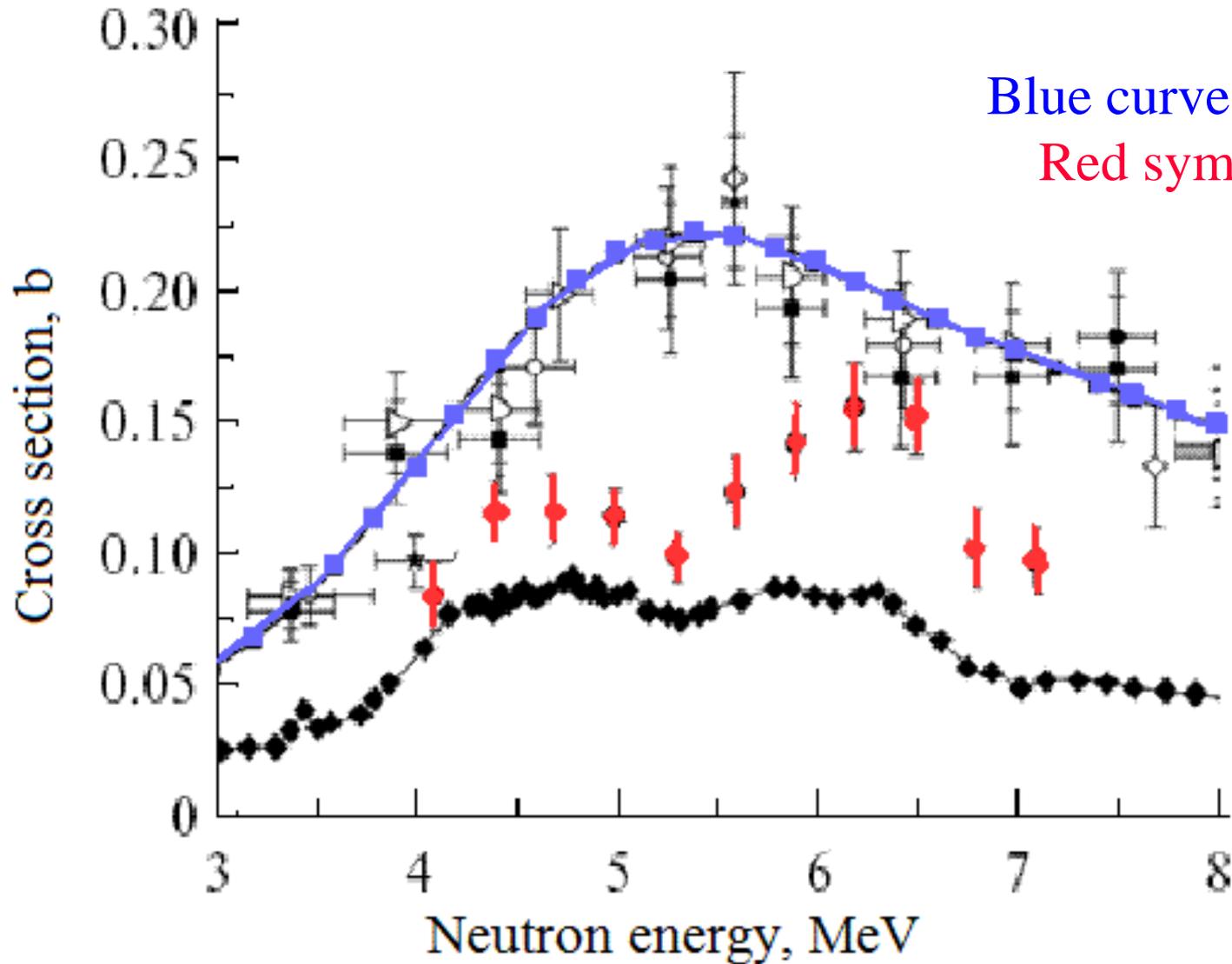
In last years essential improvements were achieved in measurements of the (n, $\alpha$ ) and (n,p) reactions on light nuclei by means of the ionization chambers, the working gas of which serves simultaneously the target material. The methods of a digital spectrometry are widely used in such measurements for identification of reaction product parameters inside a gas-volume, and the corresponding high-precision equipment was developed successfully in a collaboration of IPPE (Obninsk) and IRMM (Geel). The cross sections of the  $^{16}\text{O}(n, \alpha)$  reactions were essentially improved on basis of the new data obtained in 2006-2007. Such a ionization chamber was also manufactured in IPPE and it is used now to measure the (n, $\alpha$ ) cross sections for some other targets.

During 2010 the excitation functions of the (n, $\alpha$ ) reactions for  $^{20}\text{Ne}$  and  $^{36,40}\text{Ar}$  were measured by the Khryachkov group at the neutron energies around 7 MeV.

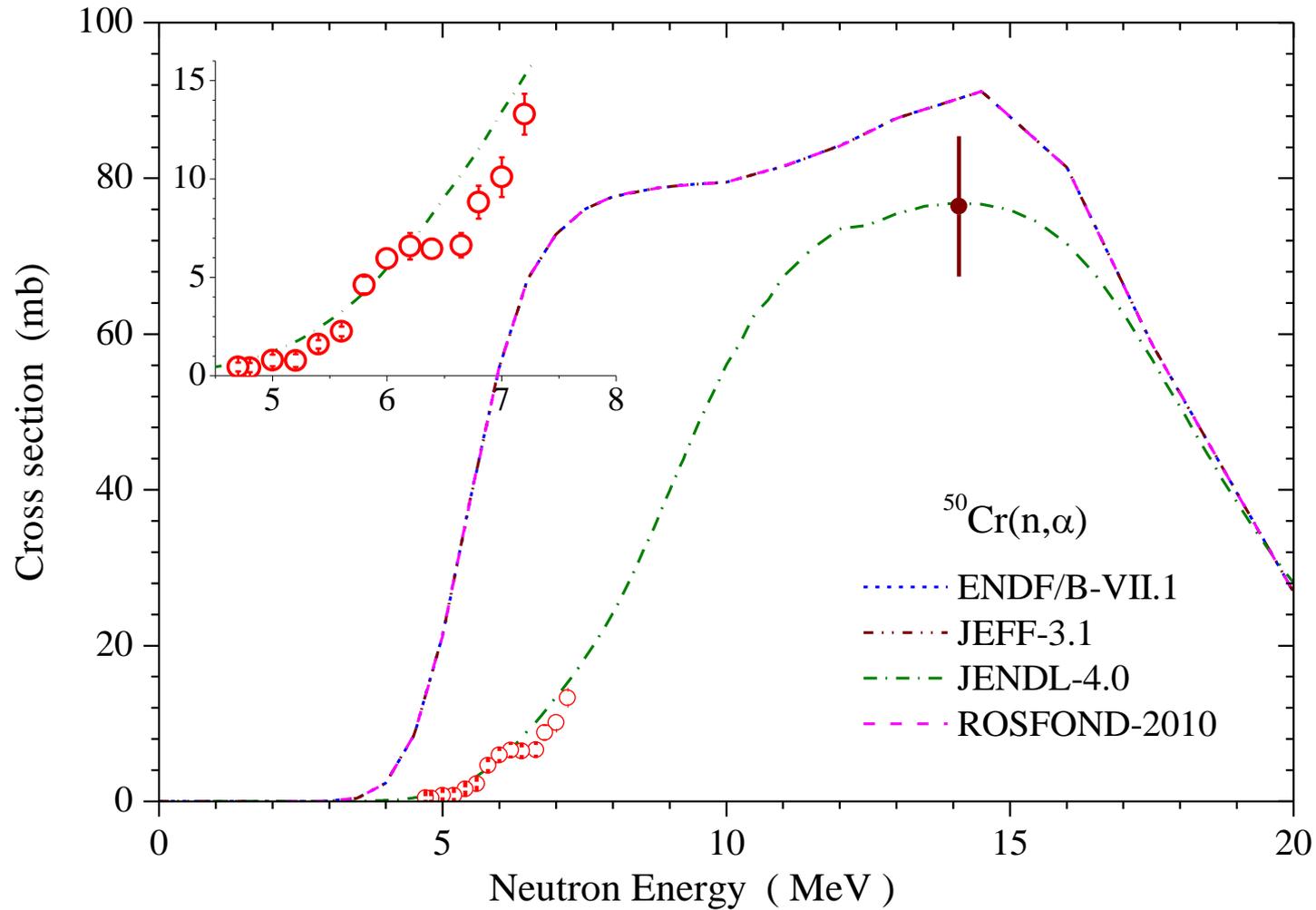
Uncertainties of the measured cross sections are about 7-10%. In 2011 measurements of the  $^{19}\text{F}(n, \alpha)$  cross sections were performed by the same group. In 2012 the  $^{10}\text{B}(n, \alpha)$  cross sections were measured.

Now the corresponding spectrometer was used for the metallic targets. The cross sections of the  $^{50,52}\text{Cr}(n, \alpha)$  reactions have been measured. The obtained data are shown in the following figures together with the recent evaluations and other experimental data [Lett. Part. & Nucl., v. 10 (2013), 579].

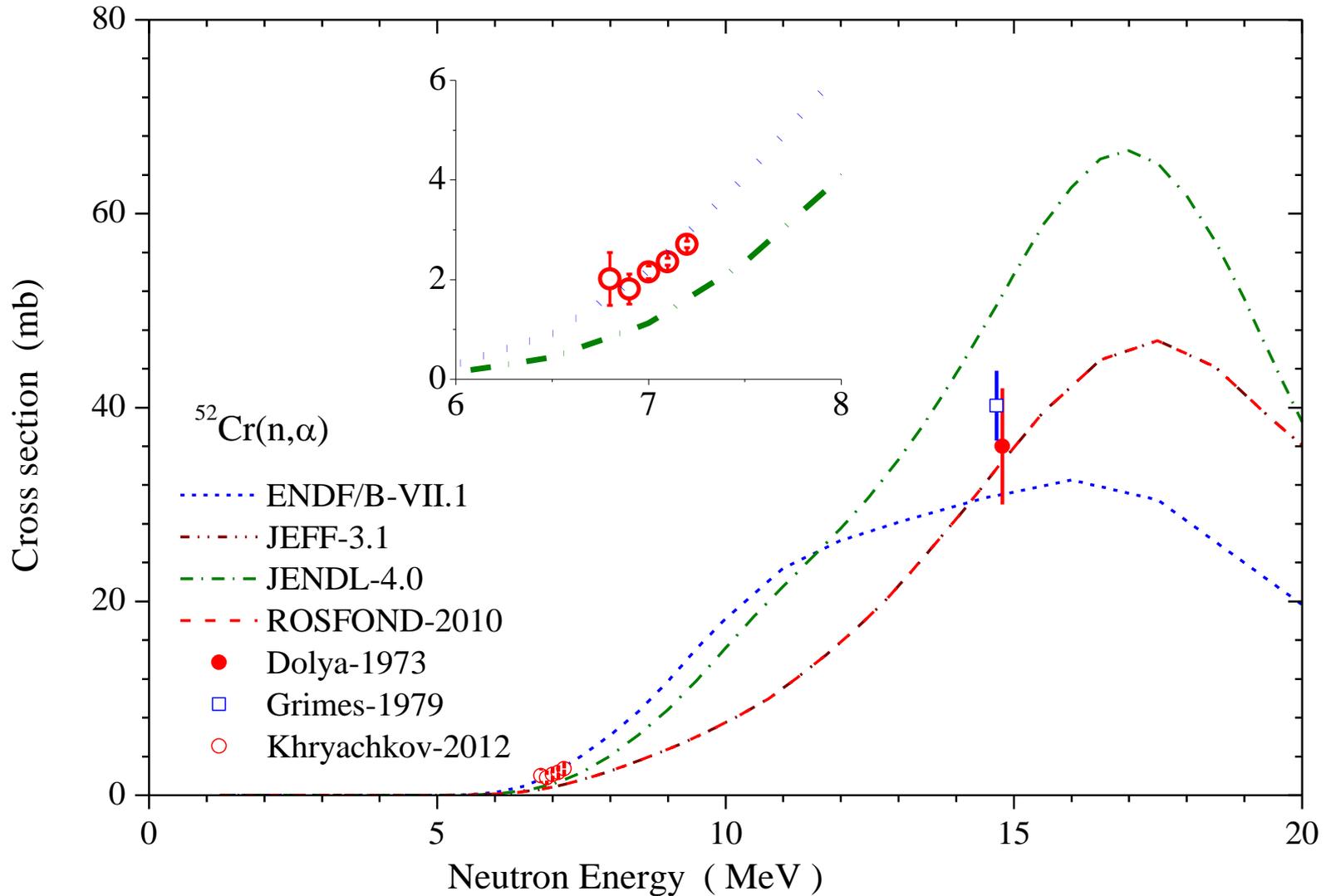
# New data on the $^{10}\text{B}(n,\alpha t)$ cross sections



# New experimental data on the $^{50}\text{Cr}(n,\alpha)$ cross sections



# New experimental data on the $^{52}\text{Cr}(n,\alpha)$ cross sections



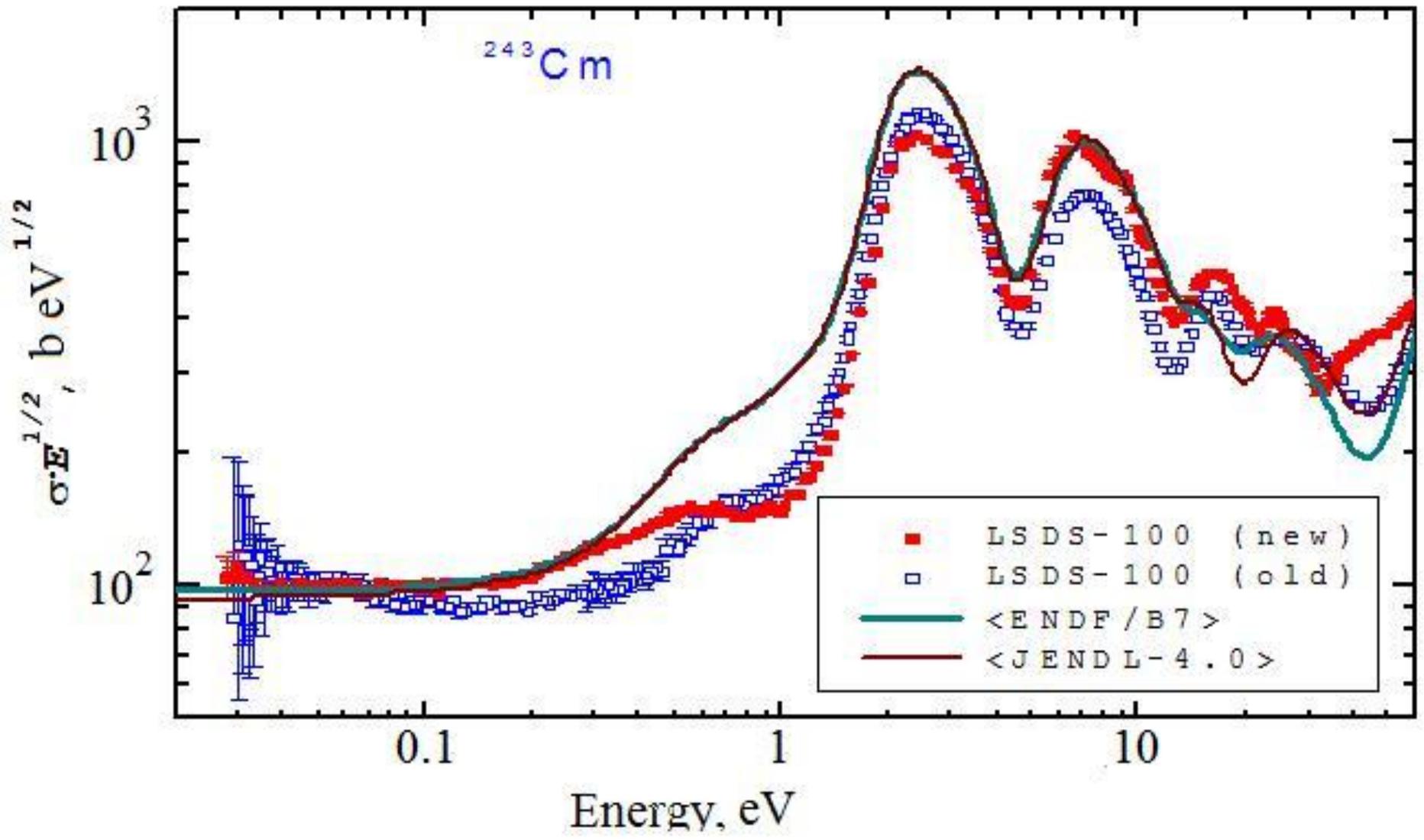
# Measurements of the fission cross sections for Cm-isotopes

Systematic measurements of the fission cross-sections for highly radioactive minor actinides (MA) were started several years ago on the lead slowing-down spectrometer (INR, Troitsk) by a collaboration of the IPPE and INR experimental groups. The spectrometer consists of the high purity lead (99.9999%) with the total mass of  $10^5$  kg assembled from blocks with the mass about 1 t, the surface of which was specially cleaned to decrease an amount of oxides. Such a cleaning allows to achieve the energy resolution close to the theoretical limit  $\sim 27$ - $28\%$ . As the neutron source the spallation reaction on a lead sample irradiated by 208 MeV proton beam of the INR linear accelerator is used. The IPPE group supplies the MA fissile sample, the corresponding detectors and the processing codes.

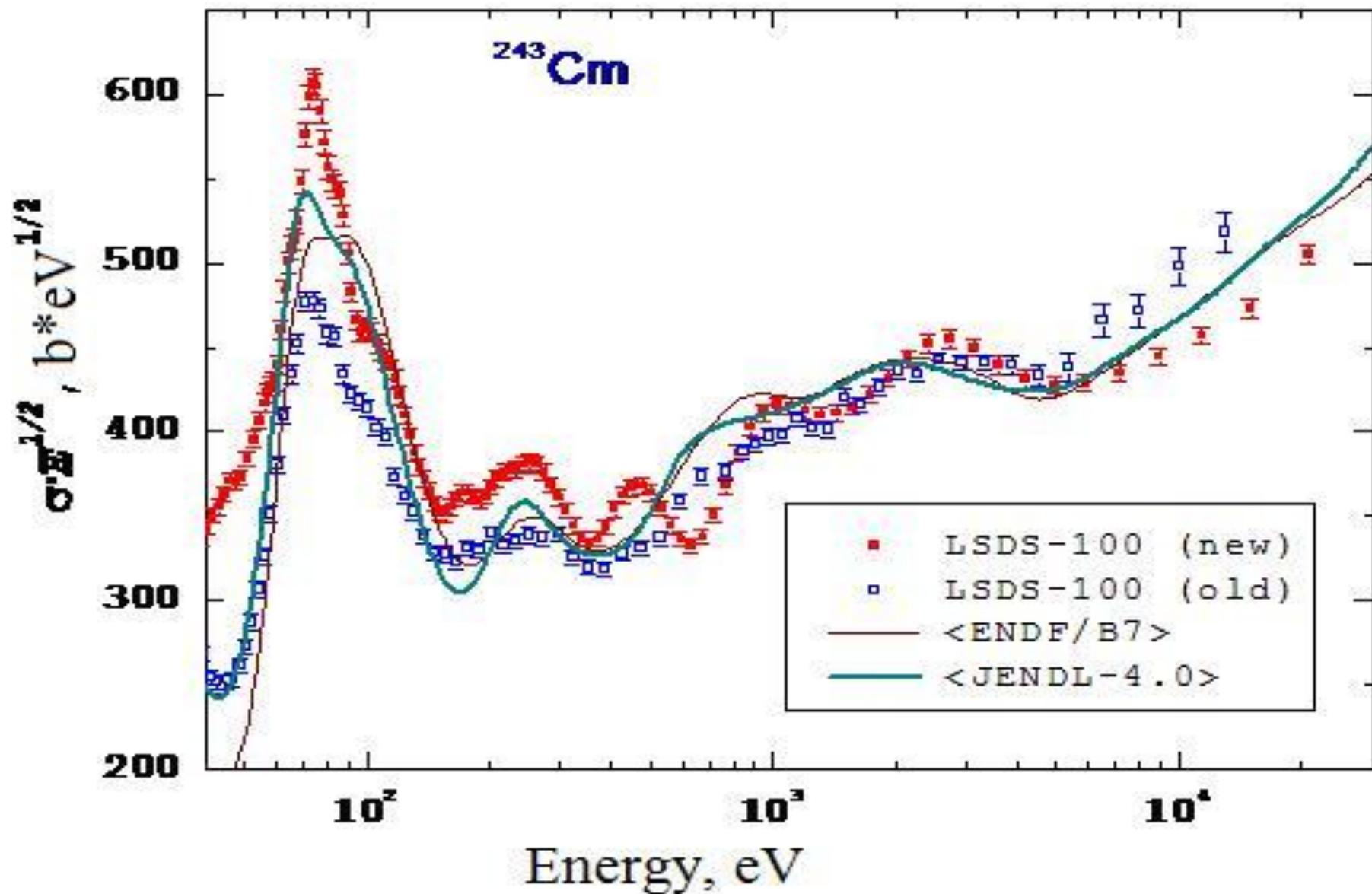
The measurements with the samples of Am-242m and Cm-245 were performed in 2006-2007. The measurements were continued for Cm-243 and Cm-244 in 2008. The fission cross sections for Cm-246, -247, -248 were measured in 2009-2010.

**For Cm-243 the measurements were repeated in 2012 with improved statistical accuracy that reduced some contradictions with the available evaluations.**

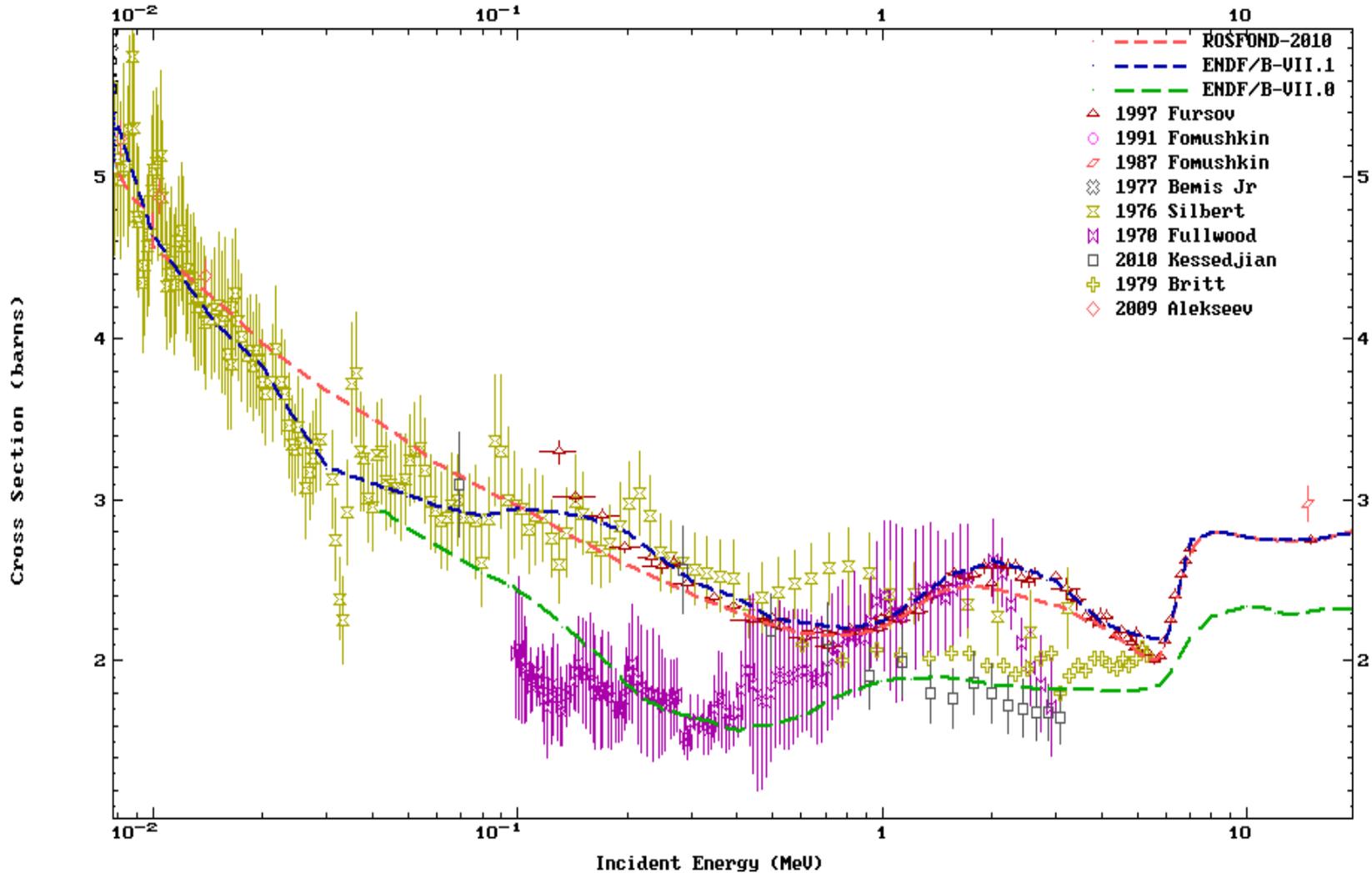
# Experimental data for Cm-243(n,f) compared with the recent evaluations



The same for higher energies



# Experimental data for Cm-243(n,f) compared with evaluations for the fast neutron region



The available samples of Cm isotopes are prepared now for measurements at the over-threshold energies.