UT-BATTELLE

SAMMY Workshop Part 4.1f

Dr. Nancy M. Larson
Oak Ridge National Laboratory

Part 4.1f. Reciprocity

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OAK RIDGE NATIONAL LABORATORY
U. S. DEPARTMENT OF ENERGY

Reciprocity

- **Wanted: to include data from an inverse reaction in the same evaluation as data from the forward reaction**
  - **Example – $^{13}C(\alpha,n)^{16}O$ for oxygen evaluation**
- **Possibilities:**
  1. **Convert the data**
  2. **Convert the resonance parameters**
  3. **Wait for further SAMMY development**
  4. **Use a different code!**

Two points-of-view for R-matrix codes

Mick Moxon, Harwell

1. SAMMY (& REFIT & …)

- One incident particle
- Many different types of nuclides in the target
  - Isotopes, chemical compounds, contaminants, etc.
- Many experimental conditions requiring corrections
  - Temperature, resolution, finite-size, etc.
- Operate in laboratory system

Two points-of-view , cont.

Gerry Hale, LANL

Chen Zhenpeng, China

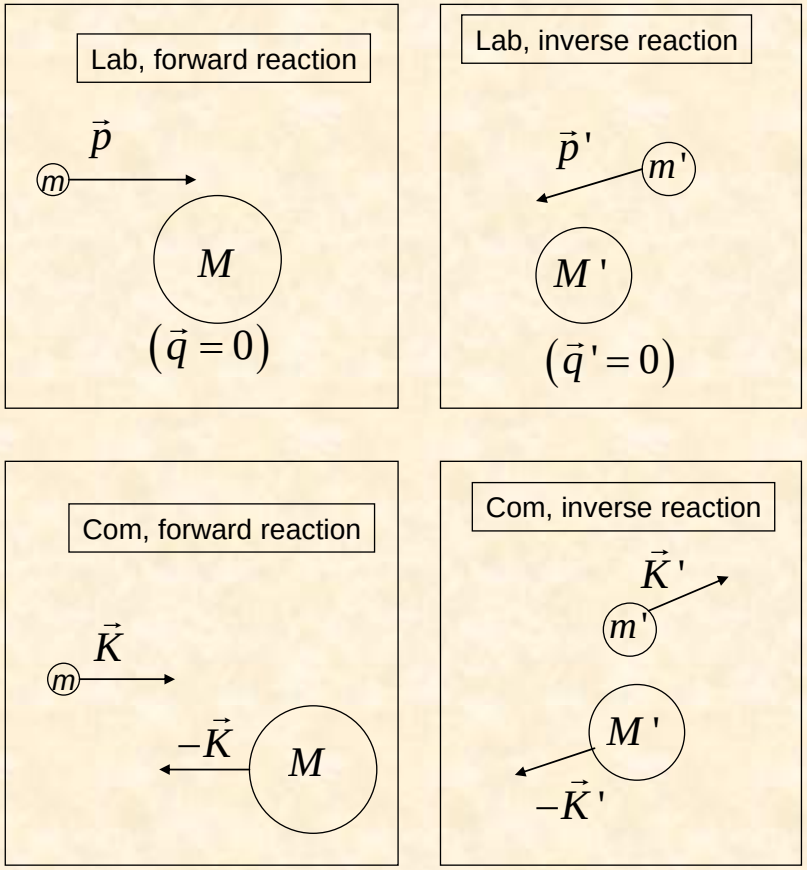
2. EDA (& RAC & …)

- One compound nucleus (CN)
- All reactions leading to that CN
- Almost no corrections for experimental conditions
  - Some resolution broadening, no Doppler
- Operate in COM system
- Calculate additional observables (polarizabilities, for example)

Point-of-view, cont.

- **Can one code do both?**
  - **Not easily: different "laboratories" for the two reactions**
    - **Required: careful attention to kinematics**
  - **R-matrix differences –**
    - **Energies are different**
    - **Reduced width amplitudes γ are the same**
    - **Partial widths Γ are different**
    - **Some spin groups do not have incident channel in one direction**
- **Can SAMMY do both?**
  - **It's on the "wish list"**

Kinematics



- **Detailed equations are in the SAMMY manual**
- **Currently, the user must do the "dirty work" to make the conversions**
- **If someone writes a general-purpose code to convert either data or resonance parameters, let me know. Perhaps it could be included in the SAMMY distribution.**