

# Contributing to the Reproducibility of R-matrix Data Fits

For SG49

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# R-matrix nuclear data fits (as in any model)

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- The R-matrix method searches for fits to data by varying:
- R-matrix parameters:
  - R-matrix pole energies
  - Reduced-width amplitudes in each channel for each pole
- Data adjustment parameters:
  - Normalization of experimental data sets (e.g. an EXFOR subentry)
    - + Chi-squared contributions if normalizations determined by experiment
  - Energy scaling of experimental data sets (e.g. an EXFOR subentry)
    - + Chi-squared contributions if energy scale determined by experiment
  - (or by generalized least squares)
  - Sometimes within a subentry these have their own adjustments:  
excitation functions for a given scattering ; or  
angular distributions for a given incident energy
- All these parameters and adjustments are part of the fit & covariance

# All parameters and adjustments part of the fit

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- All these numerical values should be saved from each search.
  - Not just R-matrix parameters
- Then easy to replicate old work, to build on others work, etc.
- Many of us want to save the full covariance matrix of our fits, thus including the correlations between the fitted parameters and the fitted data adjustments.
  - Roberto Capote, for example, is sensitive to any missing correlations in data evaluations. Doro Wiarda wants to save these in SAMMY too.
- So far GNDS or ENDF6 files save only the R-matrix parameters. Full covariances are not yet specifiable in GNDS.
- I am now including the data adjustment information in the computerCodes / inputDecks parts of the GNDS format.
- Should become standard practice.





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