ENSDF Analysis & Utility Codes

- Updates/corrections since USNDP07 Meeting
  - COMTRANS, GABS, NDS Production
- BrIcc recent developments, future plans
- BrIcc Web Interface
- BrIccMixing – status, input/output

(New NDS software – covered in separate talk by S. Geraedts)

Status Report to Structure & Decay Data Working Group at USNDP Meeting, BNL, 5-6 Nov. 2008 by C. Baglin (LBNL) and T. Kibèdi (ANU)

COMTRANS (Burrows, Tuli): fixed bug that caused loss of information from some T records.

NDS Production (Tuli): fixed bug in decay scheme drawing code that resulted in loss from drawing of exponent information for weak ε or β intensities entered in E format.

GABS (Browne): changes discussed during USNDP07 meeting were implemented and revised code has been submitted to NNDC for final checking prior to release.

Remaining Problems:

FMTCHK: the check for isomeric states should look for levels with $T_{1/2}$ >0.1 s, not those >0.1 ms.

RULER (?): some old records are kept even though new calculation differs (may be OK but check RULER.RPT file).

BrIcc – recent developments (Nov-2007 to Oct-2008)

with T.W. Burrows† (NNDC), M.B. Trzhaskovskaya (PNPI), P.M. Davidson (ANU), C.W. Nestor, Jr. (ORNL)

Version 2.2 (Apr-2008)

- Z=5-110
- "Frozen Orbital" and "No-Hole" approximations with identical energy mesh
- Calculations for the most abundant isotope adopted from the 2007 evaluation of IUPAC Commission on Atomic Weights and Isotopic Abundances

  Z=82: was A=182!!! (2002Ba85 … BrIccV2.1); now A=207
- *Updated binding energies*
- *Some changes in program logic, TMP file deleted after run*
- *New program manual*

Version 2.2a (Jul-2008)

- *Small data file update, lowest data point was 2 keV above BEK (Z=88,98,100-102)*

Reference to BrIcc: 2008Ki07 *Nucl. Instrum. Methods Phys. Res. A589, 202 (2008)*

BrIcc – future plans (2009)

- Ω(E0) tables for conversion electrons

  BrIcc table composed from 3 tabulations and incomplete in terms of atomic shells and or energies

  Currently testing CATAR (Pauli and Raff, 1975Pa26) code to extend tables for Z=2-126 and all atomic shells

- Ω(E0) tables for pair conversion

  BrIcc uses 1986PaZM (Z=8-40)

  New table is expected with K. Robertson (ANU)

- Calculation of mixed ICC for E0+E2(+M1) transitions

  Planned after the Ω(E0) tables

- Correct problem in overestimating shell ratio uncertainties (no progress)

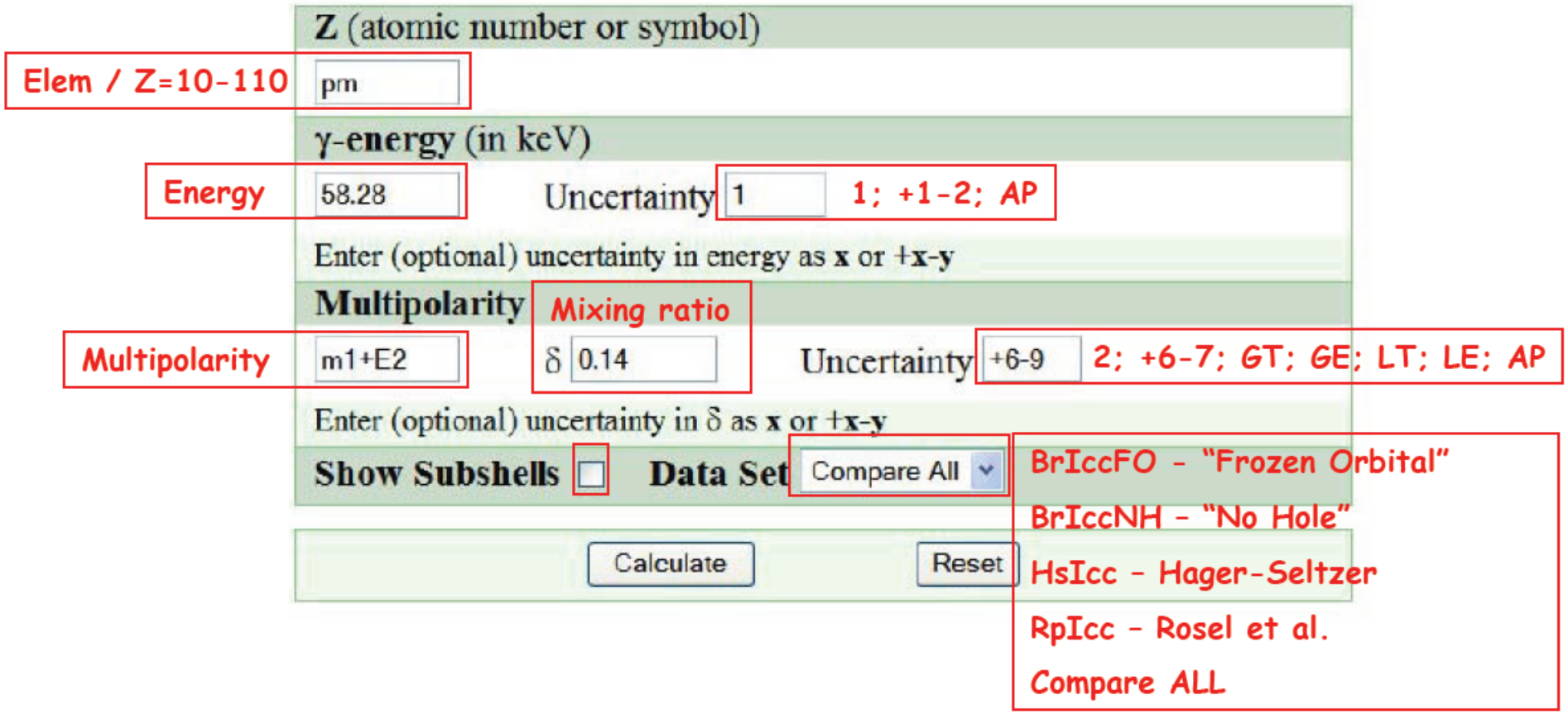
- Estimating uncertainties for small MR; MR<2 DMR (no progress)

BrIcc web interface

http://wwwrsphysse.anu.edu.au/nuclear/bricc/

In 2008 5120 Unique Visitors

^{151}Pm; 58.28(1) keV; M1+E2; δ=0.14(+6-9)



BrIccMixing - status

Status v2.2 (May-2008) based on BrIcc v2.2

- Runs on Windows only

Data set containing N-type CE data (unnormalized CE intensities)

- Uses CFIT (1980Ry04) routines to get best parameters of |MR| and *R*
- Calculates theoretical ICC`s using BrIcc, but uncertainties ignored
- No attempt to incorporate correlation effects

Data set containing A-type ICC data (conversion coefficients) ONLY

$$\chi^2 = \sum_{i=1}^{n} \frac{\left[\alpha_{i,Theor}(MR) - \alpha_{i,Exp}\right]^2}{\sigma^2_{i,Theor} + \sigma^2_{i,Exp}}$$

- Generates $\chi^2(MR)$ hyper surface in 9000 steps; 0.01 degrees in *ArcTan(MR)*
- Uses $\alpha_{i,\,Theor}(MR)$ and $\Delta\alpha_{i,\,Theor}(MR)$ values from BrIcc
- Finds |MR| where χ^2 is minimal
- Determines asymmetric uncertainties, ΔMR_{LOWER} and ΔMR_{UPPER}
- Incorporate correlation effects (with Vito Vanin, slow progress)

BrIccMixing - input file

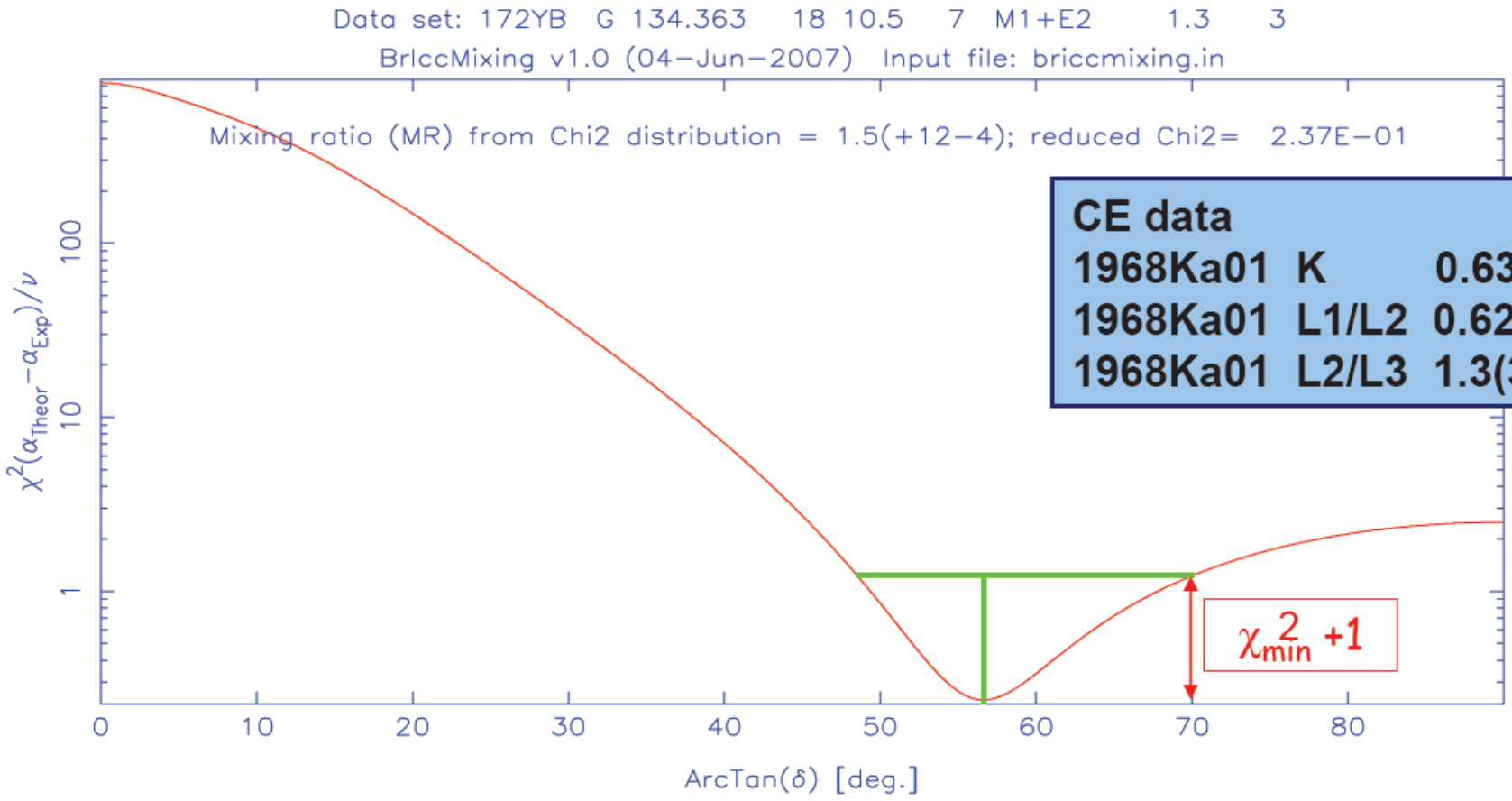
```
178HF  G     88.862 6    68.411E1(+M2)
178Hf 88.862 6
E1(+M2) 0.02  1.0
# NsrKey    Shell   IccVal    Unc   Type
1980Va04    T       0.52      3     A
1980Va04    L1/L2   0.058     13    A
1980Va04    M       0.019     6     A
1989Ki24    T       0.480     9     N
1989Ki24    K       0.398     9     N
1989Ki24    L1      0.0378    19    N
1989Ki24    L2      0.0130    7     N
1989Ki24    L3      0.0148    8     N
*NEW
```

[Title]
[transition used to invoke Brlcc]
[Multipolarity, MR(ini)*, R(ini)]
[comment line]
[CE data; max 100 entry]

[start a new data set]

* We use MR for the mixing ratio, δ

BrIccMixing sample output
134.363(18) keV M1+E2 transition in ^{172}Yb - χ^2(MR) hyper surface



CE data

1968Ka01	K	0.63(16)
1968Ka01	L1/L2	0.62(19)
1968Ka01	L2/L3	1.3(3)

Preferred method

MR=1.3(3) (ENSDF)

MR=1.52(24) (BrIccMixing from Chi-squared fit)

MR=1.5(+12-4) (BrIccMixing from X²(MR) hyper surface)