Nuclear structure information

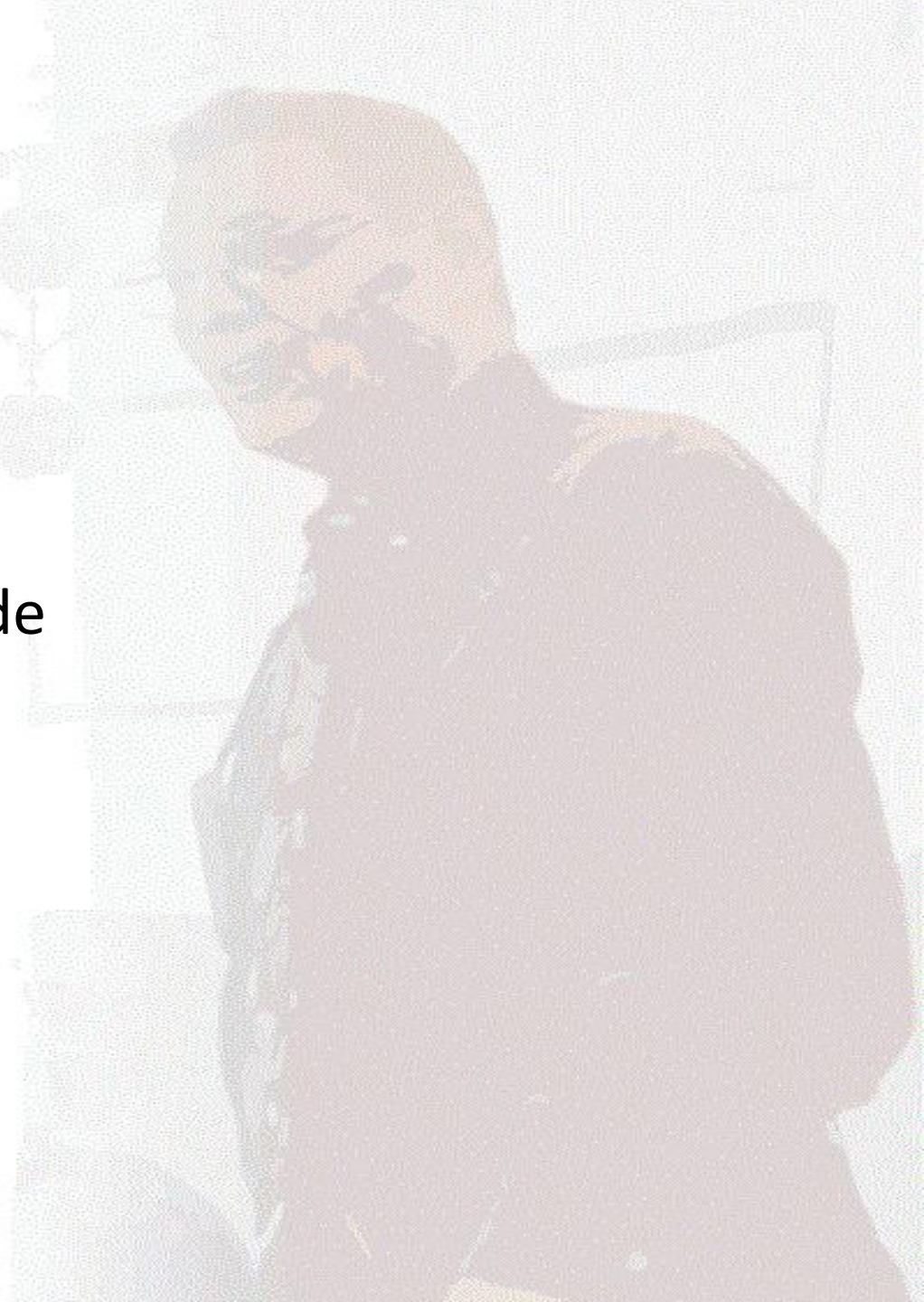
- Compilations are made every few years
- These are accessible online mainly through NNDC and the TUNL Nuclear Data Evaluation (A=5 to 20)

WARNING!

- Compilations are a good initial source of information, but
- ALWAYS check the original publication to verify.
- There are many errors in the compilation.

AZURE2 code

- Originally developed by R.E. Azuma as JINA collaboration code, published 2010
- AZURE2 developed by Ethan Uberseder, made publically available in 2012
- azure.nd.edu
- Designed for low energy charge particle and capture reaction analysis



Example 1: $^{12}C(n,n_0)$ --- ^{13}C Compound Nucleus

- www.nndc.bnl.gov
- Neutral particle scattering
- $m_n = 1.0087$, $m_{12C} = 12$
- $J^{\pi}_n = ½^+$, $J^{\pi}_{12C} = 0^+$
- $S_n = 4.946$ MeV, lowest particle separation energy
- $a_c = 1.4(A_1^{1/3}+A_2^{1/3}) = 4.6$ fm

What levels should we add?

- AZURE2 eccentricity, need to add “dummy” levels to tell code which angular momenta to include in hard sphere phase shift calculations

- Levels in excitation energy range that correspond to the lab energy range of the data
  - Our data: Auchampaugh et al. (1979), EXFOR
    - Total cross section, but below (n,n’) threshold, (n,n_0) = (n,total)
  - $1.2 < E_n < 4.8$ MeV
    - it has been truncated below n’ threshold for this exercise
    - $1.1 < E_{c.m.} < 4.4$ MeV
    - $6.0 < E_x < 9.3$ MeV

Common to truncate data at particle separation energies
More open partitions means greater complexity
Should have data for each decay partition