

VI.C. THE DATA and Data CoVariance FILES

Several possible formats are offered for inputting experimental data into the current version of SAMMY; these are described in Subsection VI.C.1. ASCII versions include the original (MULTI-style) data file with three data points per line, a format consistent with CSISRS data, and a 20-significant-digit format to meet the need for high precision.

Several different options are provided for input of the data covariance matrix (DCM). One commonly used method is to assume that the DCM contains only diagonal components, in which case the uncertainty (square root of the diagonal covariance matrix element) provided in the DATA file is used. As discussed in Section IV, this is not the optimal treatment of data uncertainties, as it is not the correct treatment for the important systematic experimental uncertainties. Instead, the user is encouraged to use one or another of several forms for including off-diagonal data covariance information.

The DCM may be calculated external to SAMMY and provided explicitly in ASCII format, as described in Section VI.C.2. When using this “explicit DCM” option, the user must take great care to ensure that as many significant digits as possible are printed in the file in order to avoid numerical difficulties in the calculations.

A better option is for the user to provide the components of the DCM, as discussed in Section VI.C.3. This is preferable to the explicit DCM, for two reasons: (1) The input is both shorter and simpler for the user to generate. (2) Internal to SAMMY, matrix manipulation can be accomplished via the efficient “implicit data covariance” treatment as described in Section IV.

Finally, components of the off-diagonal DCM often are derived from uncertainties on parameters that are directly involved in the SAMMY analysis (e.g., the normalization or the resolution-function parameters might be viewed as contributing to the DCM). In these cases, there is now an option in SAMMY to simply flag these parameters with the number “3” to indicate that these are PUPs (Propagated Uncertainty Parameters). SAMMY will then make use of the uncertainties on the PUP’d parameters in deriving the implicit data covariance matrix. Details are discussed in Section IV.D.2.