Making Matrices for ARIS SpecTcl from savesets

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Research presentation

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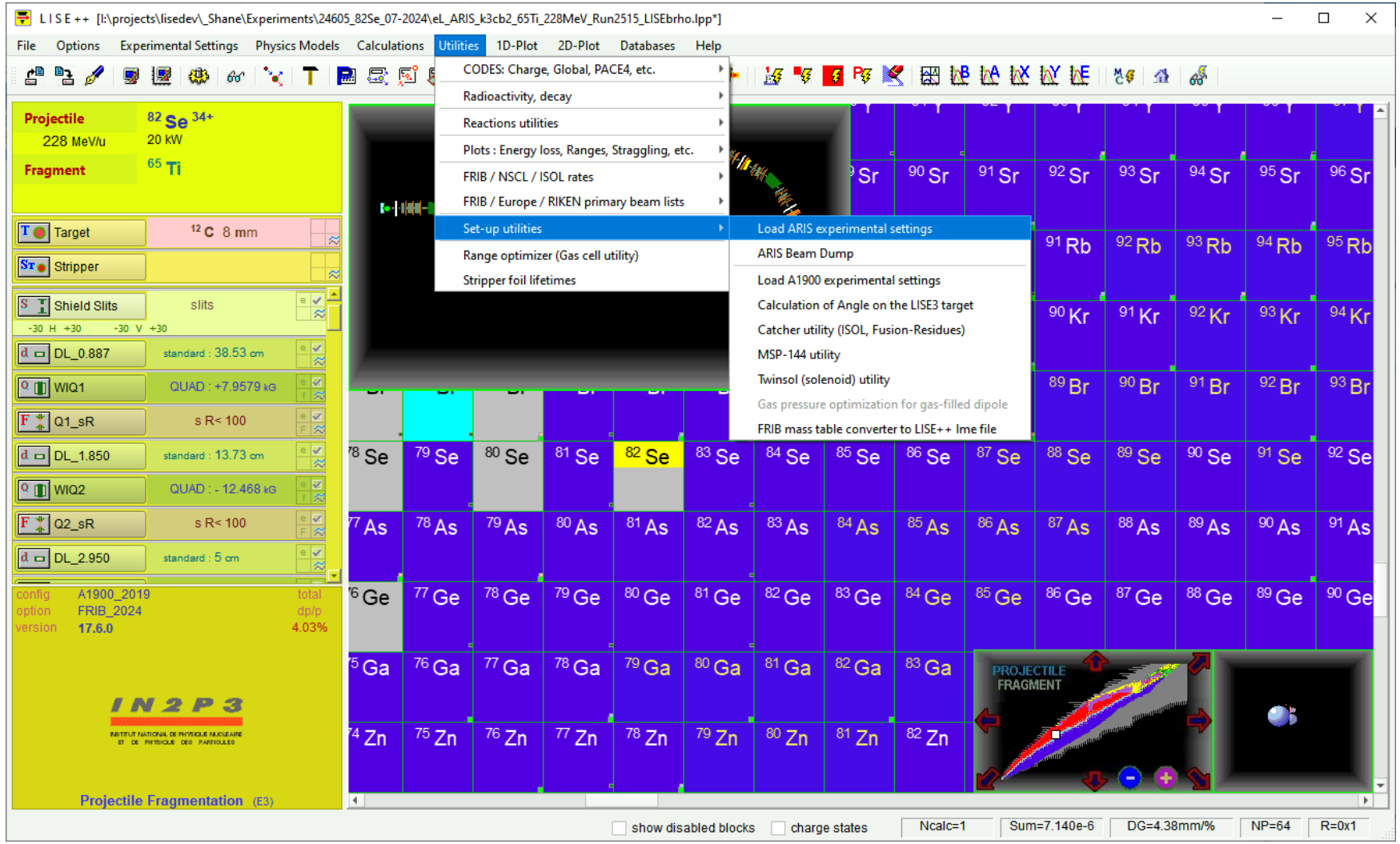
ARIS extended file (LISE-optics)



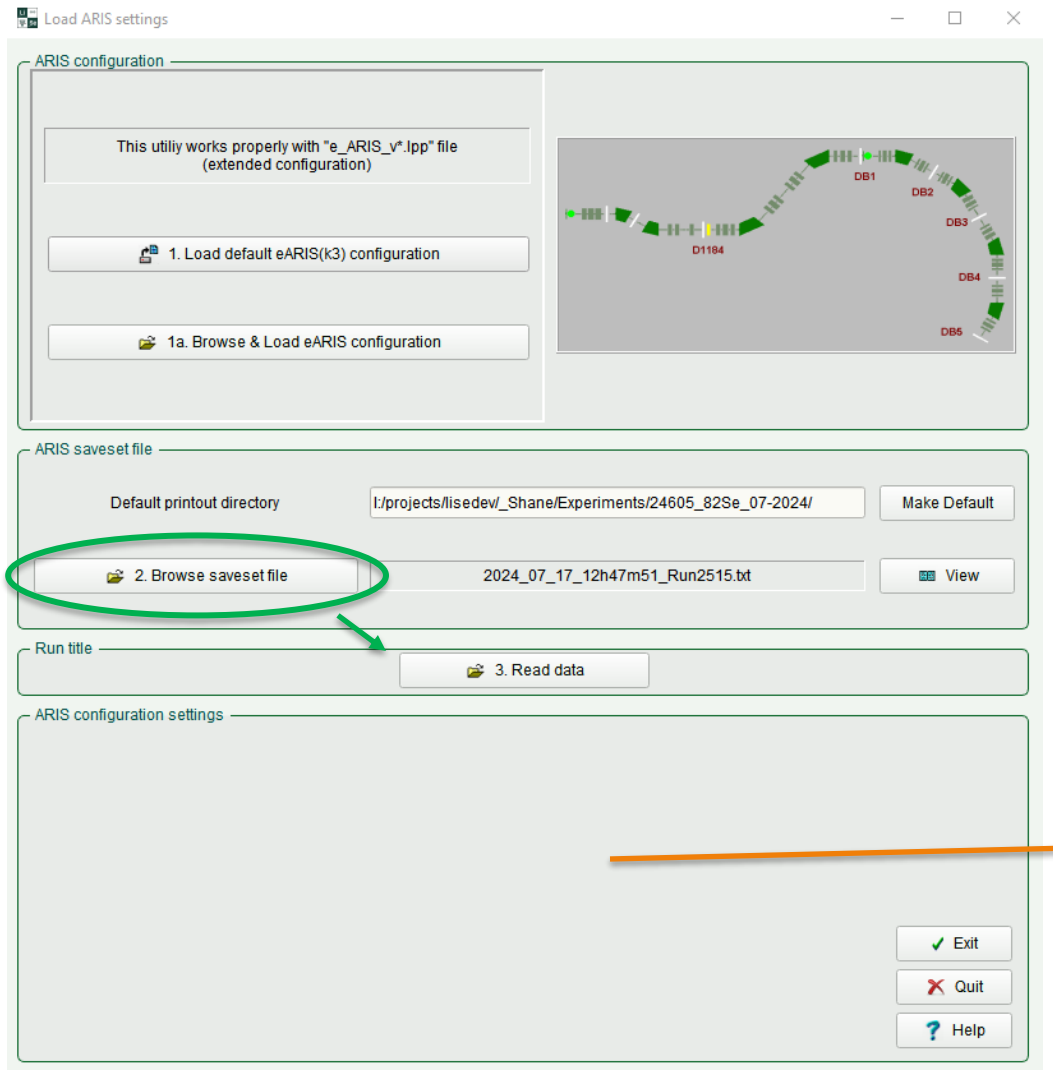
- Open the extended LISE file (available in the LISE distribution package: \My Documents\LISEcute\files\examples\FRIB\eARIS\eL_ARIS_k3cb2.lpp).
  - This file uses the most common optics setting used in ARIS: momentum compression in the pre-separator and high transmission in the C-Bend.
- Next, set your experimental configuration up (primary beam, energy, and power; fragment setting; target thickness; wedges, if applicable, etc.)
- Then, read in the saveset for the run you want to analyze:
  - Utilities → Set-up utilities → Load ARIS experimental settings

Utilities

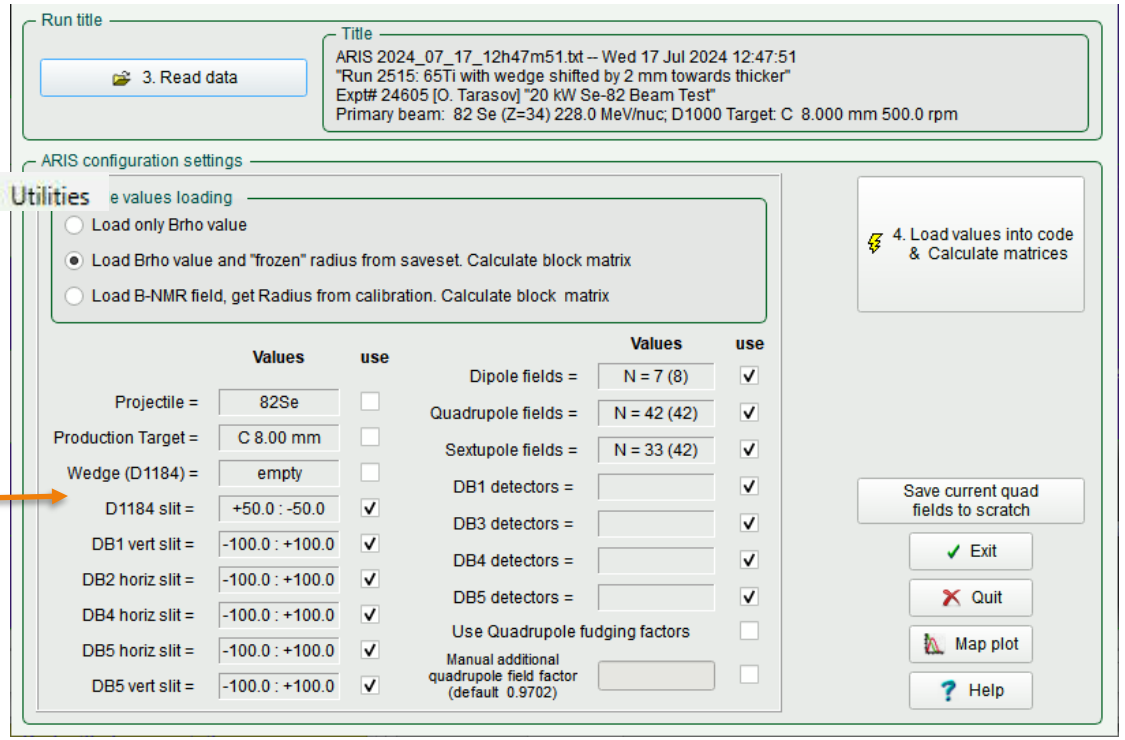
Set-up utilities

Load ARIS experimental settings

Loading saveset



- In the dialog box that pops up, browse for the saveset you want to use.
- Once selected, click the “Read data” button below.

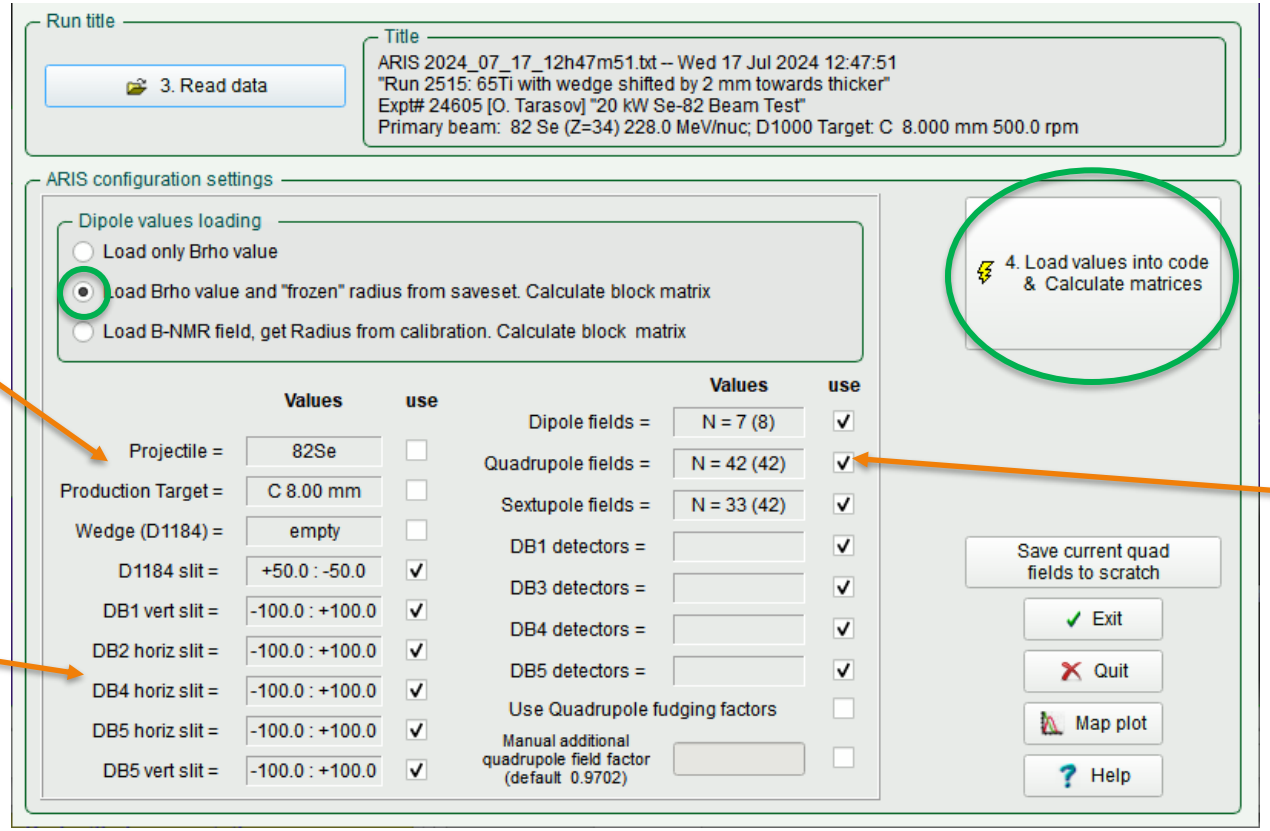


Load ARIS settings

- There are several options for dipole settings: Brho only, Brho and ‘frozen’ radii from saveset, and B-NMR field, radius from calculation.
  - Brho and frozen radius are the most commonly used.

Leave these boxes unchecked, as they may mess up the primary beam settings and/or the fragment settings.

If there is slit information, it will appear here.

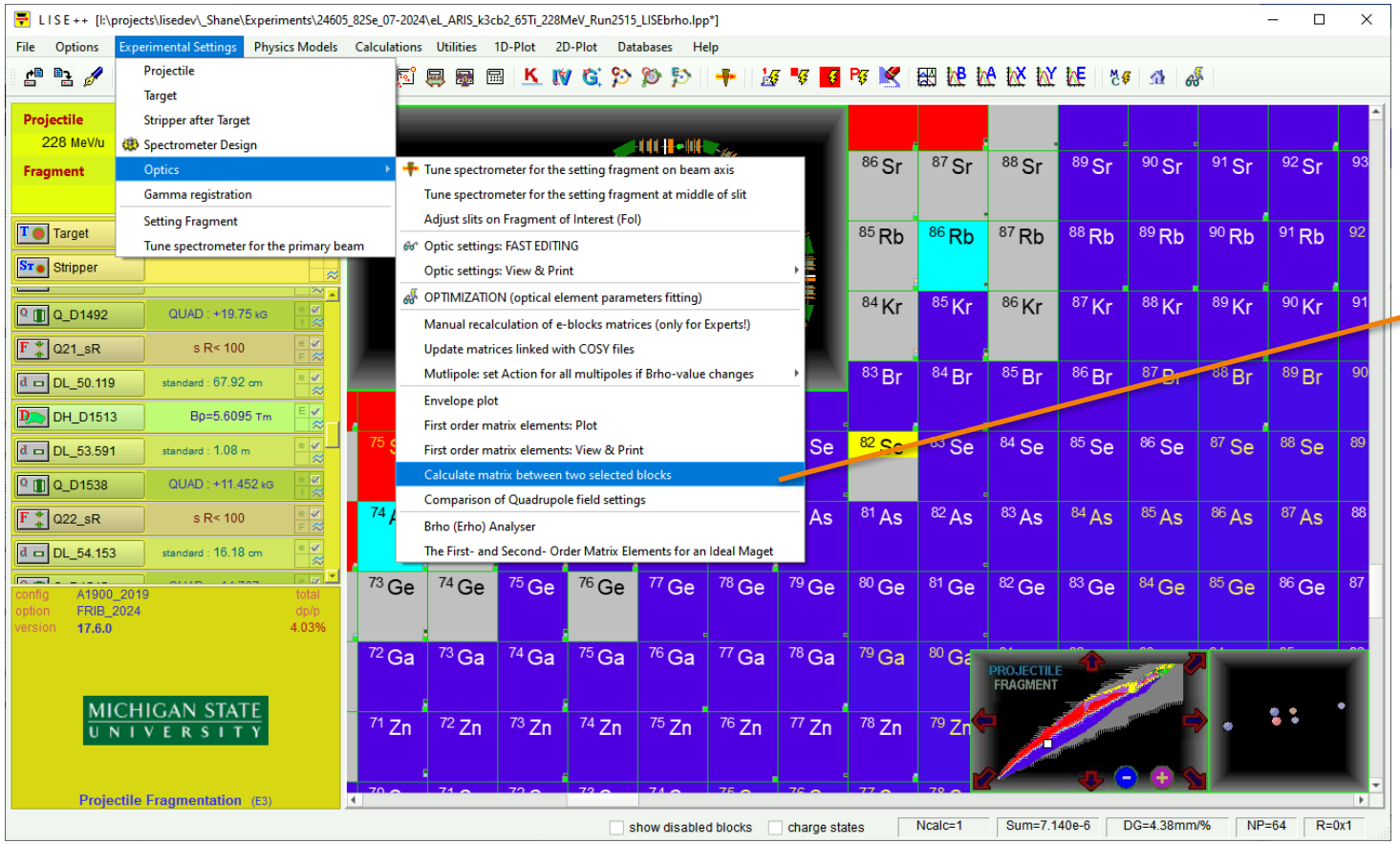


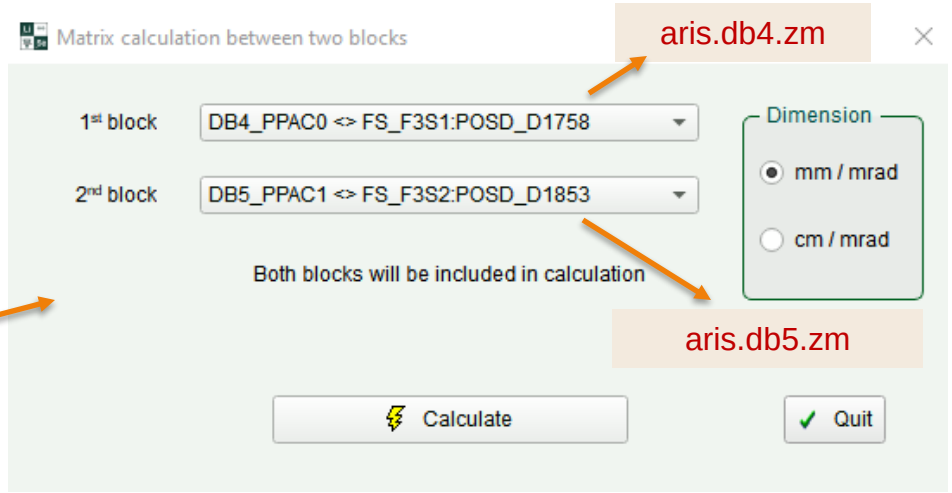
Make sure to load the values into LISE and calculate the new matrices!

These will input the magnetic fields from the saveset.

Calculate matrix between two locations: db4.ppac0 and db5.ppac1

- Once the saveset has been implemented, you may extract the transfer matrices you desire.
- Go to Experimental Settings → Optics → Calculate matrices between two selected blocks





- This dialog window will allow you to select the two blocks you wish to calculate the matrix between.
- mm/mrad is the most common units to use.
- If you don't see the blocks you want, go to Spectrometer Design and ensure they are enabled.

Matrix calculation result

```
Matrix from DB3_PPAC1 (FS_F2S2:POSD_D1663) to DB4_PPAC0 (FS_F3S1:POSD_D1758)
Number of blocks: 21; Length: 9.50463 m

                                                        transport format [mm-mrad]
                      * TRANSFORM 1 *
  1 [X]:    -1.7803e+00   +8.9367e-01    0             0             0            +2.3272e+01
  2 [T]:    +1.6204e-01   -6.4306e-01    0             0             0            -2.8103e-01
  3 [Y]:     0             0           -1.1337e+00   -3.5053e-01    0             0
  4 [F]:     0             0           +8.8480e-01   -6.0850e-01    0             0
  5 [L]:    +3.2707e-01   -1.4714e+00    0             0           +1.0000e+00   -1.0761e+00
  6 [D]:     0             0             0             0             0            +1.0000e+00
-------------------------------------------------------------------------------------------
                      * TRANSFORM 2 *
  1   1:    -3.2324e-05
  1   2:    +3.7187e-04   -4.7336e-04
  1   3:     0             0           -8.1684e-05
  1   4:     0             0           -3.7679e-04   -1.9245e-03
  1   5:     0             0            0             0             0
  1   6:    +1.0113e-02   +2.8771e-02    0             0             0            -2.2392e-01
-------------------------------------------------------------------------------------------
  2   1:    +8.6894e-06
  2   2:    -8.7659e-05   -1.6549e-04
  2   3:     0             0           +1.0051e-06
  2   4:     0             0           +6.1326e-05   +1.8666e-04
  2   5:     0             0            0             0             0
  2   6:    -1.8102e-03   -6.3868e-03    0             0             0            +2.1920e-03
-------------------------------------------------------------------------------------------
```

- The output will look like the example to the left.
- The top matrix is the first order transfer matrix, while the ones below it are the second order matrices.
- This example is the transfer matrix between DB3 PPAC1 and DB4 PPAC0.
- This resulting map should be transferred to file CB2_Dip34_*.tcl and linked in pid.tcl

Matrices in ARIS SpecTcl (CB2-optics)

calibrations/pid.tcl

```
if {$RunNumber >=3117 && $RunNumber <= 3156 } {

set aris.db1.zm ${aris.db1.z}
set aris.db2.zm ${aris.db2.z}
set aris.db3.zm ${aris.db3.ppac1.z}
set aris.db4.zm ${aris.db4.ppac0.z}
set aris.db5.zm ${aris.db5.ppac1.z}

source ./calibrations/matrix/CB2_Dip34_run3120.tcl
source ./calibrations/matrix/CB2_Dip45_run3120.tcl
}
```

ARIS SpecTcl supports CB1-optics.
Check CB1_Dip13.tcl and
CB1_Dip35.tcl fles im the matrix folder

/calibrations/matrix/

CB2_Dip34_run3120.tcl

```
#-------- Dip34   exp 21035   db3.ppac1 - db4.ppac0   138Sb
puts -nonewline  "matrix CB1_Dip34 run 3120"

treevariable -set aris.Dip34.matr.xx -1.6857;
treevariable -set aris.Dip34.matr.xa  0.2
treevariable -set aris.Dip34.matr.xd  23.058;

treevariable -set aris.Dip34.matr.xdd  0;

treevariable -set aris.Dip34.matr.ax  0.12888;
treevariable -set aris.Dip34.matr.aa -0.61580;
treevariable -set aris.Dip34.matr.ad -0.19710;

treevariable -set aris.Dip34.matr.yy -1.0727;
treevariable -set aris.Dip34.matr.yb  -0.17076;

treevariable -set aris.Dip34.matr.by  0.83006;
treevariable -set aris.Dip34.matr.bb -0.80011;

treevariable -set aris.Dip34.matr.lx  0.26395;
treevariable -set aris.Dip34.matr.la -1.4141;
treevariable -set aris.Dip34.matr.ld -1.0772;


treevariable -set aris.Dip34.b_use_x 2; #  "-1,0,1,2"); // -1 not use, 0- ppac0, 1-ppac1, 2 - both ppacs
treevariable -set aris.Dip34.e_use_x 0; #  "-1,0,1,2"); // -1 not use, 0- ppac0, 1-ppac1, 2 - both ppacs
treevariable -set aris.Dip34.b_use_a 1;
treevariable -set aris.Dip34.e_use_a 0;

treevariable -set aris.Dip34.delta_method 0; # forward

#-------------------------------------------
puts "   end CB2_Dip34 *"
```

CB2_Dip45_run3120.tcl

```
#-------- Dip45      e21035  db4.ppac0 db5.ppac1  138Sb
puts  -nonewline   "matrix CB1_Dip45 run 3120"

treevariable -set aris.Dip45.matr.xx -0.68612;
treevariable -set aris.Dip45.matr.xa  0.4;
treevariable -set aris.Dip45.matr.xd  15;

treevariable -set aris.Dip45.matr.ax  0.006406;
treevariable -set aris.Dip45.matr.aa -1.4563;
treevariable -set aris.Dip45.matr.ad  0.030511;

treevariable -set aris.Dip45.matr.yy -0.51088;
treevariable -set aris.Dip45.matr.yb  -0.24174

treevariable -set aris.Dip45.matr.by  1.4126
treevariable -set aris.Dip45.matr.bb  -1.2890

treevariable -set aris.Dip45.matr.lx  0.012144;
treevariable -set aris.Dip45.matr.la -2.2843;
treevariable -set aris.Dip45.matr.ld -1.0752;

#-------------------------
treevariable -set aris.Dip45.b_use_x 0; #  "-1,0,1,2");
# // -1 not use, 0- ppac0, 1-ppac1, 2 - both ppacs      only  db4-ppac0
treevariable -set aris.Dip45.e_use_x 2;
#  "-1,0,1,2"); // -1 not use, 0- ppac0, 1-ppac1, 2 - both ppacs
treevariable -set aris.Dip45.b_use_a 0;
treevariable -set aris.Dip45.e_use_a 1;

treevariable -set aris.Dip45.delta_method 1; # reverse

puts "   end CB1_Dip45 *"
```