EXFOR "testing"

- ✓ WPEC Sg 30
- ✓ X4 to C4 to XC4 to …
- ✓ Statistical tests
- ✓ Comparison with TALYS
- ✓ Results

NEA WPEC Subgroup 30…

… on improving the accessibility and quality of the EXFOR database

– "Accessibility": completeness of data retrieval
– "Quality": correctness of the information

Objective: *Make EXFOR an easily accessible and correct database.*

→ More feedback from data users to the Data Centres,
→ More efficient validation of nuclear model codes,
→ More efficient nuclear data evaluation.

Activities:

– Translation of the EXFOR database into computational/tabular format,
– Detection of the most obvious errors in the data or in the reaction identification,
– Harmonization of the format

From EXFOR to user database

❑ EXFOR to C4 (computer format) and XC4 (extended C4) by V. Zerkin

- X4toC4 code by D.E. Cullen, A. Trkov.
- Simple ENDF-oriented computer/tabular format (MF/MT, fixed set of units).
- Translation is based on dictionaries (reaction, heading, units).

- XC4 includes extension to allow the data to be more easily accessible/understandable to the end-user.

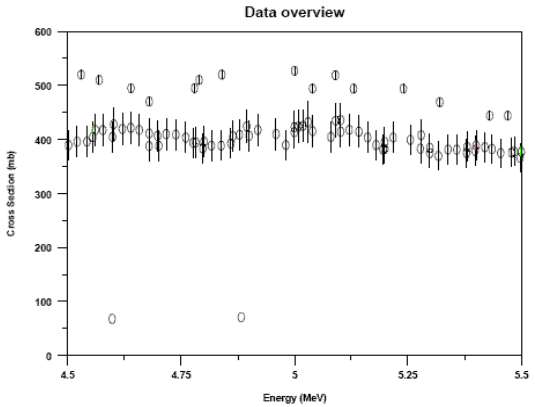
❑ XC4 to directory-structure database

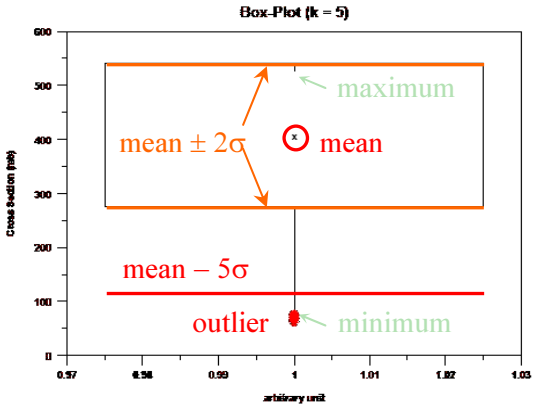
- Splitting of the large XC4 file into small individual data files organized by directories: projectile/element/isotope/reaction/data.
- Every data files contains one single data set in simple tabular format (x y dx dy).

Statistical tests

☺ Advantage: any kind of data can be tested (cross sections, nu-bar, resonance integral, spectrum average, ratio, residual production…).
☹ Drawback: requires good statistics, three independent data sets is the obvious minimum.

Detection of outliers more than a few standard deviations away from the average value:



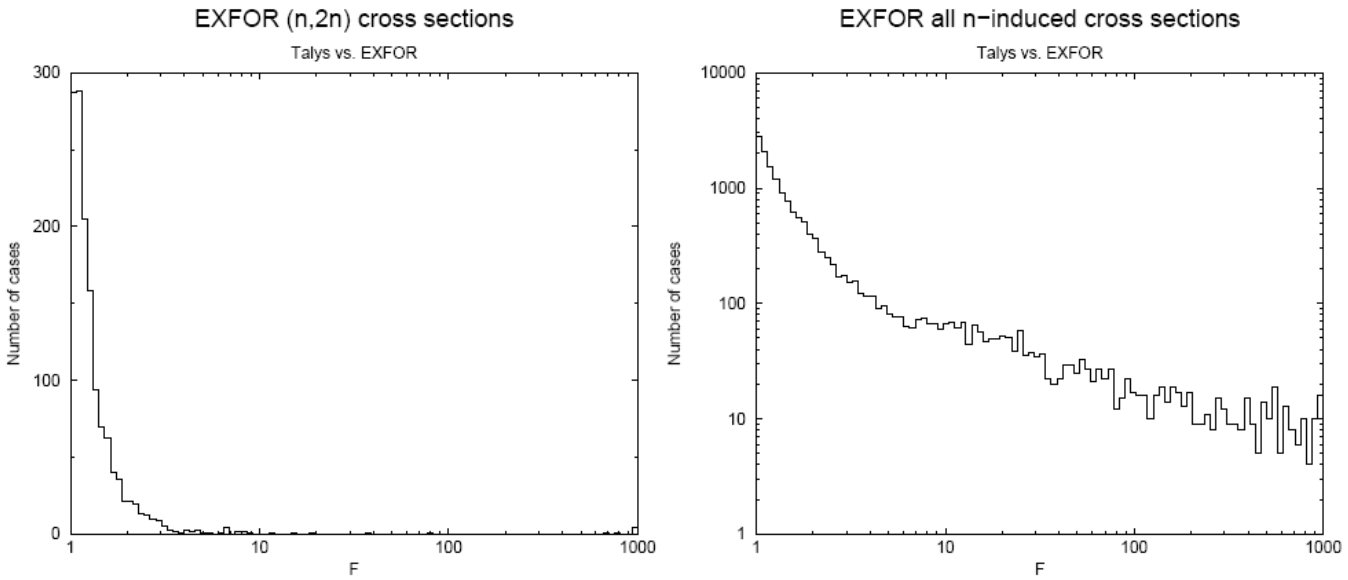


Y is an outlier
if $(Y - \Delta Y) \geq \text{mean} + 5\sigma$
or $(Y + \Delta Y) \leq \text{mean} - 5\sigma$

Comparison with TALYS

☺ Advantage: statistics not an issue.
☹ Drawback: TALYS results do not cover all nuclei and data.

Large deviation factors (C/E, F-factor…) indicate possible problem in XC4 or TALYS :

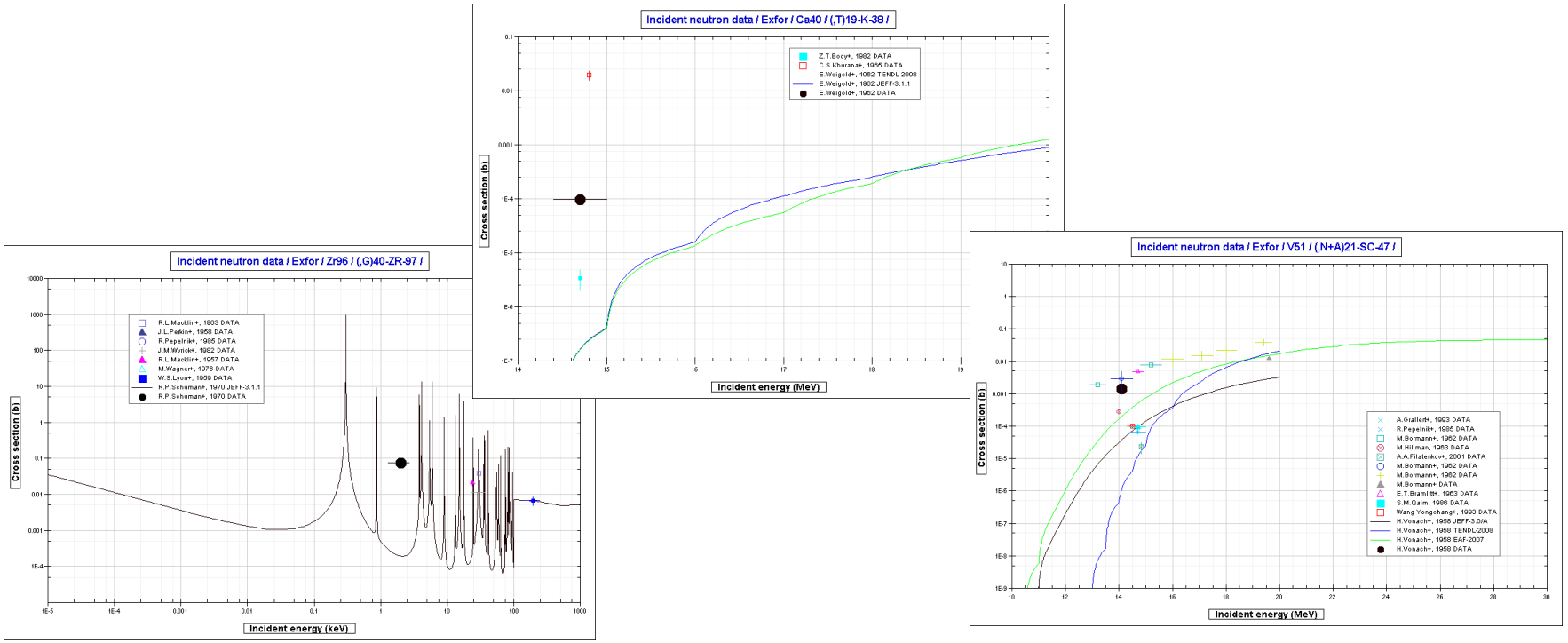


Filtering the results

The output of all tests have been carefully analyzed to filter:

– Conversion problems from EXFOR to XC4,

– False alarms (mainly in the threshold and resonance regions).



Final verification

After visual inspection, suspicious EXFOR data sets have been verified by NDS,

– 121 cases were actual coding mistakes and most of them already corrected,

– 86 cases were not errors in EXFOR, but were obsolete or poor quality data,

– 25 cases could not be checked (e.g. numerical data sent to NRDC but not published).