SAMMY Workshop Part 4.1e

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Part 4.1e. Charged Particles

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Charged-particle exit channels

- **Capability was added to SAMMY in 2000**
  - **Version M5 of the code**
- **Initial development work by Royce Sayer**
  - **Implemented charge-dependent penetrabilities, shift factors, and phase shifts into SAMMY**
- **The SAMMY author modified Sayer's code to**
    - **Conform to SAMMY conventions**
    - **Eliminate unused features**
    - **Increase speed of computation**
  - **Any errors in the SAMMY implementation are those of the SAMMY author**

Charged-particle exit channels, cont.

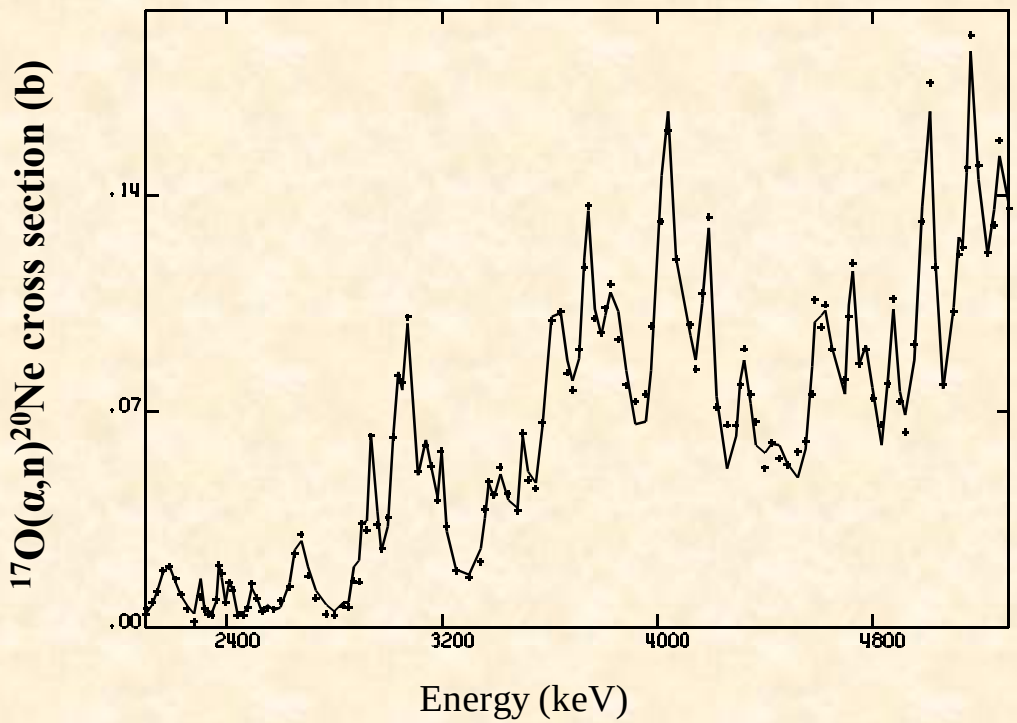
- **Sayer's analysis of ^{16}O with α channel**
  - **"R-Matrix Evaluation of ^{16}O Neutron Cross Sections up to 6.3 MeV"**
    - **R. O. Sayer, L. C. Leal, N. M. Larson, R. R. Spencer, and R. Q. Wright, ORNL/TM-2000/212, August 2000**
  - **Also presented at ND2001 in Tsukuba, Japan**

- **Includes α channel**
    - **Threshold for $^{16}O(n, \alpha)^{13}C$ = 2.36 MeV**
- **Includes $^{13}C(\alpha,n)^{16}O$ data via reciprocity**
    - **Reciprocity will be discussed later**

Charged-particle entrance channels

- **Capability was added ~2001**
  - **Included in release M6 of the code (May 2003)**
- **Development and debugging was assisted by people working with *incident* charged particles**
  - **$^{17}F(p,p)^{17}F$ at ORNL (J. Blackmon)**
  - **$^{13}C(\alpha,\alpha)^{13}C$ at Karlsruhe (M. Heil)**
  - **$^{13}C(\alpha,n)^{16}O$ and $^{17}O(\alpha,n)^{20}Ne$ at Cadarache**

Early example of SAMMY analysis with incident charged-particle



From: *Modeling of (α,n) Reactions on Light Nuclei and Perspectives*, R. Babut, E. Fort, E. Dupont (Cadarache), at ND2001 conference

Equations et al.

- **Available in the SAMMY manual**
- **Much messier than in non-Coulomb case**
- **Elastic scattering, especially, is more complicated**