Cr50 is a completely new evaluations in collaboration with ORNL and FZK.

High energy part and scattering matrices:

Authors: P.Pereslavtsev, A. Konobeyev, L.Leal, U. Fischer

This evaluated data file is based on the nuclear model code Talys [kon07], 1.0 and on existing resonance parameter tables. This file can be used in particle transport calculations as well as activation and shielding applications over the incident neutron energy range from 1.0E-11 to 200 MeV.

24-Cr- 50 ORNL Resonance Evaluation Including Covariance

Authors: L. C. Leal, H. Derrien, K. Guber, G. Arbanas and D. Wiarda

Resolved resonance parameter evaluation for Cr-50 was done with the computer code SAMMY. Transmission measurements for highly enriched samples of chromium isotopes, done by Harvey et al., were used in the evaluations.[1] One transmission measurement for Cr-50 done with a 95.98% enriched sample were used in the evaluation. The transmission measurement was done at the Oak Ridge Electron Linear Accelerator (ORELA) of the Oak Ridge National Laboratory. The transmission data were measured at the 201-meter flight-path in the energy range of 90-800 KeV. Thermal cross section data available in the EXFOR data system were also included in the evaluation.

A set of resonance parameter describing the experimental data was obtained. Resonance parameter covariance matrices were also obtained in the SAMMY evaluation process. The Cr-50 evaluation was done in the energy region 10^{-5} eV to 783 keV.[2]

Thermal cross section obtained in the present evaluation are compared to the values listed in the Atlas of Neutron Resonances in the following table:

Cross Section	ORNL	Atlas
Capt	15.37+/-0.34	15.40+/-0.20
Total	17.79+/-0.38	-
Scat	2.42+/-0.12	

	ORNL	ENDFBVII.0	JENDL4
Res. Int	7.232+/-0.171	7.481	7.226

References

[ref 1] J. Harvey, personal communication, Transmission Data for Chromium Isotopes, January 2007.

[ref 2] Evaluation of the Chromium Resonance Parameters Including Resonance Parameter Covariance, L. Leal, H. Derrien, K. Guber, G. Arbanas, and D. Wiarda, International Conference on Nuclear Data for Science and (ND2010), Jeju Island, Korea, April 26-30, 2010. REFERENCES 2437 1451 129

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[Kal88] C. Kalbach, Phys. Rev. C37, 2350 (1988)

[kon07] A.J. Koning, S. Hilaire and M.C. Duijvestijn, Talys-1.0, Proceedings of the International Conference on Nuclear Data for Science and Technology - ND-2007, April 22-27, 2007, Nice, France

[Sm93] D.L.Smith, A Least-Squares Computational Tool Kit, ANL/NDM-128, 1993
[Sm04] D.L.Smith, Covariance Matrices for Nuclear Cross Sections Derived from Nuclear Model Calculations,ANL/NDM-159, 2004
[Sm08] D.L.Smith, A Unified Monte Carlo Approach to Fast Neutron Cross Section Data Evaluation, ANL/NDM-166, 2008

Processing

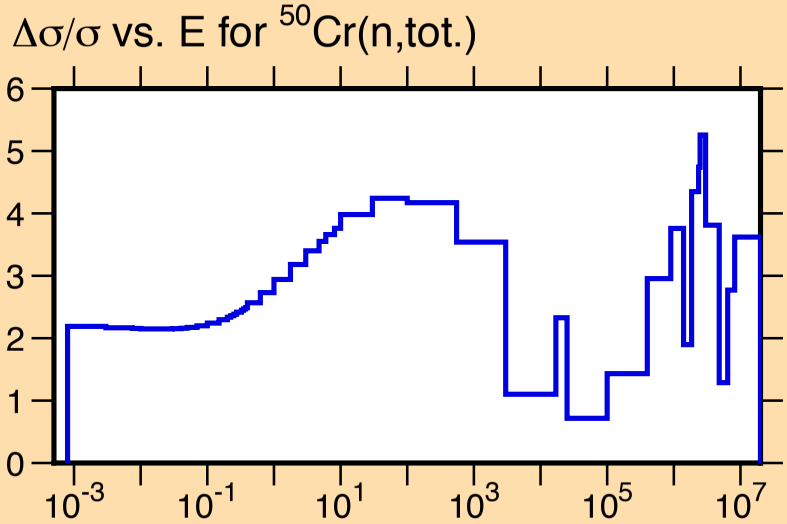
PUFF and ERRORR have two options of generating covariance matrices, (1) use point data to make the cross section data on the union grid, (2) use MG library with cross sections precomputed. Both options were run and differences between ERRORR and PUFF are in the expected range. The SCALE 44 group structure was used in connection with a 1/E weighting spectrum.

Differences (file 1 is ERRORR) for option 1 and Cr 50 for cross section and uncertainty are listed below (off-diagonal elements show larger differences, mainly for cross-reaction values:

```
Cross section differ for reaction 2425   1  for group  10 values are   3.878100E+00   3.877371E+00   1.879388E-04
Uncert. data differ  for reaction 2425   1  for group  10 values are   2.997800E-02   2.954658E-02   1.439104E-02
Cross section differ for reaction 2425   1  for group  11 values are   3.250300E+00   3.236817E+00   4.148320E-03
Uncert. data differ  for reaction 2425   1  for group  11 values are   1.509100E-02   1.431599E-02   5.135549E-02
Cross section differ for reaction 2425   1  for group  12 values are   8.714100E+00   8.690942E+00   2.657541E-03
Uncert. data differ  for reaction 2425   1  for group  12 values are   7.058000E-03   7.160847E-03   1.457168E-02
Cross section differ for reaction 2425   1  for group  13 values are   3.071200E+00   3.063125E+00   2.629343E-03
Uncert. data differ  for reaction 2425   1  for group  13 values are   2.322400E-02   2.327857E-02   2.349881E-03
Uncert. data differ  for reaction 2425   1  for group  14 values are   1.099700E-02   1.101504E-02   1.640845E-03
Uncert. data differ  for reaction 2425   1  for group  15 values are   3.540300E-02   3.539583E-02   2.023482E-04
Uncert. data differ  for reaction 2425   1  for group  36 values are   2.199100E-02   2.198792E-02   1.402638E-04
Uncert. data differ  for reaction 2425   1  for group  37 values are   2.173400E-02   2.173162E-02   1.095270E-04
Uncert. data differ  for reaction 2425   1  for group  38 values are   2.159400E-02   2.159173E-02   1.048892E-04
Uncert. data differ  for reaction 2425   1  for group  39 values are   2.152700E-02   2.152476E-02   1.038312E-04
Uncert. data differ  for reaction 2425   1  for group  40 values are   2.149100E-02   2.148823E-02   1.289663E-04
Uncert. data differ  for reaction 2425   1  for group  41 values are   2.149100E-02   2.148813E-02   1.333866E-04
Uncert. data differ  for reaction 2425   1  for group  43 values are   2.167000E-02   2.166755E-02   1.132887E-04
Uncert. data differ  for reaction 2425   1  for group  44 values are   2.189700E-02   2.189452E-02   1.133052E-04
Cross section or uncert. data differ for        2425        1
Cross section differ for reaction 2425   2  for group  10 values are   3.825200E+00   3.822880E+00   6.066423E-04
Uncert. data differ  for reaction 2425   2  for group  10 values are   3.014900E-02   2.972174E-02   1.417171E-02
Cross section differ for reaction 2425   2  for group  11 values are   3.236100E+00   3.225611E+00   3.241317E-03
Uncert. data differ  for reaction 2425   2  for group  11 values are   1.516100E-02   1.437041E-02   5.214626E-02
Cross section differ for reaction 2425   2  for group  12 values are   8.688900E+00   8.675845E+00   1.502474E-03
Uncert. data differ  for reaction 2425   2  for group  12 values are   7.085700E-03   7.180647E-03   1.339973E-02
Cross section differ for reaction 2425   2  for group  13 values are   3.031800E+00   3.028112E+00   1.216471E-03
Uncert. data differ  for reaction 2425   2  for group  13 values are   2.376800E-02   2.379633E-02   1.191895E-03
Uncert. data differ  for reaction 2425   2  for group  14 values are   1.102300E-02   1.104049E-02   1.586704E-03
Uncert. data differ  for reaction 2425   2  for group  15 values are   3.559500E-02   3.558950E-02   1.544748E-04
Cross section or uncert. data differ for        2425        2
Cross section differ for reaction 2425   5  for group   4 values are   1.314700E-01   1.314842E-01   1.077889E-04
Uncert. data differ  for reaction 2425   5  for group   4 values are   1.423300E+00   1.423150E+00   1.051970E-04
Uncert. data differ  for reaction 2425   5  for group   5 values are   1.726100E+01   1.725913E+01   1.081800E-04
Cross section differ for reaction 2425   5  for group   6 values are   5.267300E-03   5.267967E-03   1.265091E-04
Uncert. data differ  for reaction 2425   5  for group   6 values are   4.826000E+01   4.825422E+01   1.197527E-04
Cross section differ for reaction 2425   5  for group   7 values are   1.602200E-03   1.602414E-03   1.335485E-04
Uncert. data differ  for reaction 2425   5  for group   7 values are   1.500500E+02   1.500299E+02   1.338258E-04
Cross section differ for reaction 2425   5  for group   8 values are   1.220800E-04   1.220998E-04   1.617542E-04
Uncert. data differ  for reaction 2425   5  for group   8 values are   1.178200E+03   1.178032E+03   1.422530E-04
Cross section differ for reaction 2425   5  for group   9 values are   1.745300E-06   1.745807E-06   2.903239E-04
Uncert. data differ  for reaction 2425   5  for group   9 values are   1.066700E+05   1.066434E+05   2.489424E-04
Cross section differ for reaction 2425   5  for group  10 values are   4.698500E-11   4.700987E-11   5.293703E-04
Uncert. data differ  for reaction 2425   5  for group  10 values are   6.574100E+08   1.398422E+09   1.127169E+00
Cross section or uncert. data differ for        2425        5
Cross section differ for reaction 2425  51  for group  10 values are   4.851800E-02   4.852754E-02   1.967145E-04
Cross section or uncert. data differ for        2425       51
Cross section differ for reaction 2425  52  for group   7 values are   2.382800E-02   2.383169E-02   1.546993E-04
```

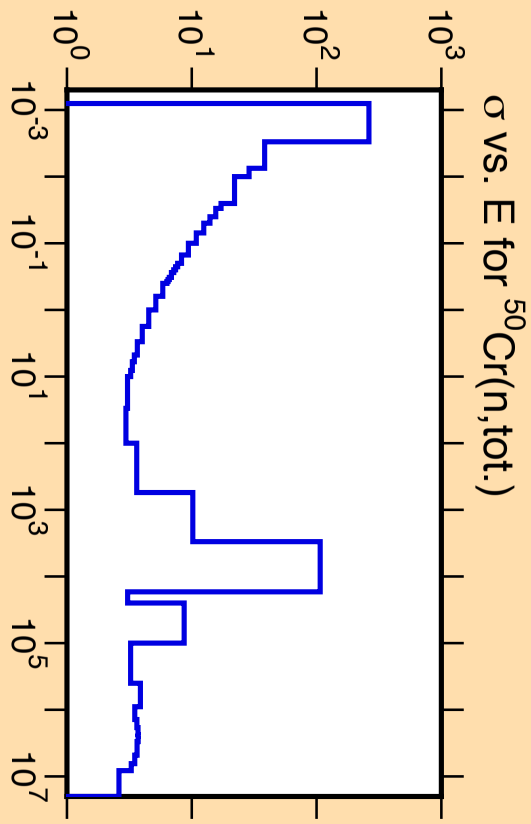
Cross section or uncert. data differ for	2425	52				
Cross section differ for reaction 2425	53	for group	5 values are	1.095100E-03	1.097119E-03	1.844084E-03
Cross section or uncert. data differ for	2425	53				
Cross section differ for reaction 2425	58	for group	1 values are	1.559400E-03	1.559222E-03	1.142952E-04
Cross section or uncert. data differ for	2425	58				
Cross section differ for reaction 2425	61	for group	4 values are	1.018000E-02	1.018123E-02	1.205779E-04
Cross section or uncert. data differ for	2425	61				
Cross section differ for reaction 2425	64	for group	4 values are	3.932800E-03	3.933219E-03	1.064457E-04
Cross section or uncert. data differ for	2425	64				
Cross section differ for reaction 2425	69	for group	4 values are	3.102900E-03	3.103245E-03	1.111290E-04
Cross section or uncert. data differ for	2425	69				
Cross section differ for reaction 2425	102	for group	10 values are	4.380600E-03	4.371954E-03	1.973793E-03
Uncert. data differ for reaction 2425	102	for group	10 values are	1.466100E-01	1.468277E-01	1.484932E-03
Cross section differ for reaction 2425	102	for group	11 values are	1.424600E-02	1.394895E-02	2.085120E-02
Uncert. data differ for reaction 2425	102	for group	11 values are	4.047000E-02	3.303052E-02	1.838271E-01
Cross section differ for reaction 2425	102	for group	12 values are	2.523600E-02	2.444095E-02	3.150473E-02
Uncert. data differ for reaction 2425	102	for group	13 values are	9.857300E-02	9.440517E-02	4.228168E-02
Uncert. data differ for reaction 2425	102	for group	14 values are	4.018000E-02	4.016031E-02	4.899990E-04
Uncert. data differ for reaction 2425	102	for group	36 values are	2.242000E-02	2.241737E-02	1.173915E-04
Uncert. data differ for reaction 2425	102	for group	38 values are	2.242000E-02	2.241745E-02	1.137360E-04
Uncert. data differ for reaction 2425	102	for group	39 values are	2.241900E-02	2.241655E-02	1.094207E-04
Uncert. data differ for reaction 2425	102	for group	40 values are	2.241600E-02	2.241312E-02	1.285471E-04
Uncert. data differ for reaction 2425	102	for group	43 values are	2.241700E-02	2.241460E-02	1.070209E-04

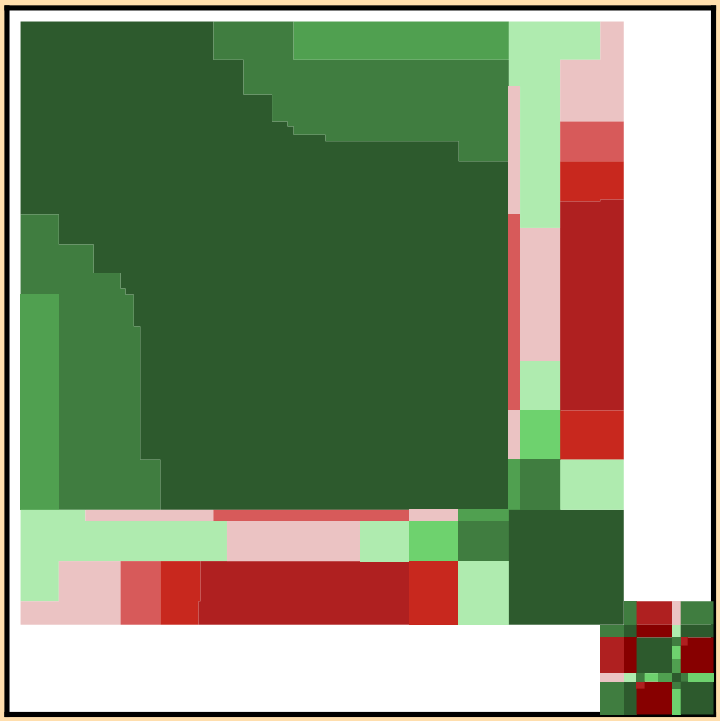
The plots for the matrices are shown below:



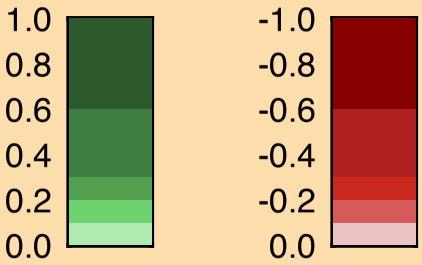
Ordinate scales are % relative standard deviation and barns.

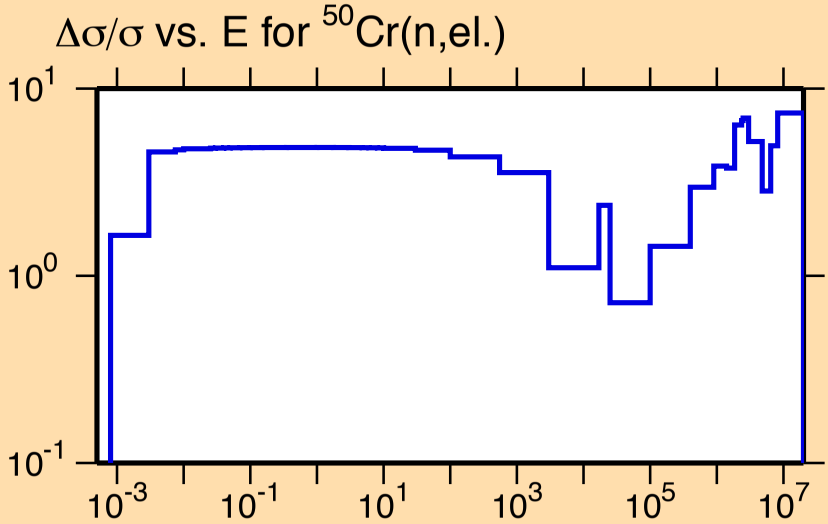
Abscissa scales are energy (eV).





Correlation Matrix





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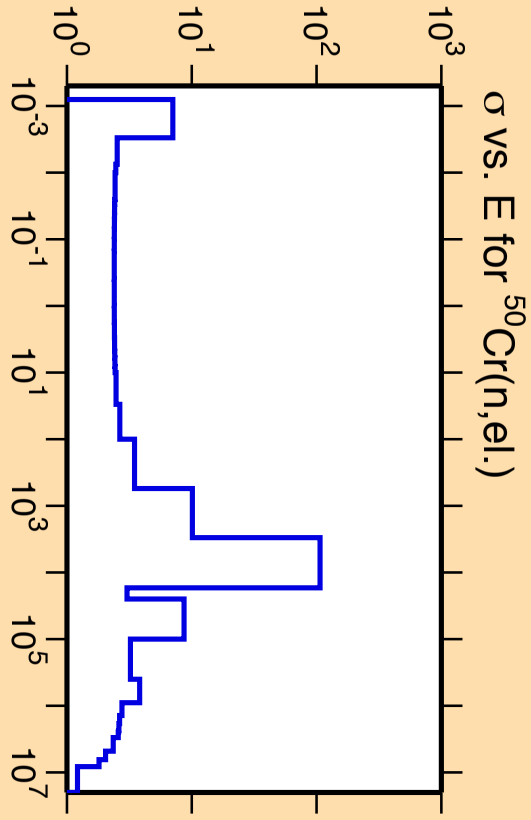
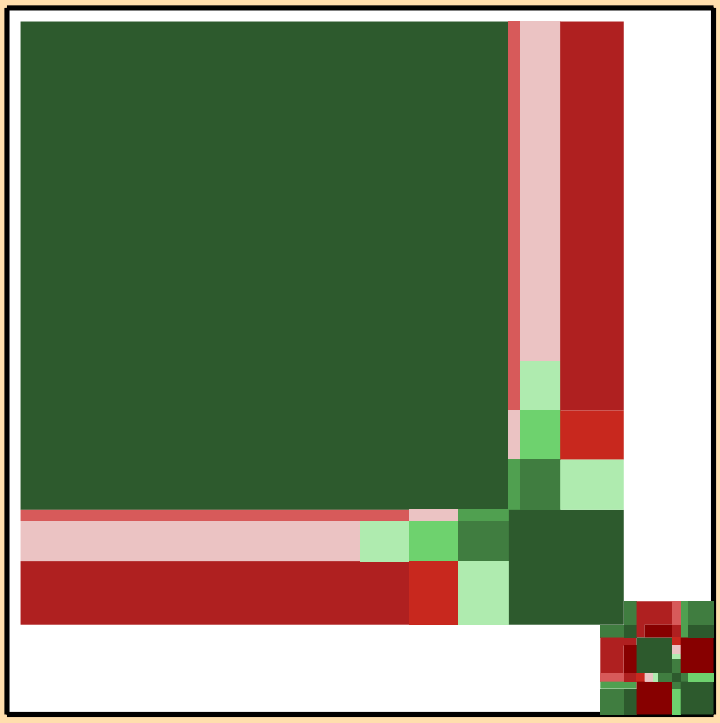
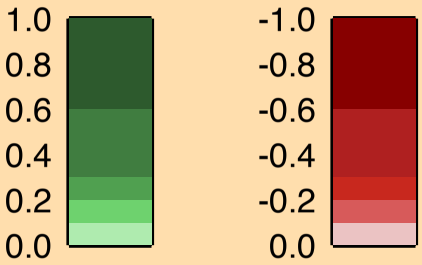
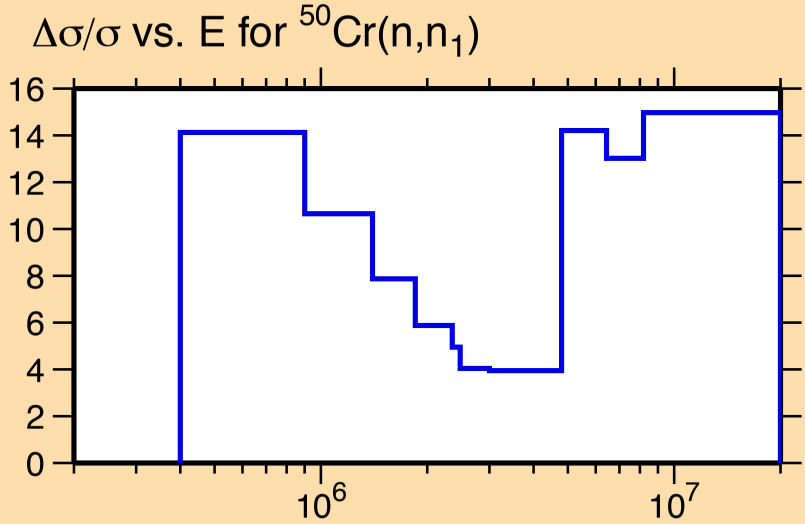




Correlation Matrix





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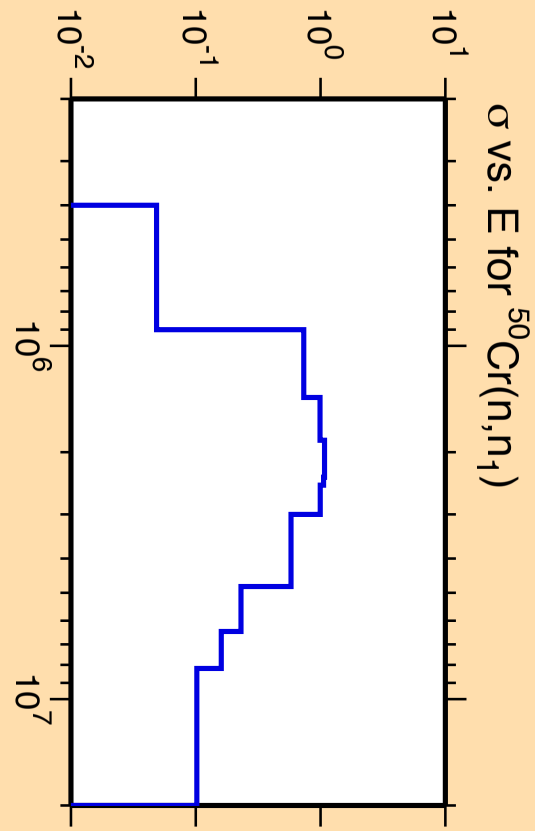

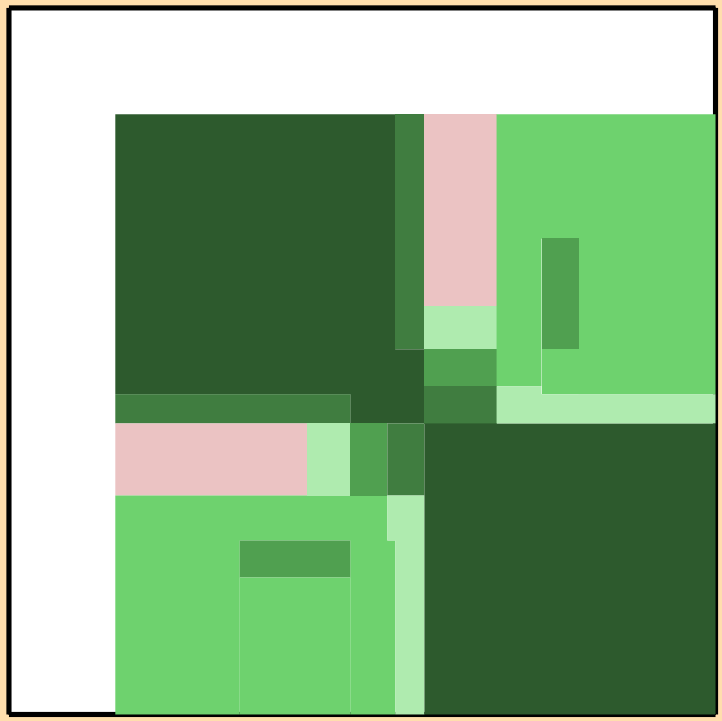

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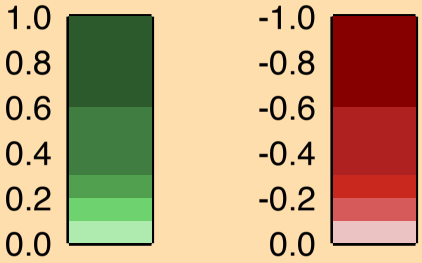

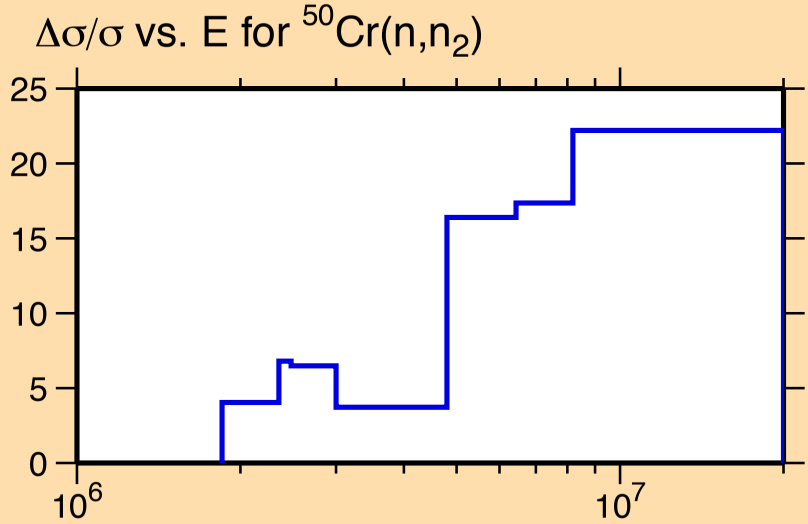

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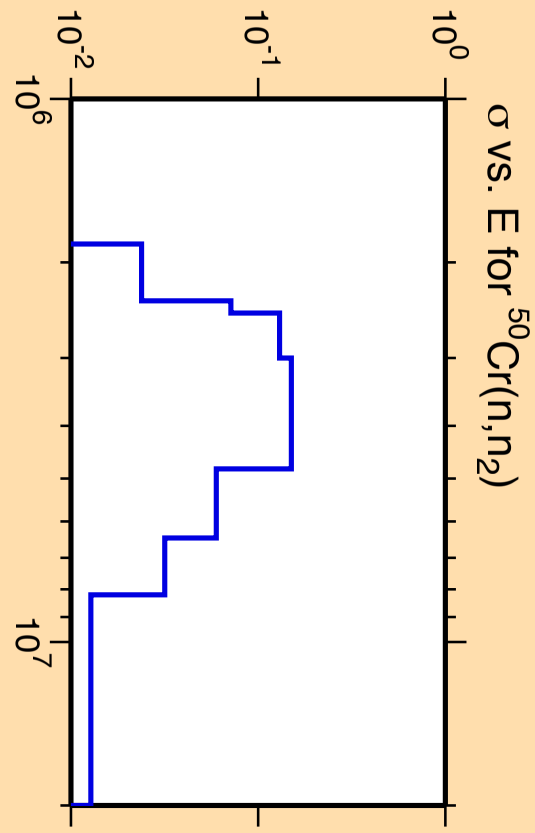
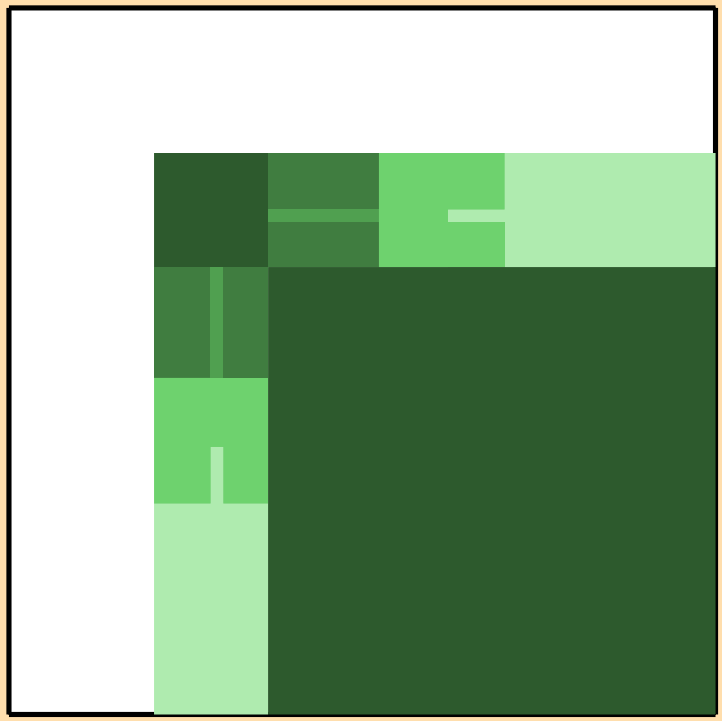
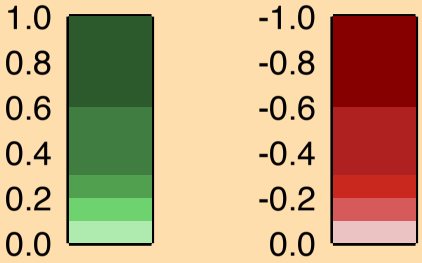
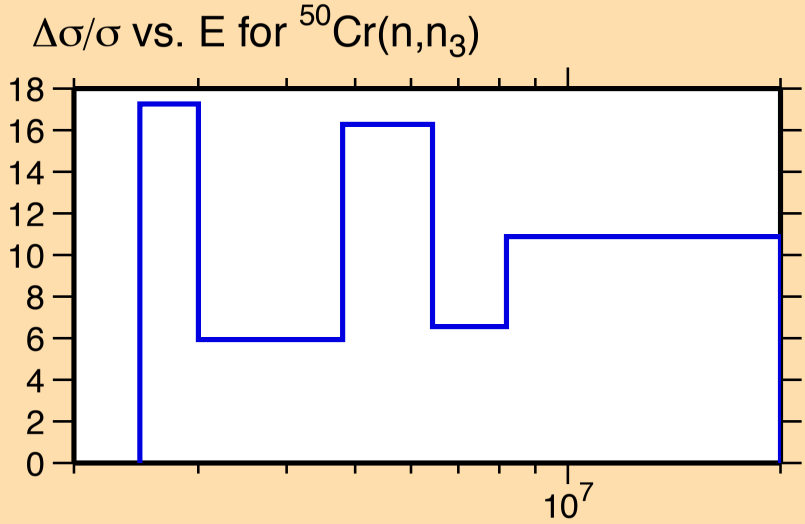
Abscissa scales are energy (eV).





Correlation Matrix





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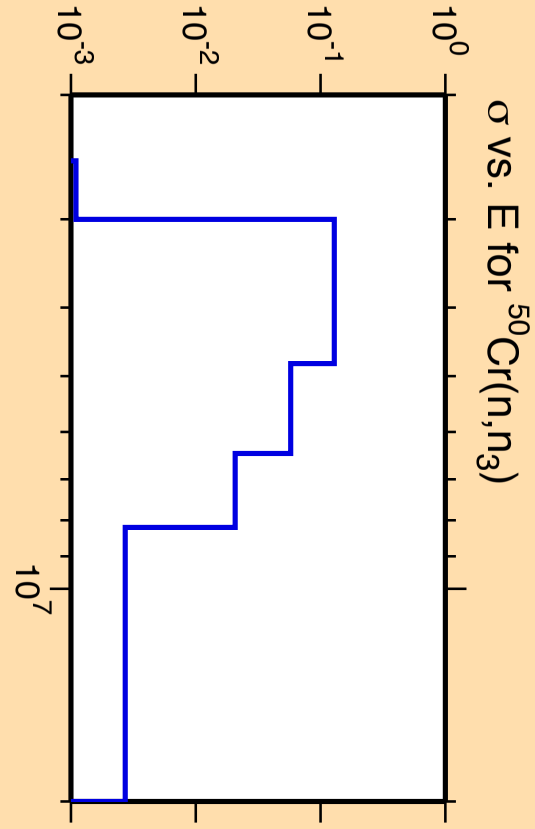
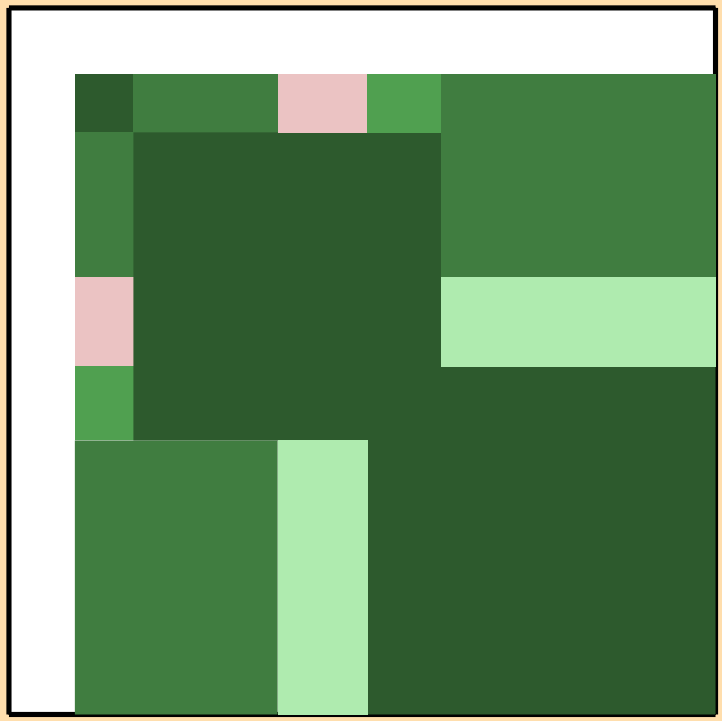
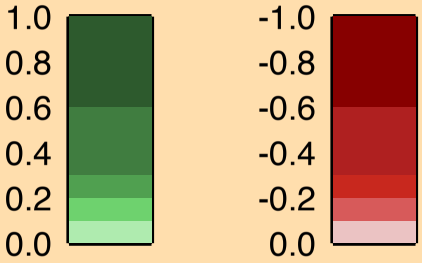
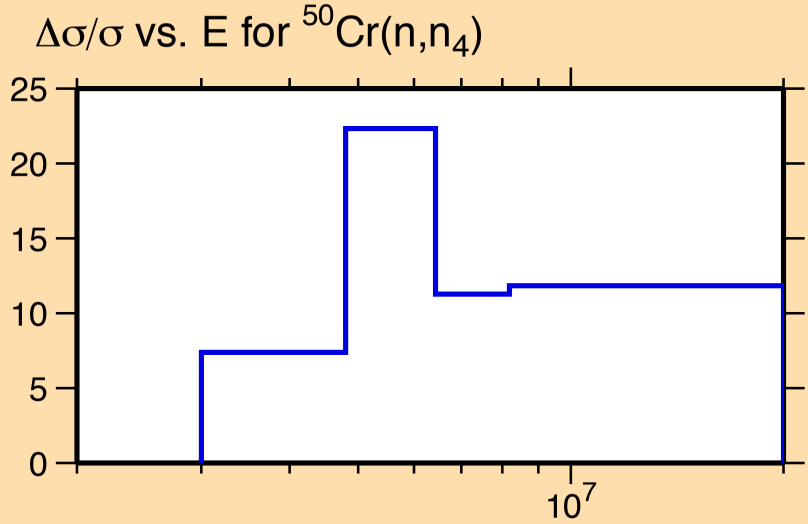




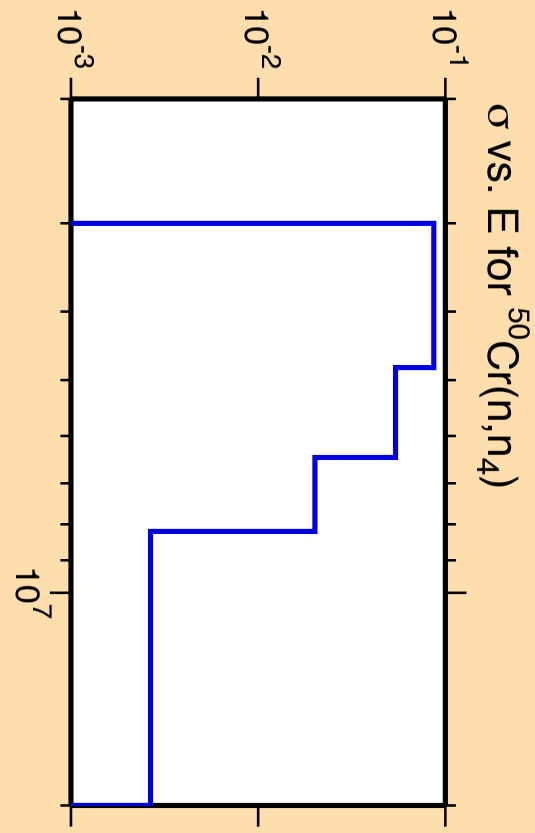
Correlation Matrix

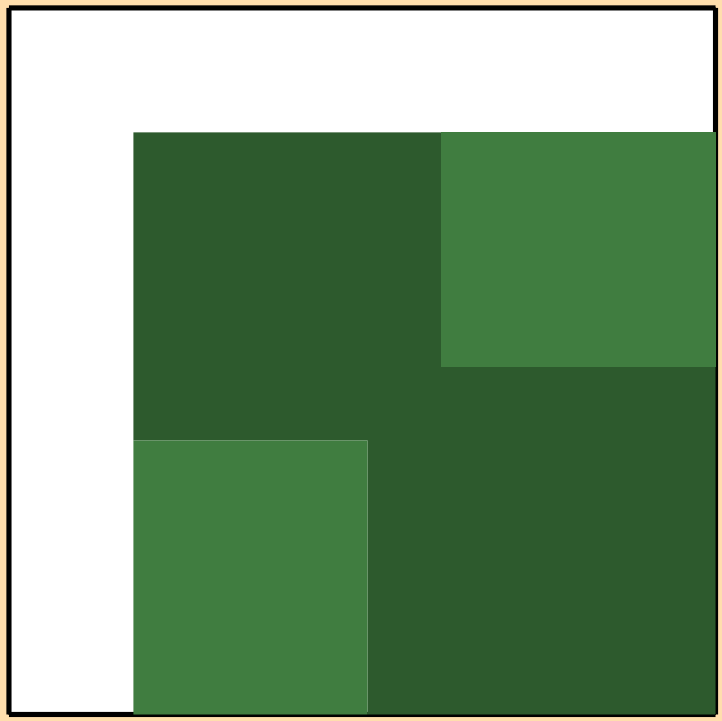




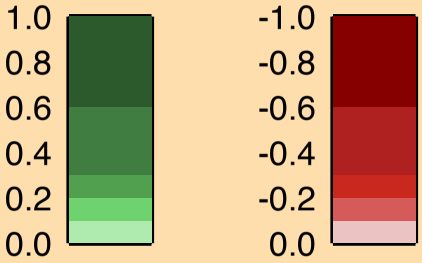
Ordinate scales are % relative standard deviation and barns.

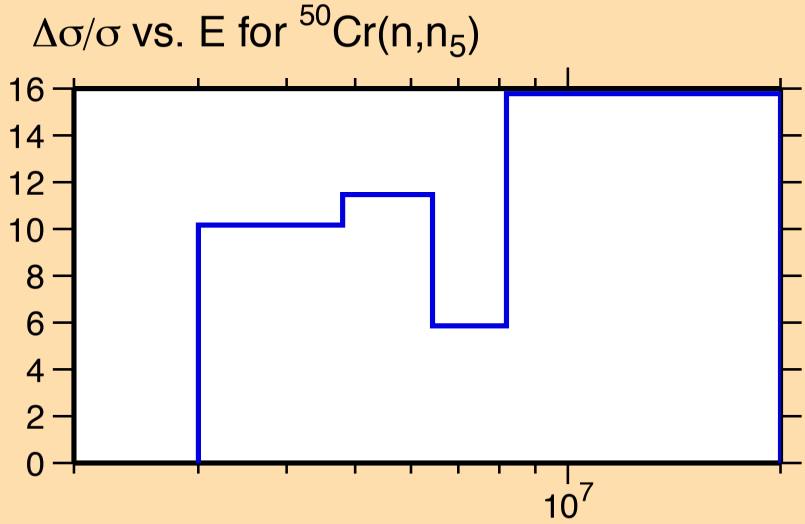
Abscissa scales are energy (eV).





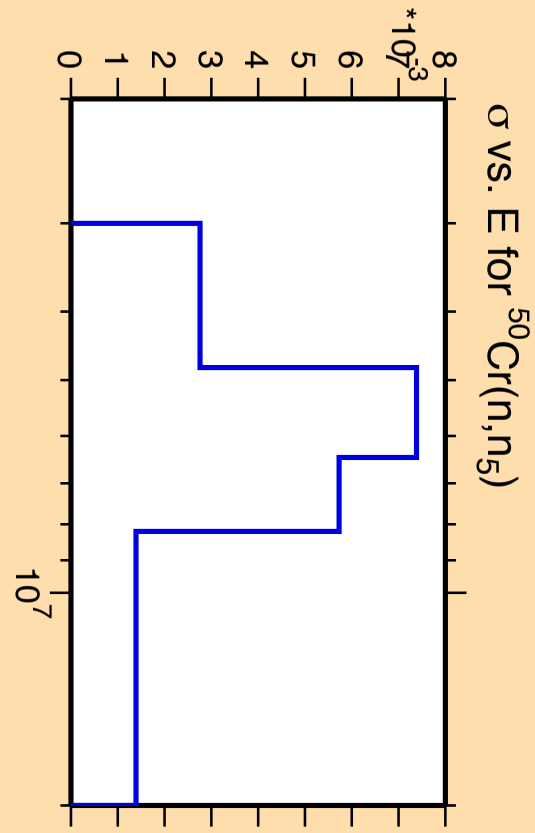
Correlation Matrix

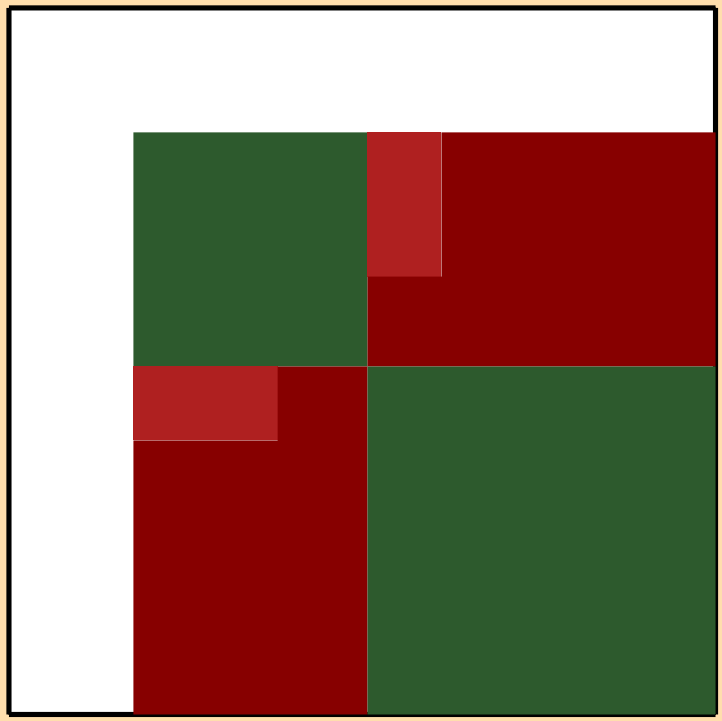




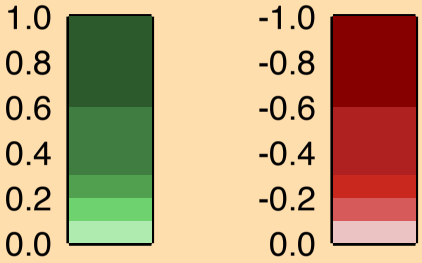
Ordinate scales are % relative standard deviation and barns.

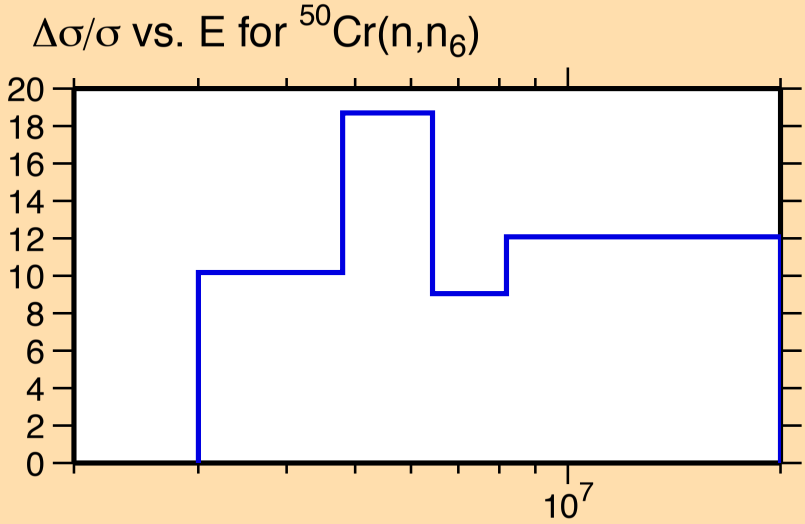
Abscissa scales are energy (eV).





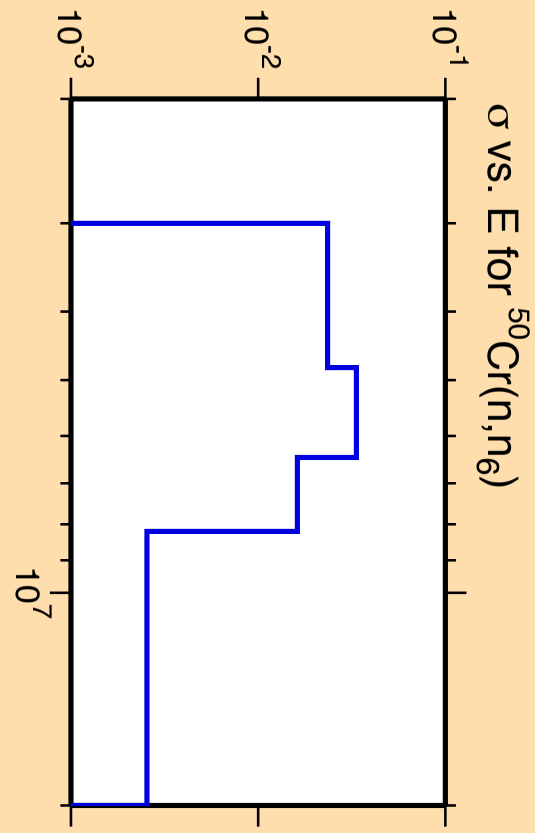
Correlation Matrix

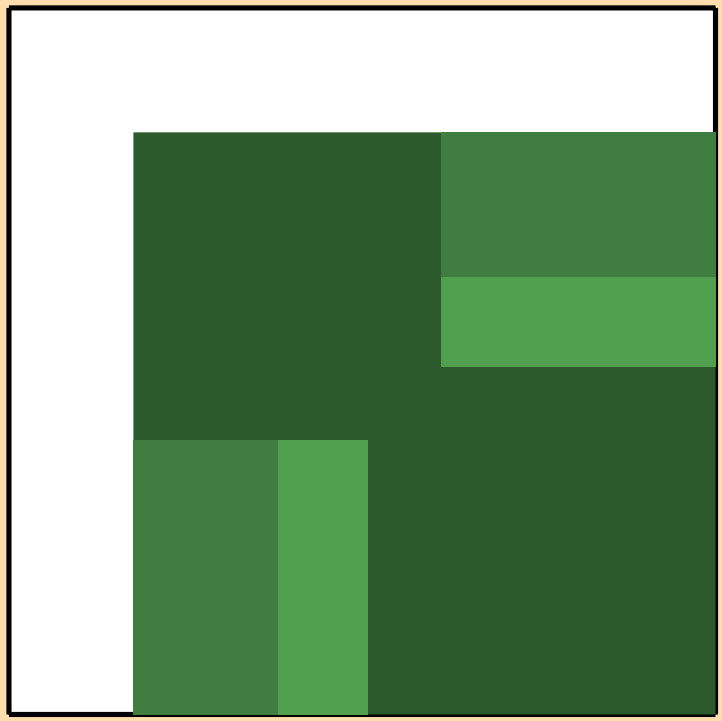




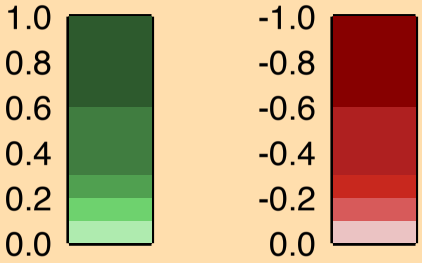
Ordinate scales are % relative standard deviation and barns.

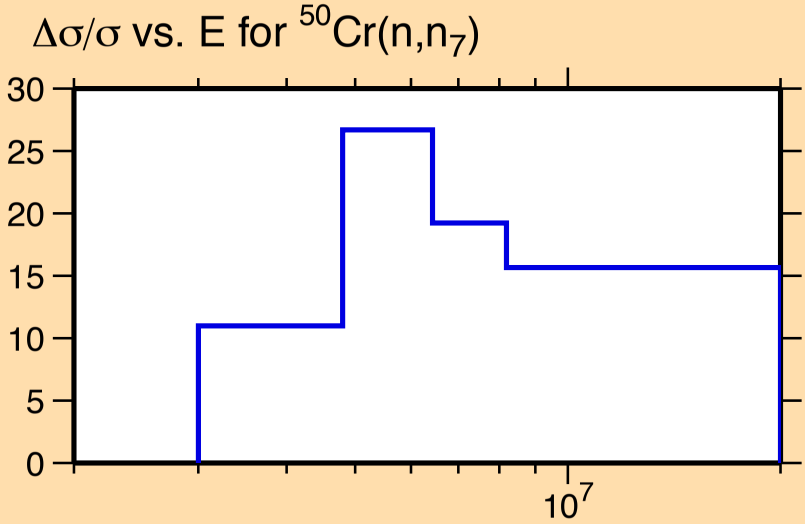
Abscissa scales are energy (eV).





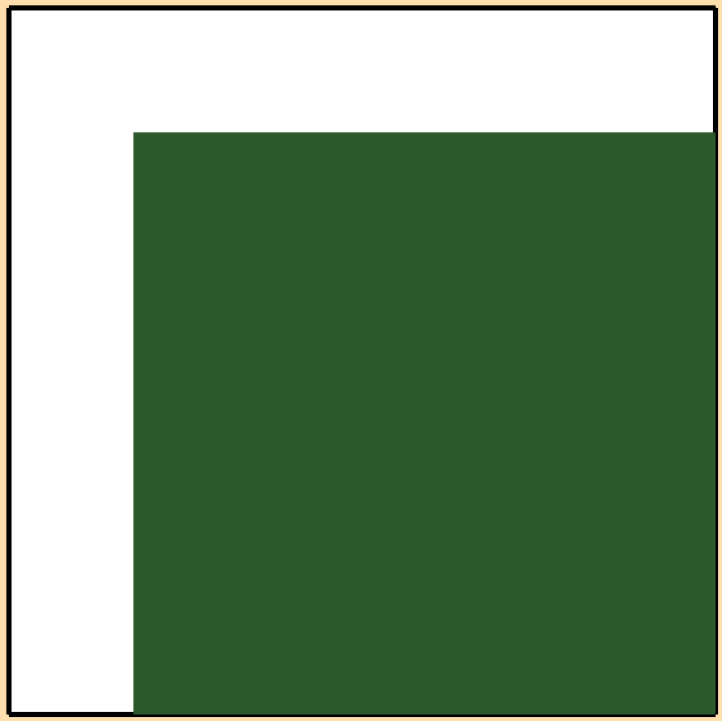
Correlation Matrix





Ordinate scales are % relative standard deviation and barns.

Abscissa scales are energy (eV).



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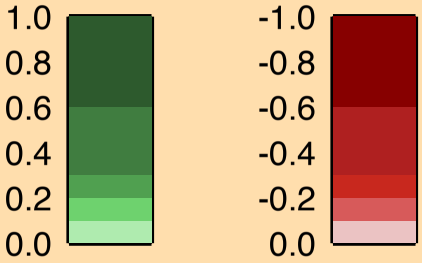

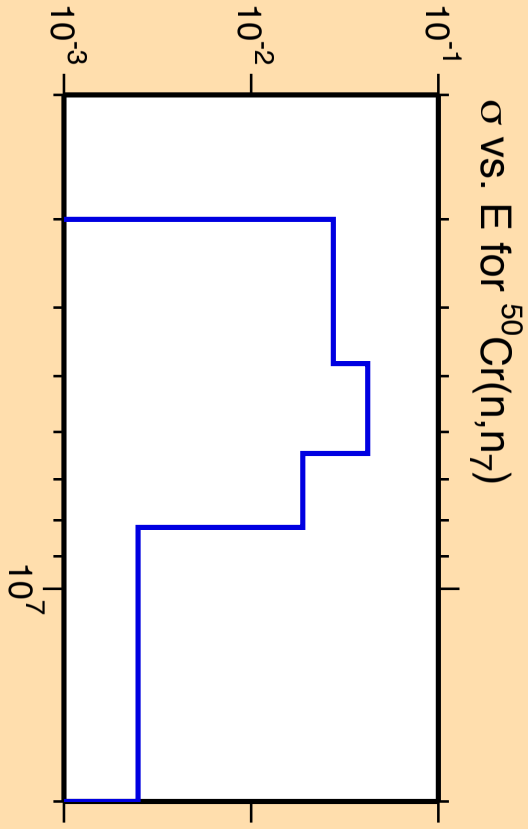

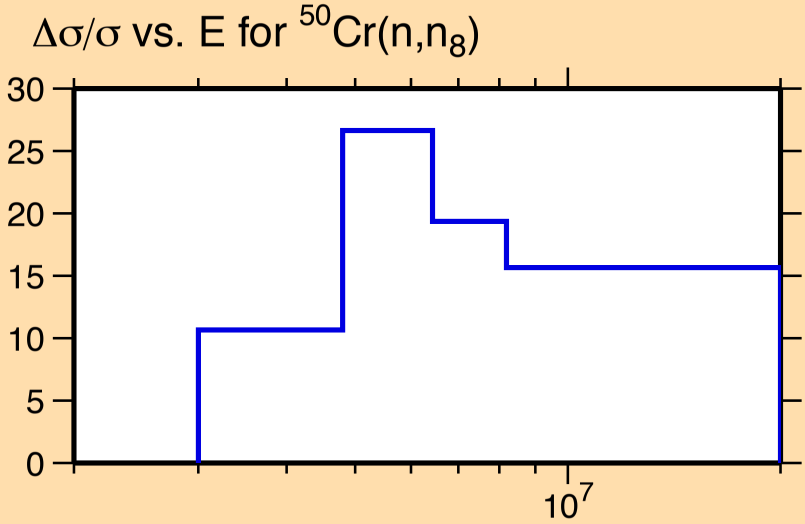

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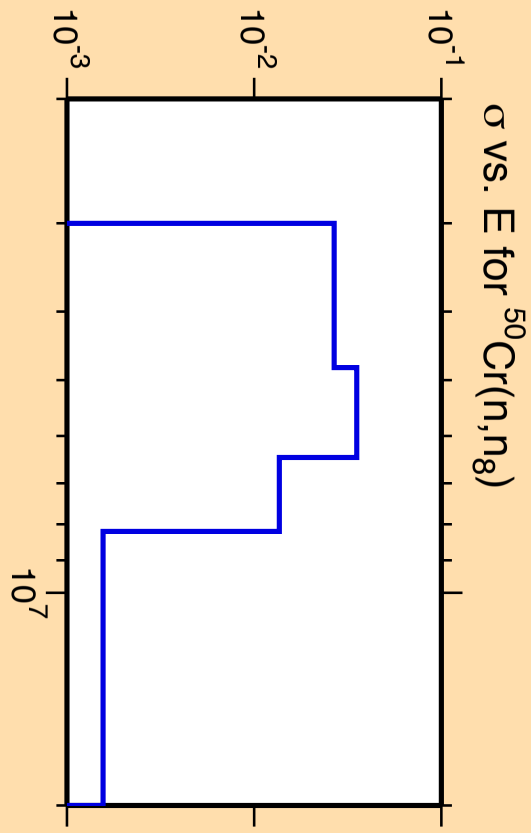

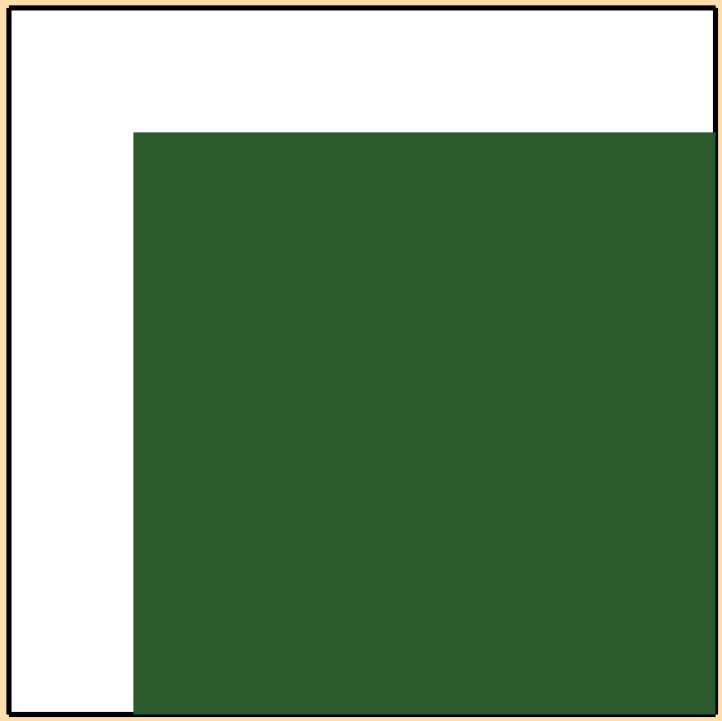

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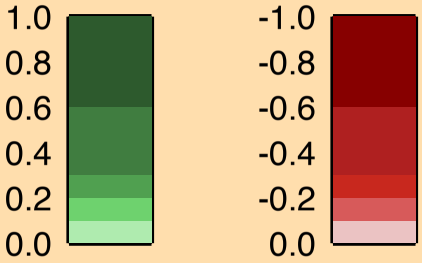

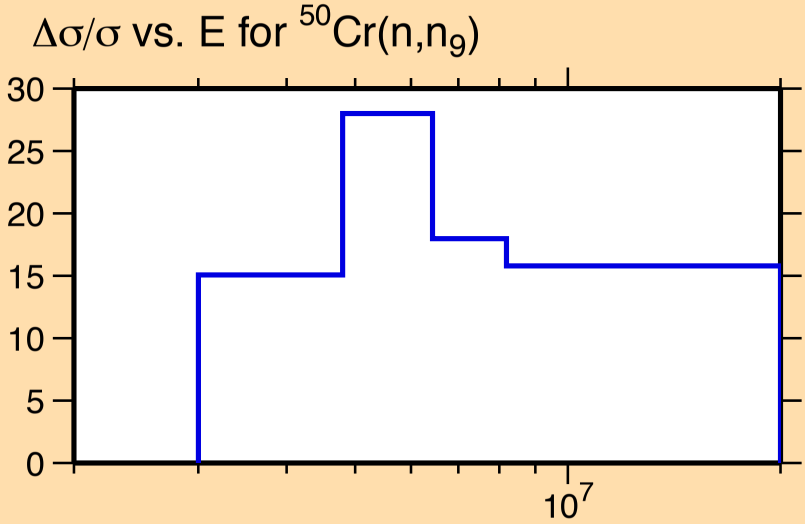

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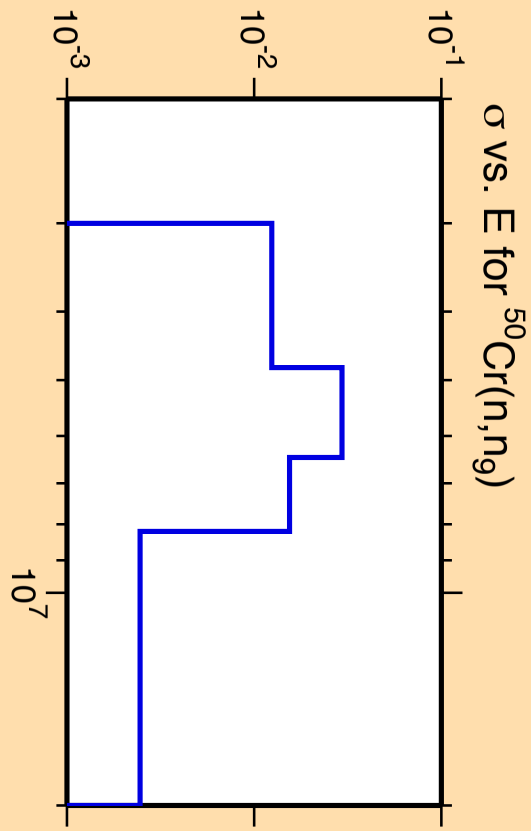

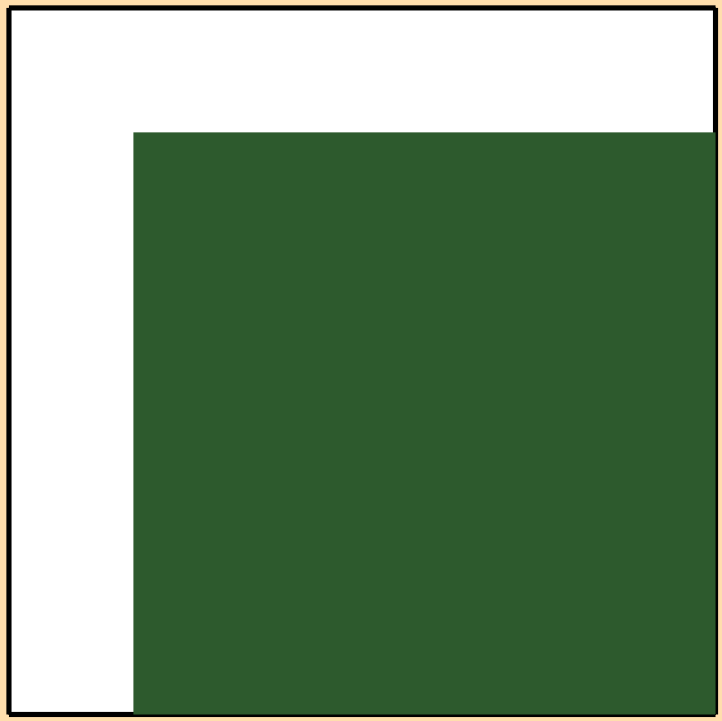

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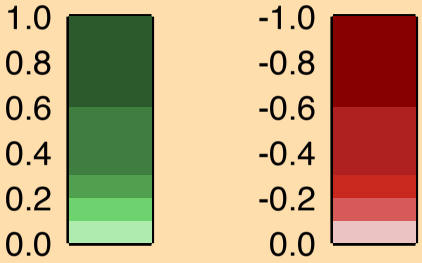

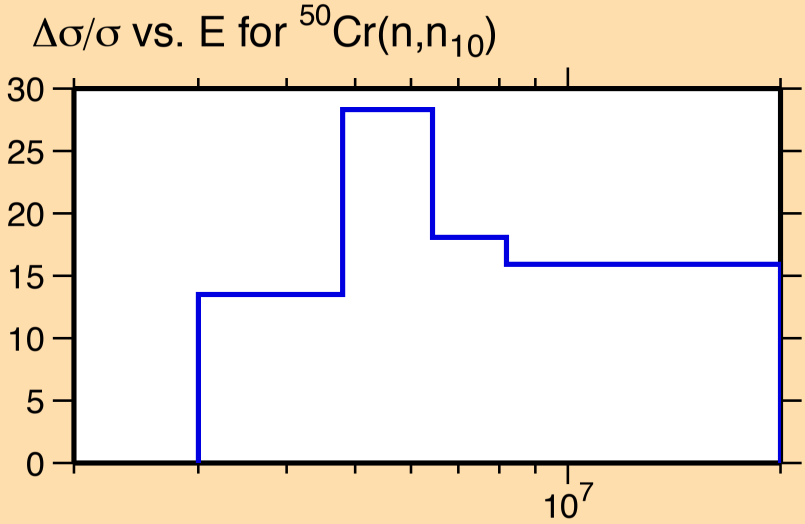

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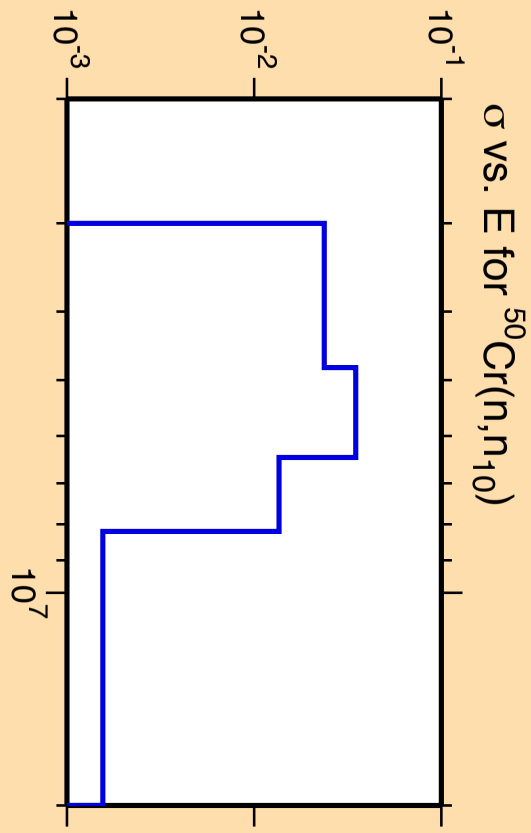

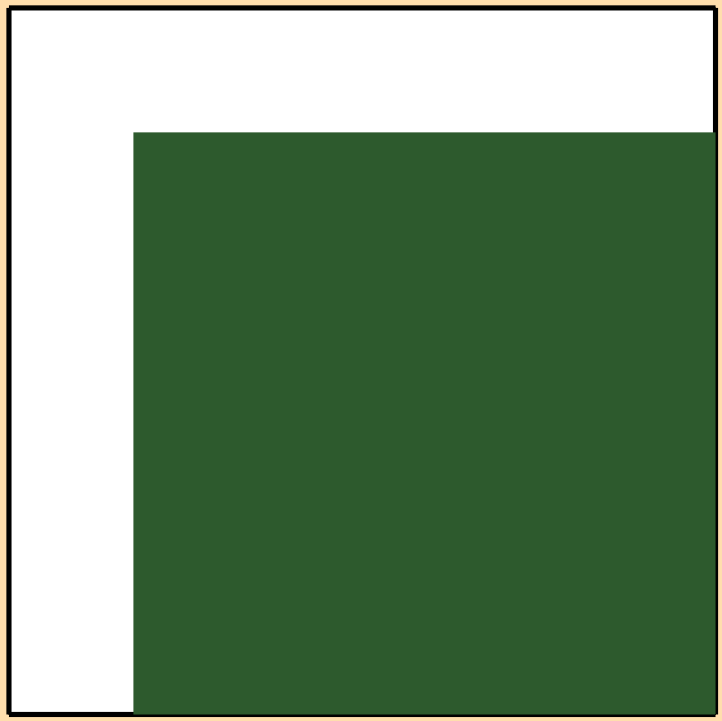

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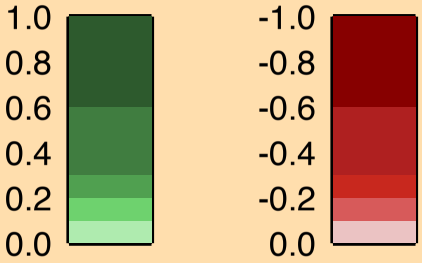

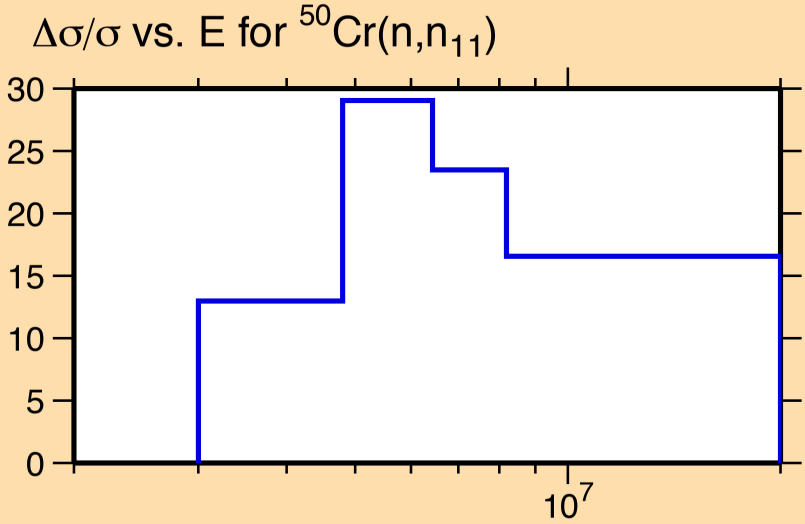

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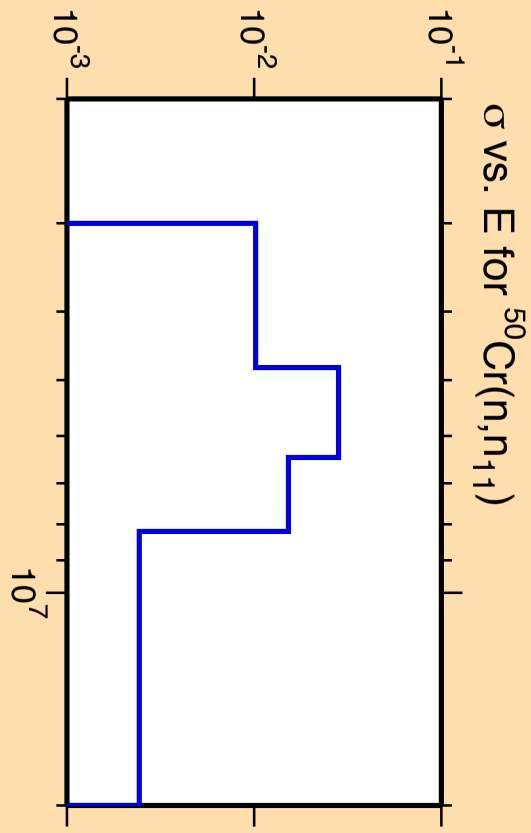

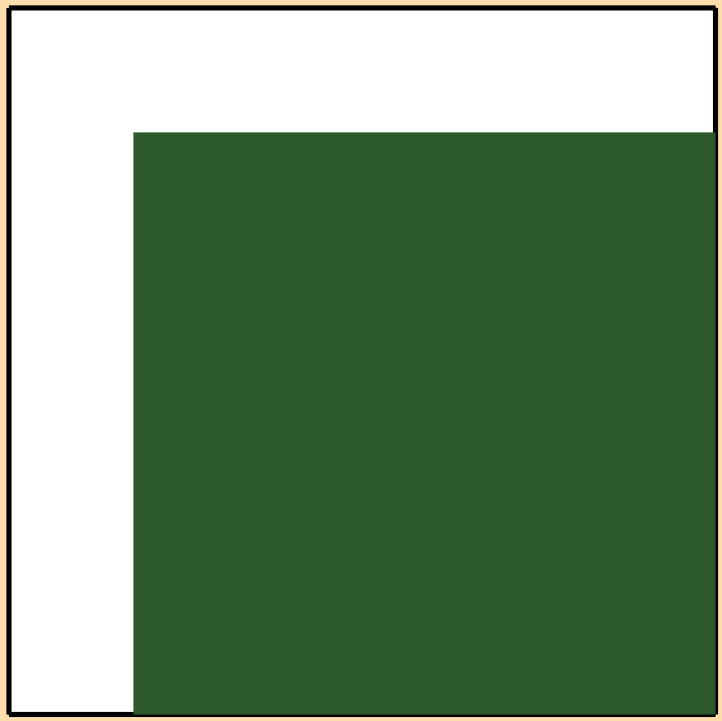

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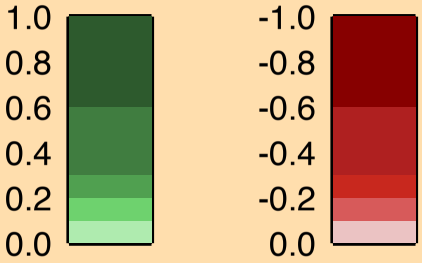

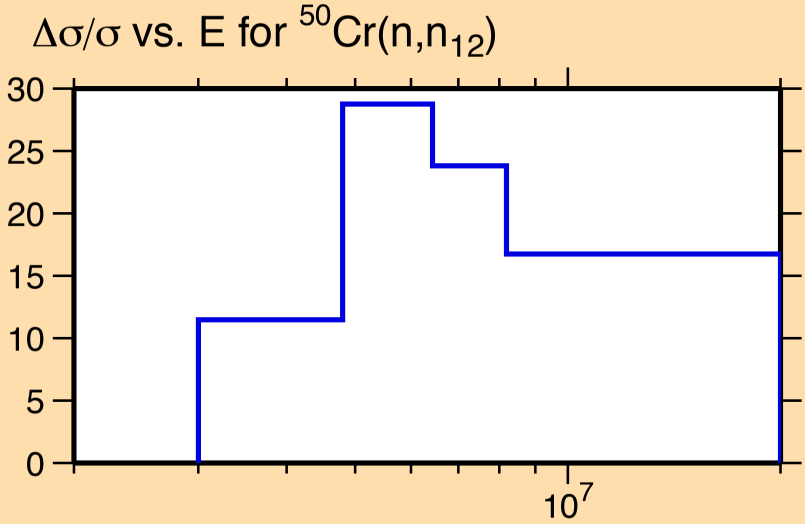

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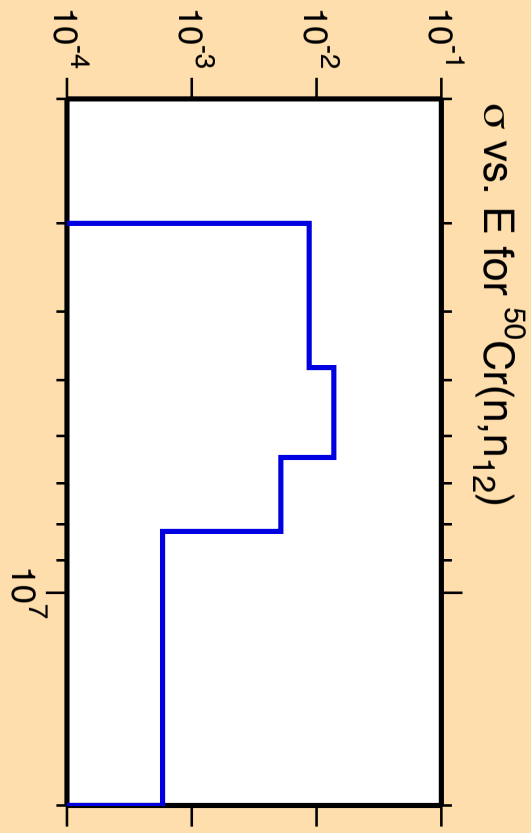

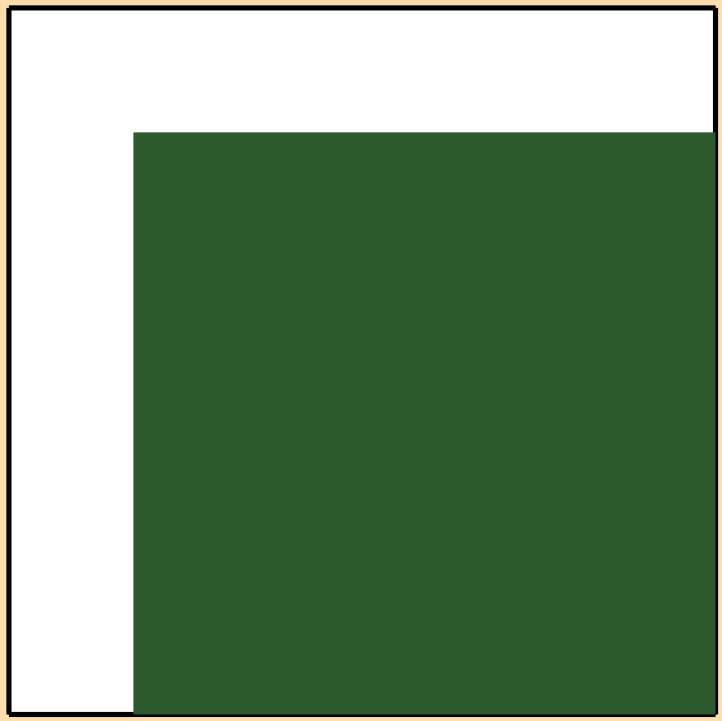

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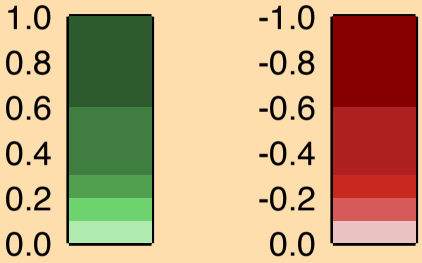

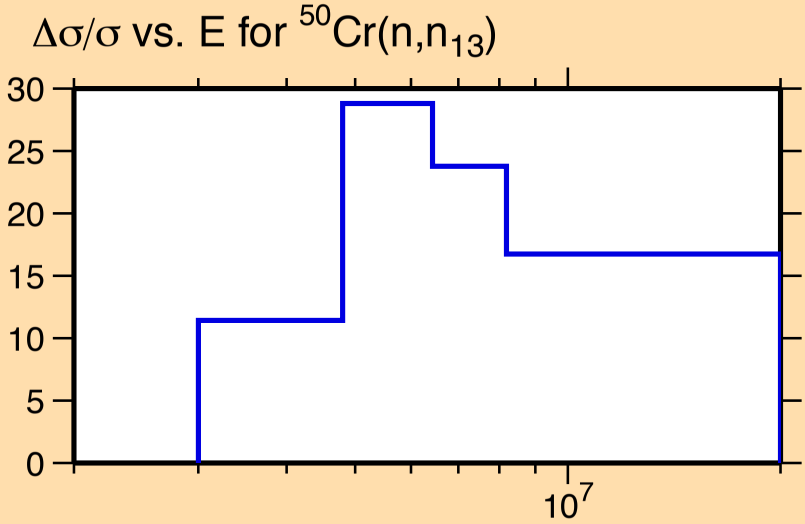

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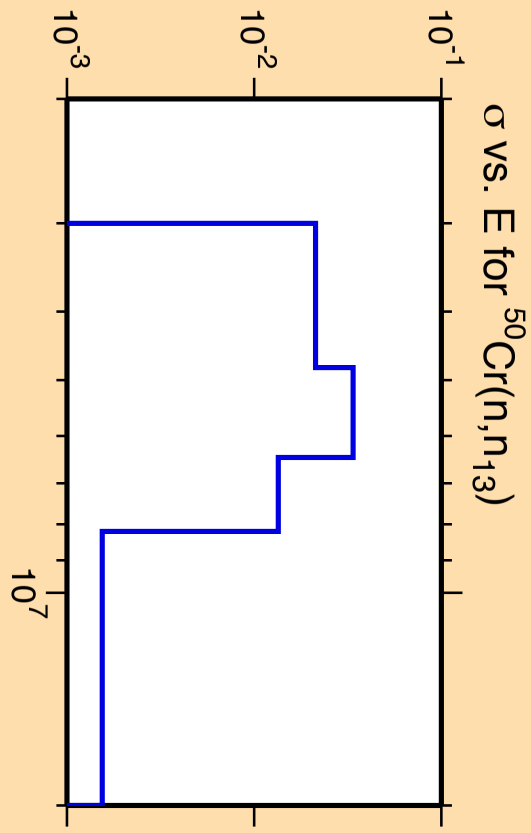

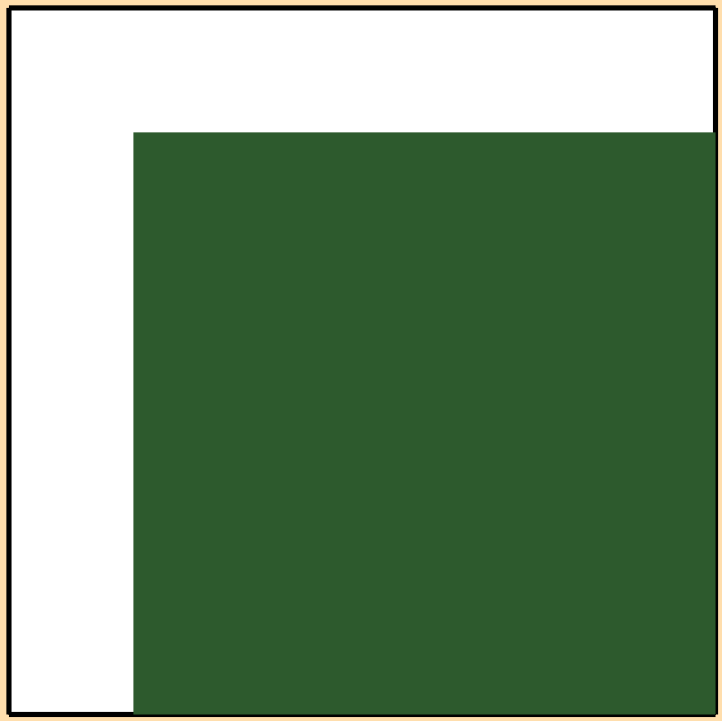

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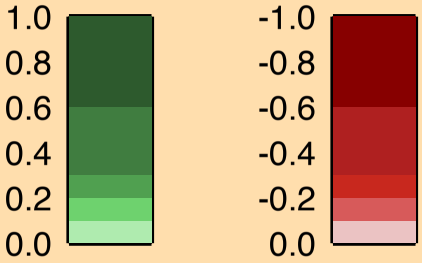

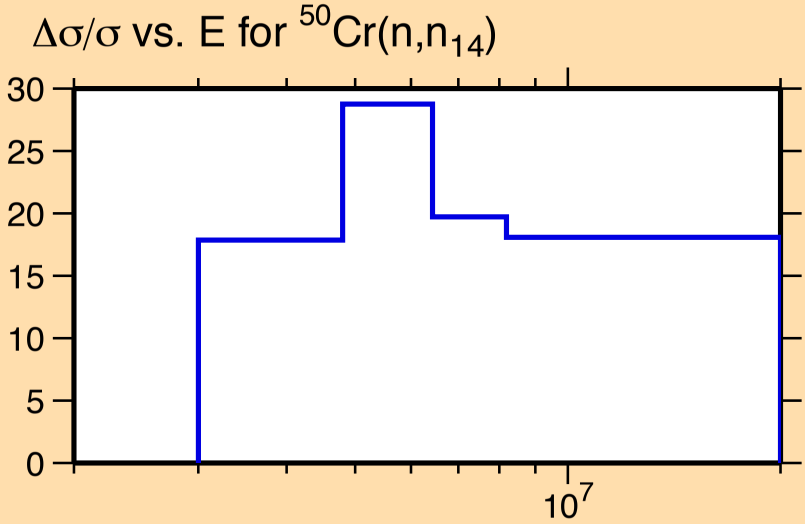

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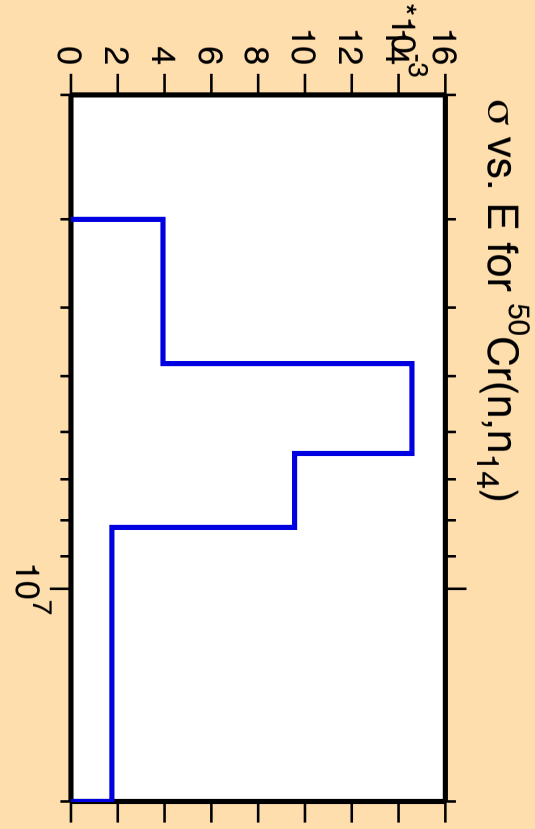

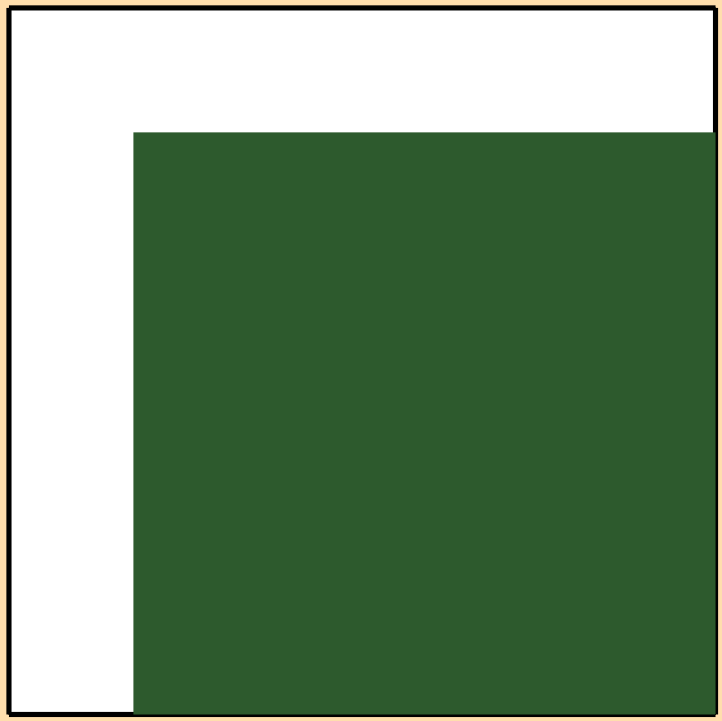

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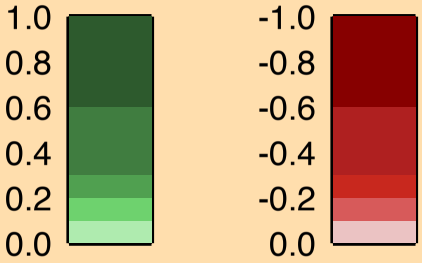

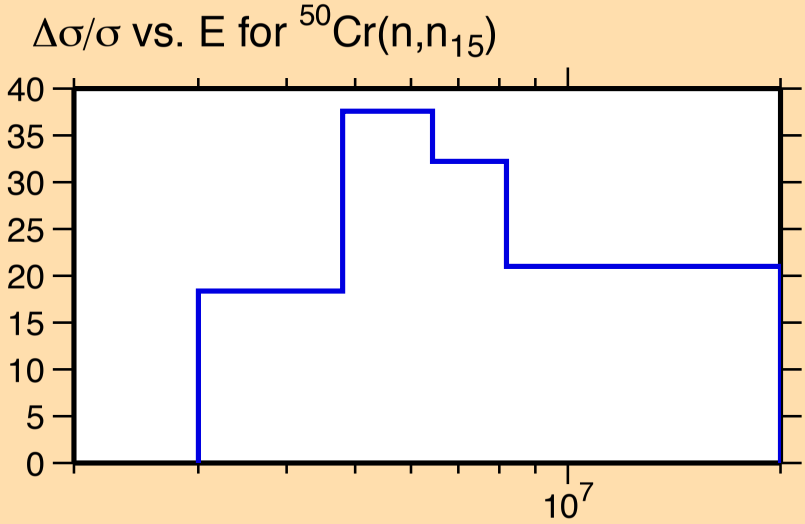

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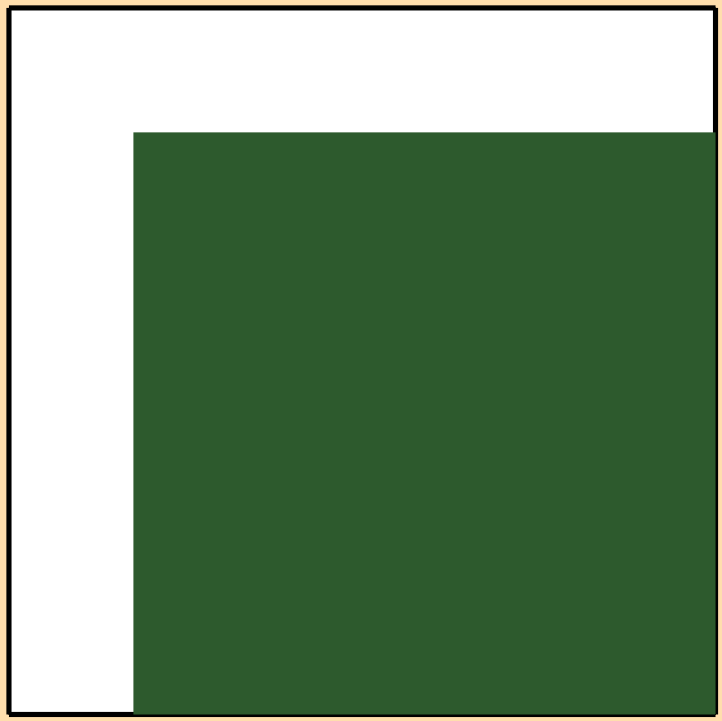

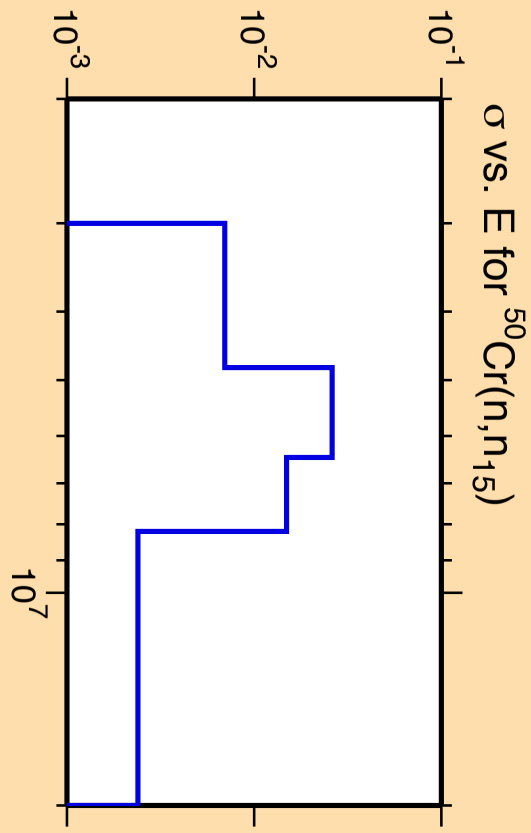

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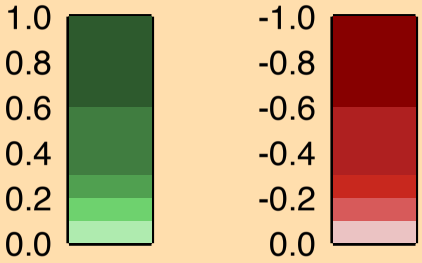

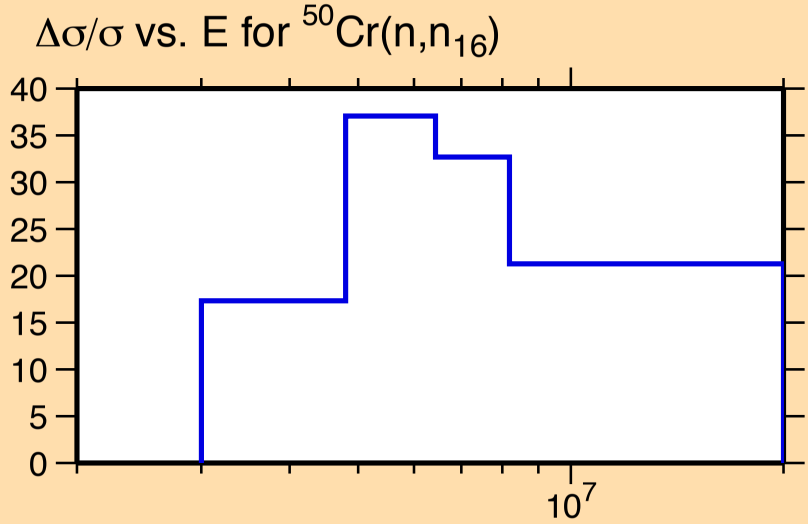

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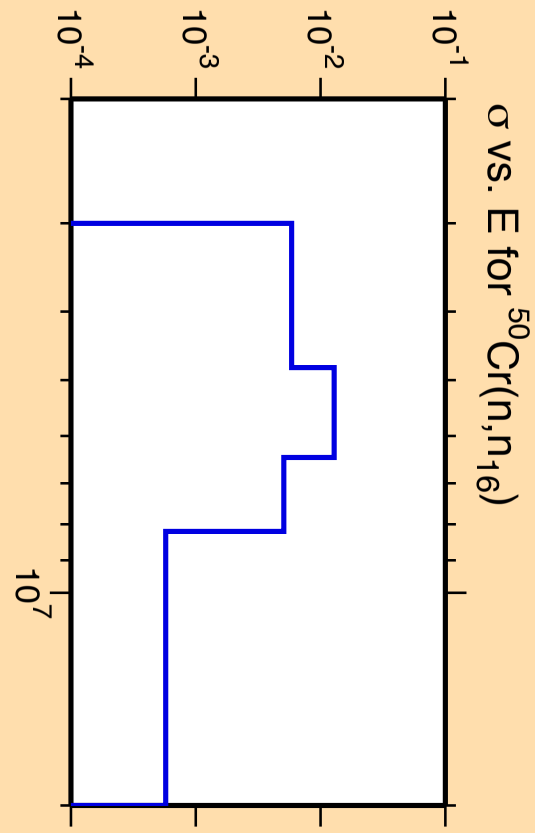

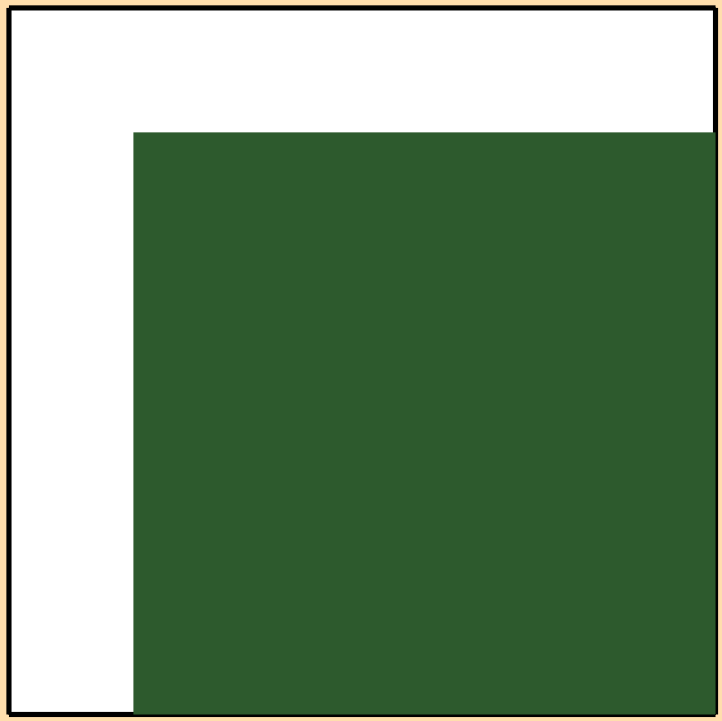

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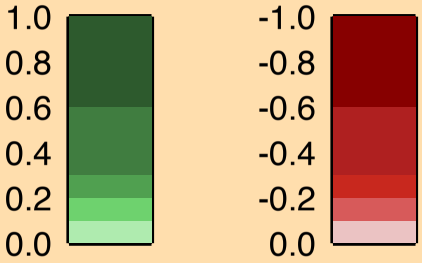

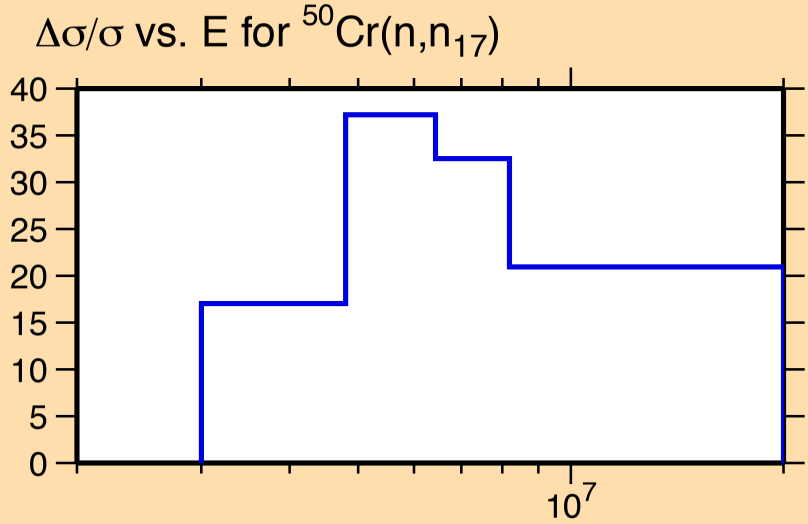

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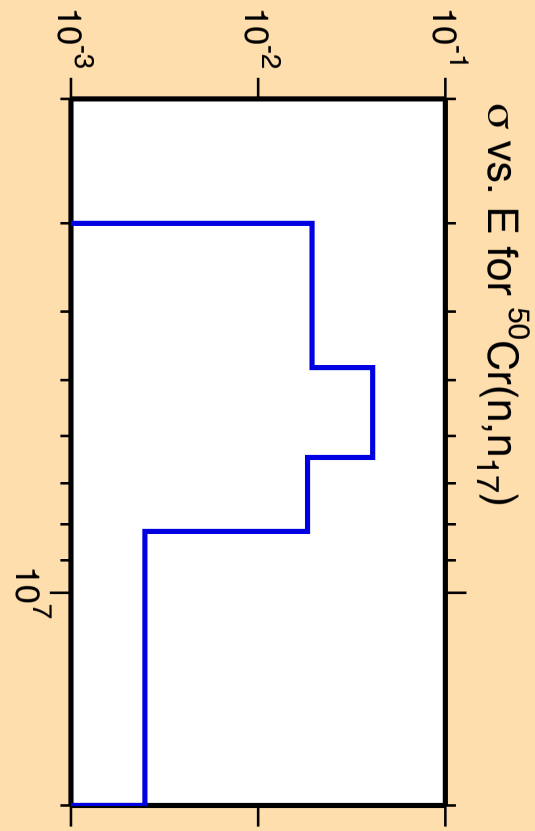

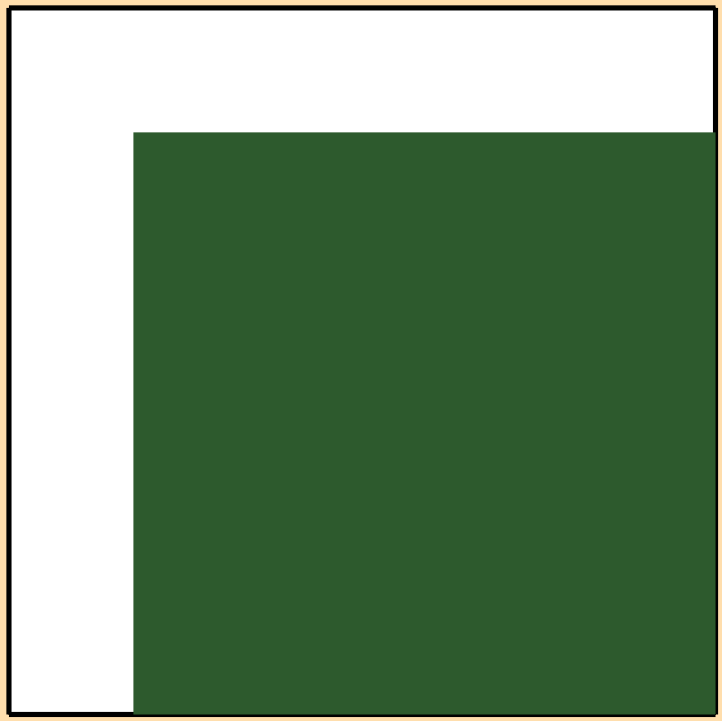

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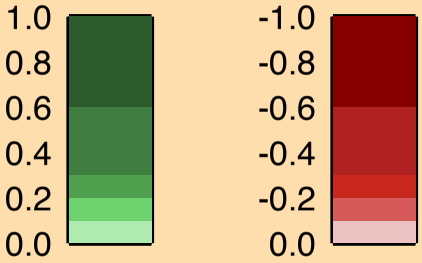

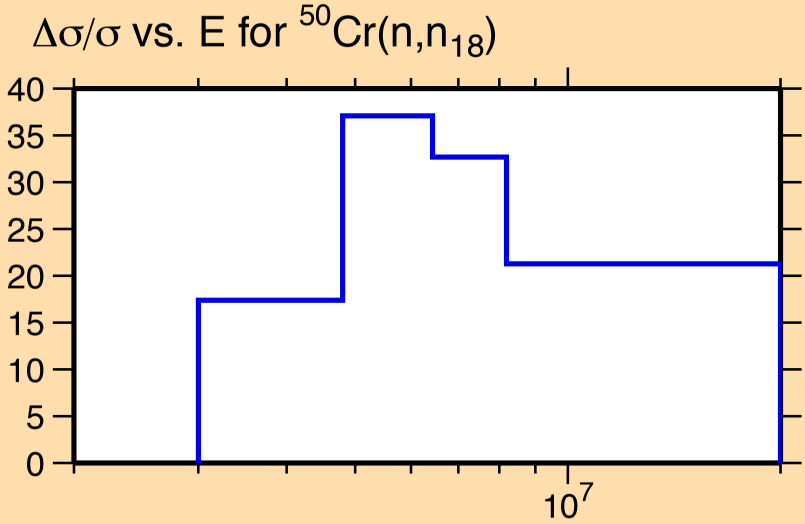

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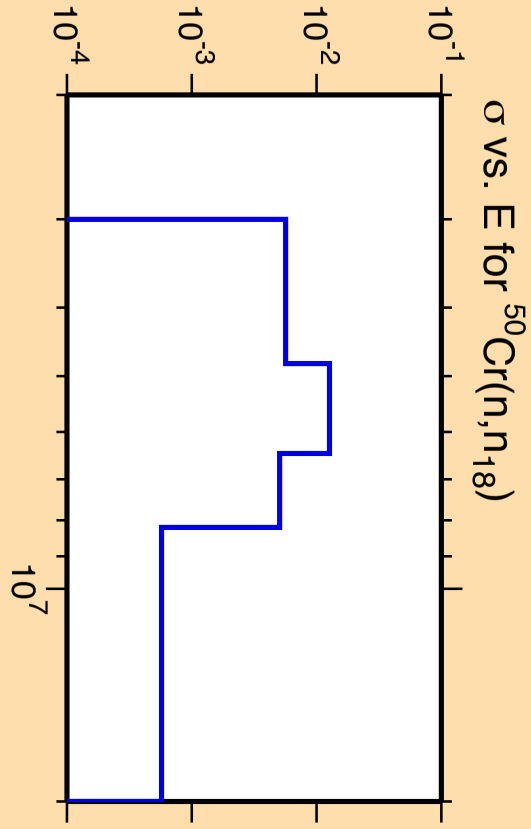

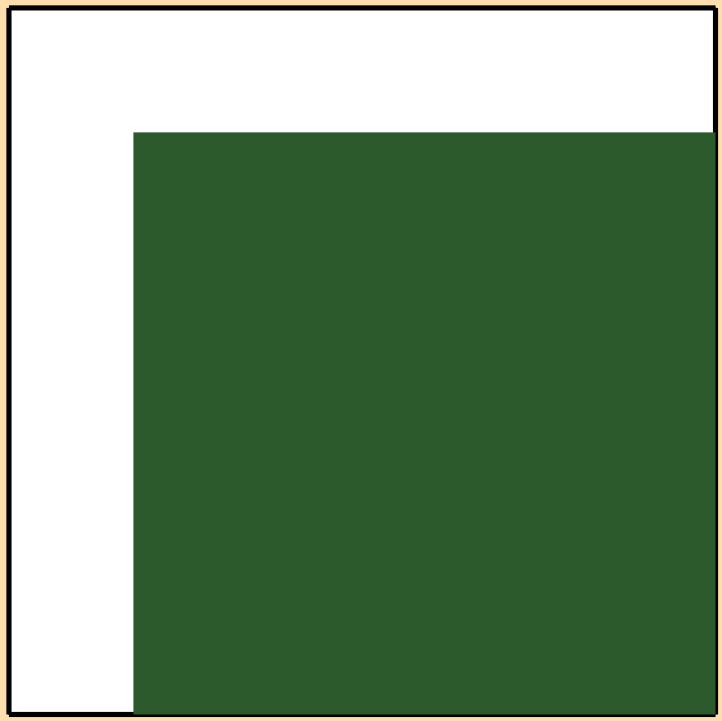

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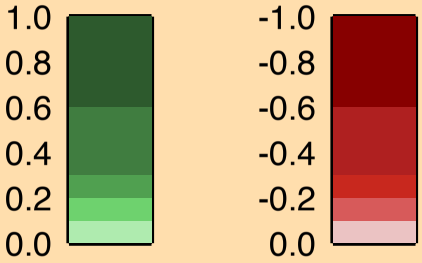

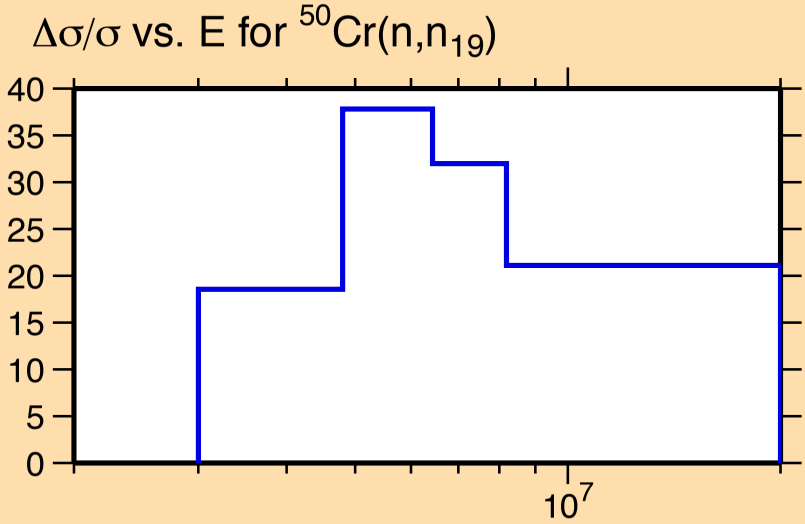

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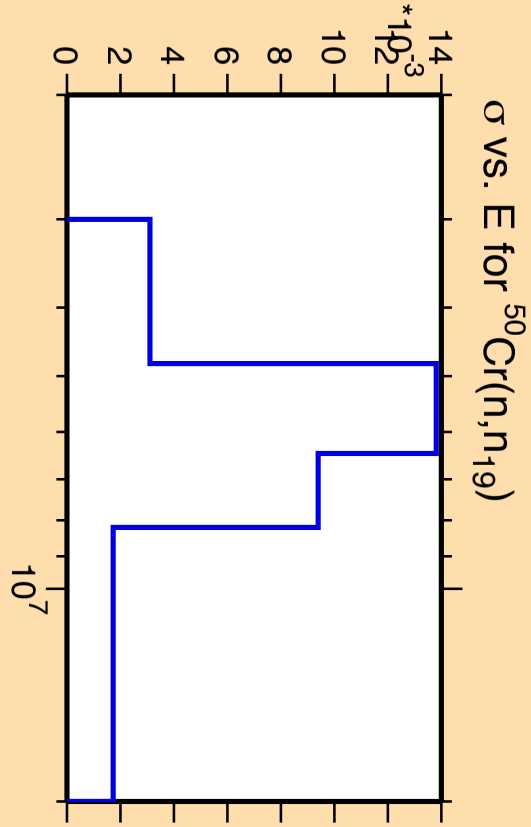

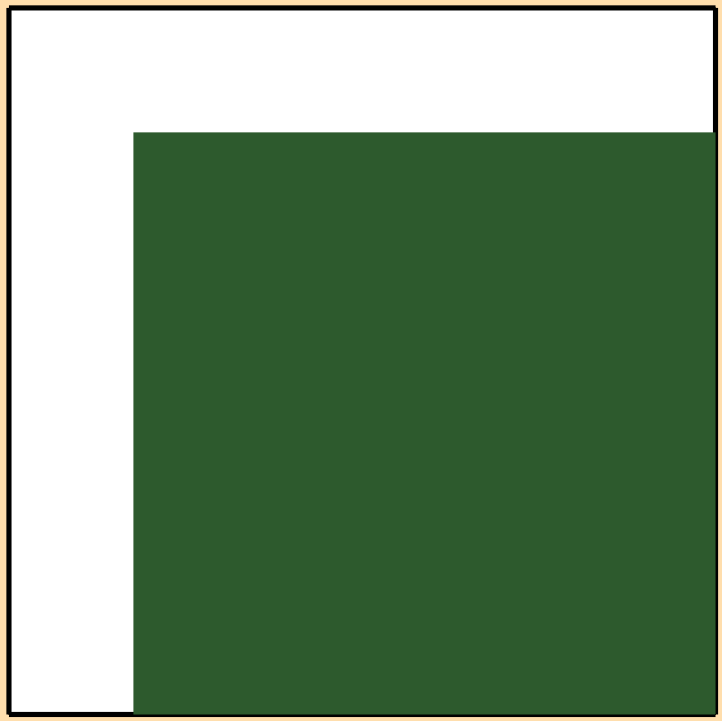

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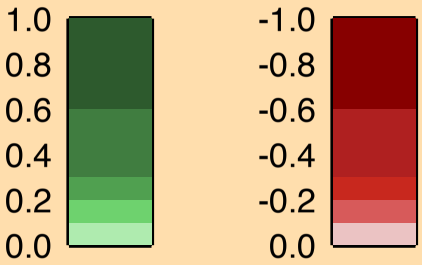

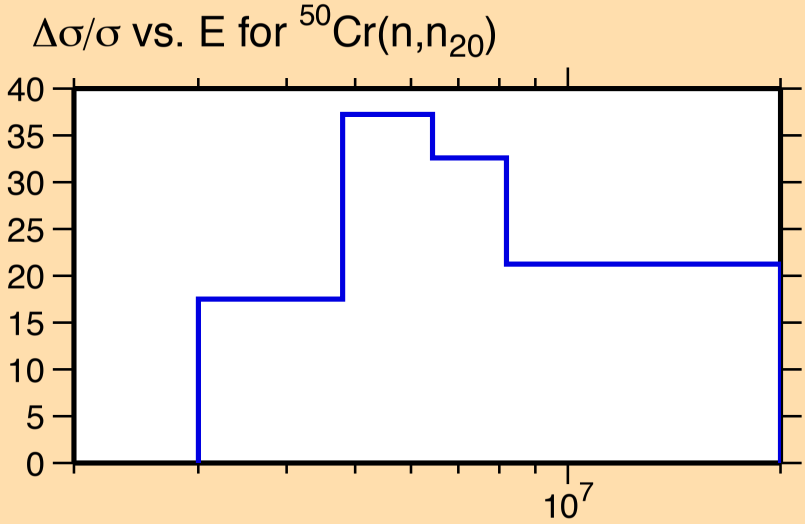

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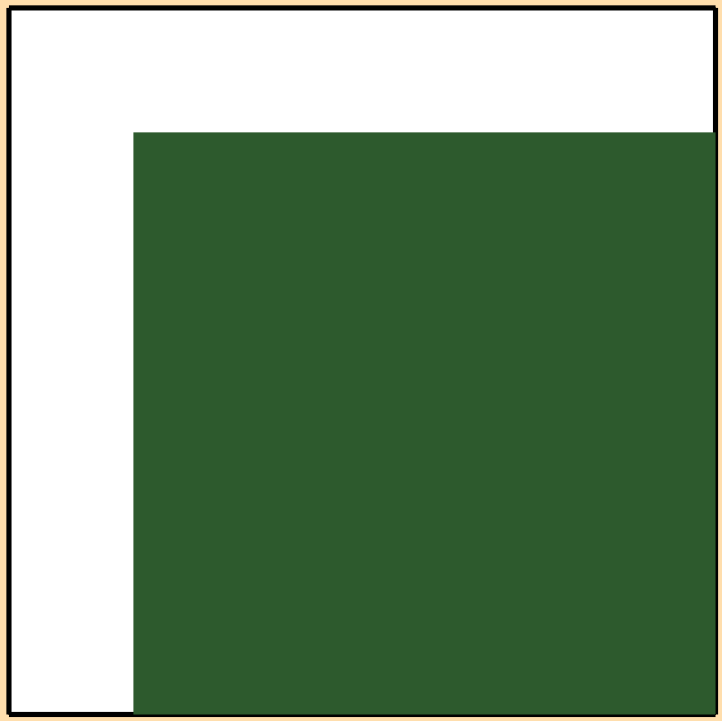

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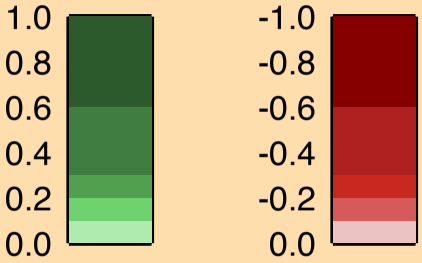

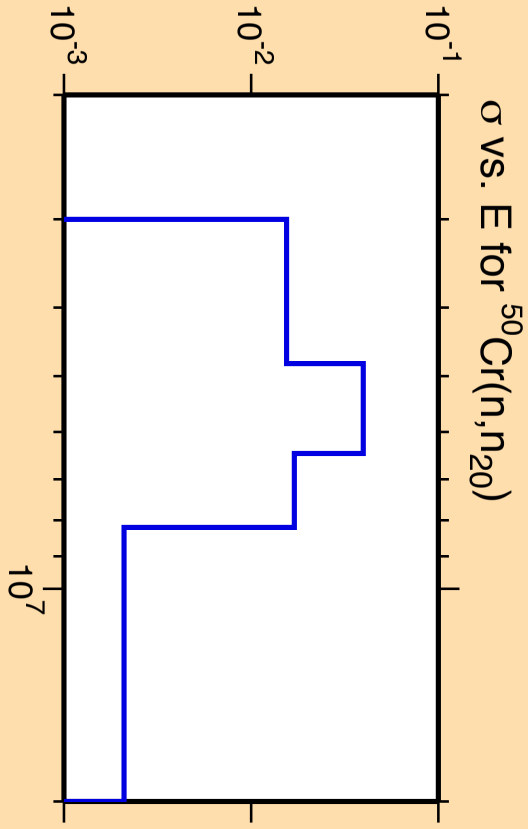

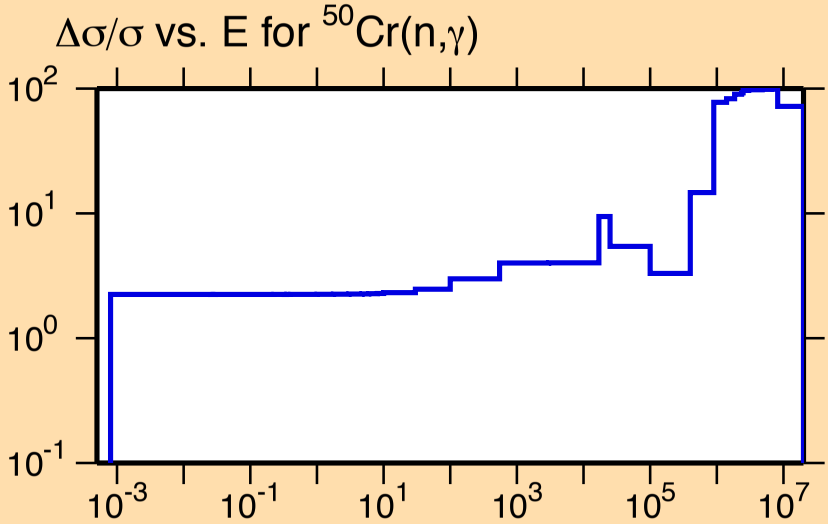

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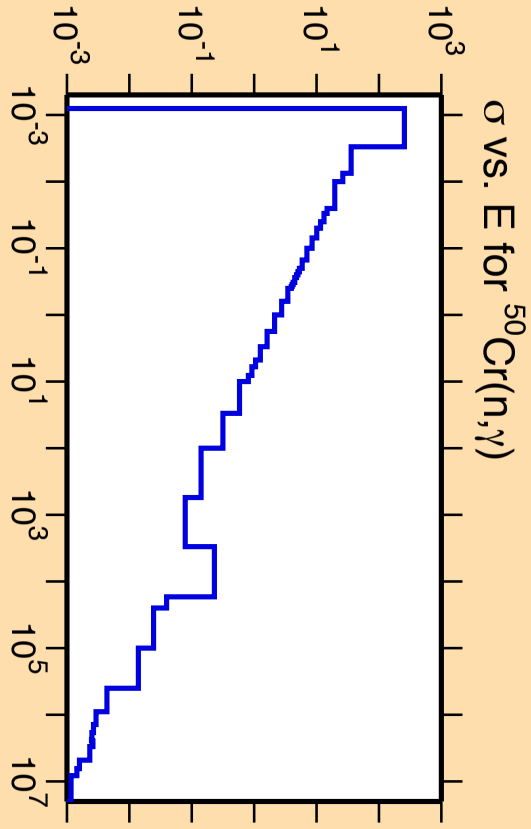

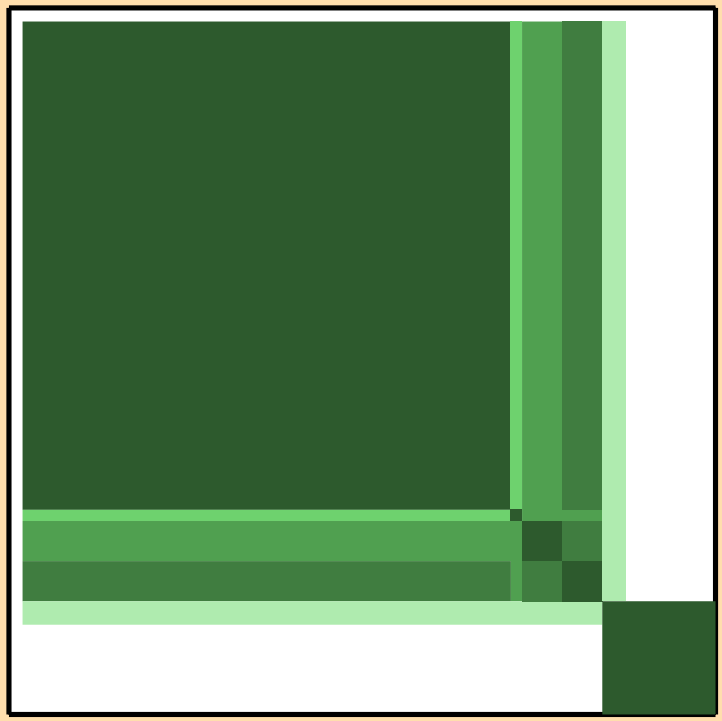
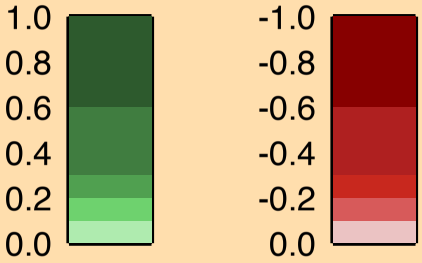
Correlation Matrix