

Ruler Version 3.2a [August 6, 2007] New Features

A. Calculations when widths or very short half-lives are encountered on a Level record: If a value in eV's or as units is found in the T field of the Level record, additional information on the Gamma or Level continuation records will be used in an attempt to properly calculate the reduced transition probabilities. These are:

1. WIDTHG on Gamma continuation record. If found this will be used to obtain the partial half-life.
2. WIDTHG0,... on a Level continuation record. If found and no WIDTHG on the corresponding Gamma continuation, these will be used to obtain the partial half-lives for the corresponding gammas.
3. If 1 or 2 above are not found and WIDTHG is found on a Level continuation record, it will be used to calculate the total partial gamma half-life.
4. If 1 through 3 above are not found and %IT or %G is found, the total partial gamma half-life will be calculated using this value.
Note: %IT should be reserved for isomeric states and %G used elsewhere.
5. If none of the above are found and other partial widths or branching modes are found on a Level continuation record, the total partial gamma half-life will be calculated based on these.

If nothing is found, the reduced transition probabilities will be calculated **but** a new record will not be output; this will be noted in the report file and the new summary file (See E below).

Note: Except for 1 and 2 above, there may still be some problems in calculating the reduced transition probabilities unless the I_γ 's are given in % photon branching from each level (option 7 on the PN record).

B. New logic for formatting asymmetric asymmetries: The program has been completely rewritten in terms of formatting the asymmetric uncertainties of the new values. This should be more stable and will also point out problems encountered in the formatting. These are:

1. Cases where the asymmetric uncertainty could not be formatted.
 2. Cases where there are too many significant digits (absolute difference in the number of digits for the positive and negative components greater than 2).
- These will be indicated in the report file and the new summary file (See E below).

C. Comparison of new or old values against RUL: In the mode for calculating new $BE\lambda W$'s and $BM\lambda W$'s, there is now a comparison of the new values or old values, if these are kept, against the Recommended Upper limits (RUL's). Discrepancies are noted in the report file and the new summary file (See E below).

Notes:

1. An uncertainty of 40% is assumed if the value is approximate and an uncertainty of 10% is assumed if it is a lower limit.
2. For A=6-44 where there are RUL's for both isovector and isoscalar transitions and the values may only be discrepant with one of them.
3. E2's in super-deformed bands may have $\Gamma_\gamma/\Gamma_W > 1000$.

4. There may be cases where the value is unrealistically large but the uncertainty is such that it overlaps the RUL. A typical case is a possible M3 admixture. In such cases, it may be better to use RUL to estimate an upper limit on the mixing ratio.
 5. If there is insufficient information to calculate new values, the old record is not checked. D below should pick up these values for manual checking.
- D.** Additional checks of input data: Some additional checks are made with respect to $BE\lambda W$'s or $BM\lambda W$'s on the Gamma continuation records and possible problems are noted in the report file and the new summary file (See E below). These checks are:
1. A $BE\lambda W$ or $BM\lambda W$ without a multipolarity on the Gamma record
 2. $BE\lambda W$ and $BM\lambda W$ with a multipolarity on the Gamma record but no mixing ratio on a Gamma or Gamma continuation record.
 3. $BE\lambda W$ or $BM\lambda W$ but $\Delta\pi$ is unknown (*e.g.*, D, Q, *etc.* given on Gamma record).
 4. Disagreement between $BE\lambda W$ or $BM\lambda W$ and the multipolarity on the Gamma record.
- Note:** Unless a new record is created, these continuation records will be retained and need to be manually checked to see if they should be deleted. New records will not be created for 1 through 3 above and will be created for 4 only if there is enough information to do so.
- E.** New file summarizing problems found. In an attempt to make it easier to find possible problems a new file will be produced containing a short summary of problems. This file is only created when calculating new reduced transition probabilities and only if problems are encountered. The file consists of a header giving the version of RULER used and a date stamp and the following:
1. ID record of dataset where problems occurred,
 2. Parent Level record of the gamma's with possible problems, and
 3. Gamma record and Gamma continuation record with problems or
 4. gamma energy and problems.