

III.C. RESOLUTION BROADENING

Unlike Doppler broadening, for resolution broadening there is no “standard” or “best” function that is appropriate everywhere. Instead, each analysis code has its own version of resolution broadening, with specific formulations for specific experimental sites or setups. For this reason, many distinct types of resolution broadening are available in SAMMY.

Readers interested in a detailed study of resolution broadening, with emphasis on the 200-m flight path at the Oak Ridge Electron Linear Accelerator (ORELA), are referred to the paper by Larson, Larson, and Harvey [DL84].

The original resolution-broadening function in SAMMY is a combination of Gaussian plus exponential. This formulation is based upon the method used in the MULTI code [GA74] and is described in Section III.C.1.

A second option is a more realistic function — the ORR or “Oak Ridge Resolution function,” which uses mathematical descriptions of the components in the experimental broadening as determined from careful studies of ORELA experiments. Section III.C.2 gives specifics about this resolution function.

Another option is a realistic function designed to describe the experimental situation for the linac at Rensselaer Polytechnic Institute; this “RPI resolution function” is described in Section III.C.3. This option has been expanded to include features which may make it also useful for data from the Geel Electron Linear Accelerator (GELINA) at the Institute for Reference Materials and Measurements (IRMM) in Belgium or for data from the neutron time-of-flight (nTOF) facility at the European Council for Nuclear Research (CERN) in Switzerland.

A straight-line energy average resolution function is available, primarily for use with charged-particle or angular distribution data. See Section III.C.4.

A numerical user-defined resolution (UDR) function is described in Section III.C.5.

It is possible to include more than one of the above resolution functions for a single SAMMY run. To use this feature, include the command

TWO RESOLUTION FUNCTIONS together

in your INPUT file. With this command, you are permitted to use the following combinations of resolution functions:

1. one occurrence of the Gaussian plus exponential function; and/or
2. one straight-line energy average resolution function; and/or
3. at most one of the ORR, RPI, or UDR resolution functions.