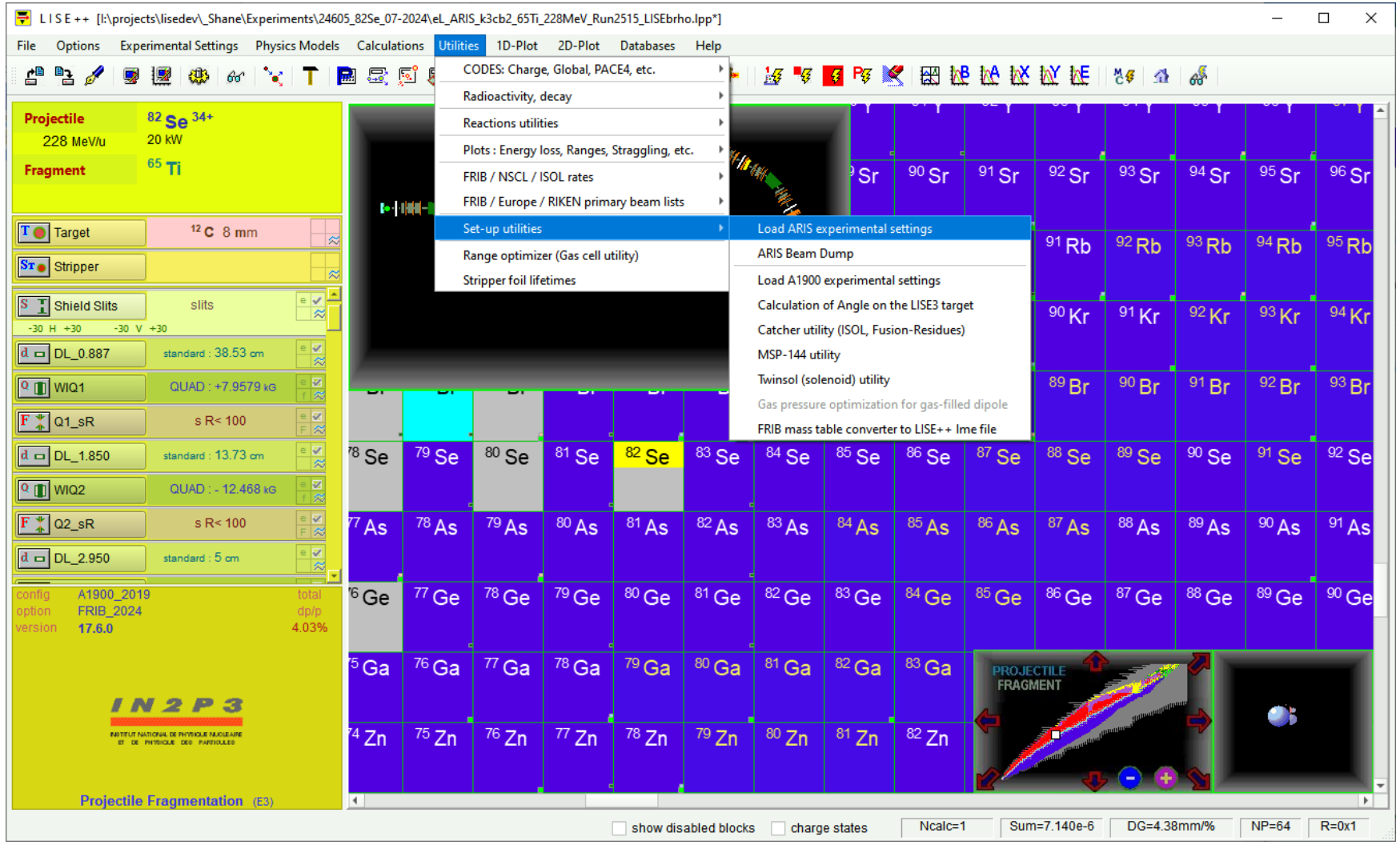
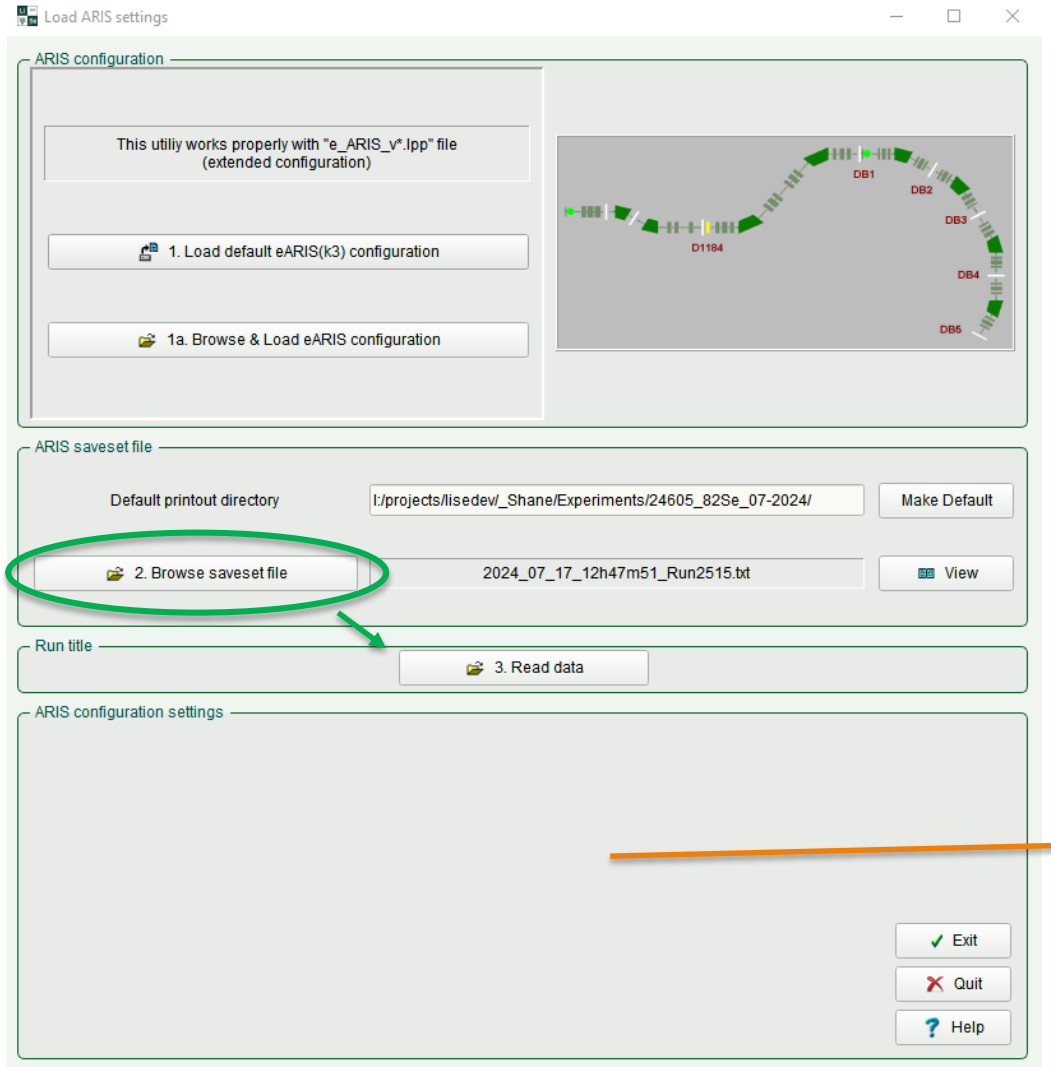
Extracting Matrices in LISE

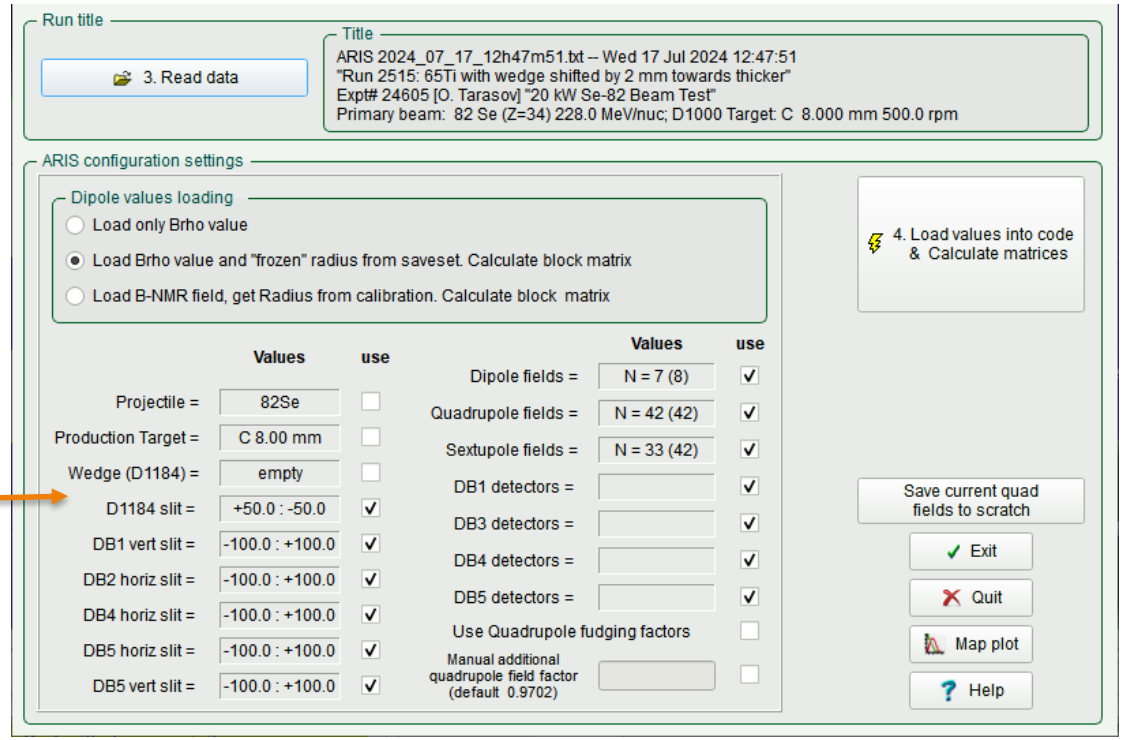


- Open the extended LISE file (available in the LISE distribution package: \My Documents\LISEcute\files\examples\FRIB\eARIS\eL_ARIS_k3cb2.lpp).
  - This file uses the most common optics setting used in ARIS: momentum compression in the pre-separator and high transmission in the C-Bend.
- Next, set your 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

Extracting Matrices in LISE



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

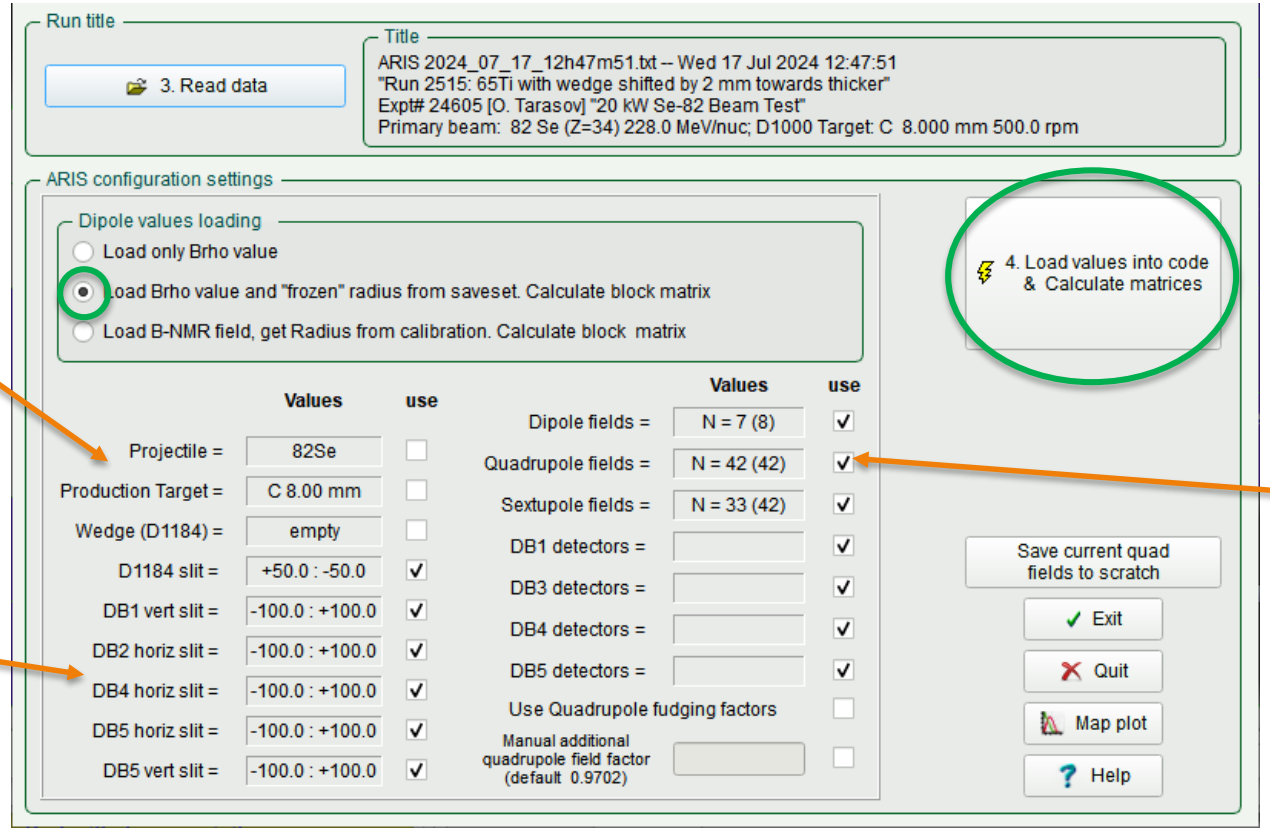


Extracting Matrices in LISE

- 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.

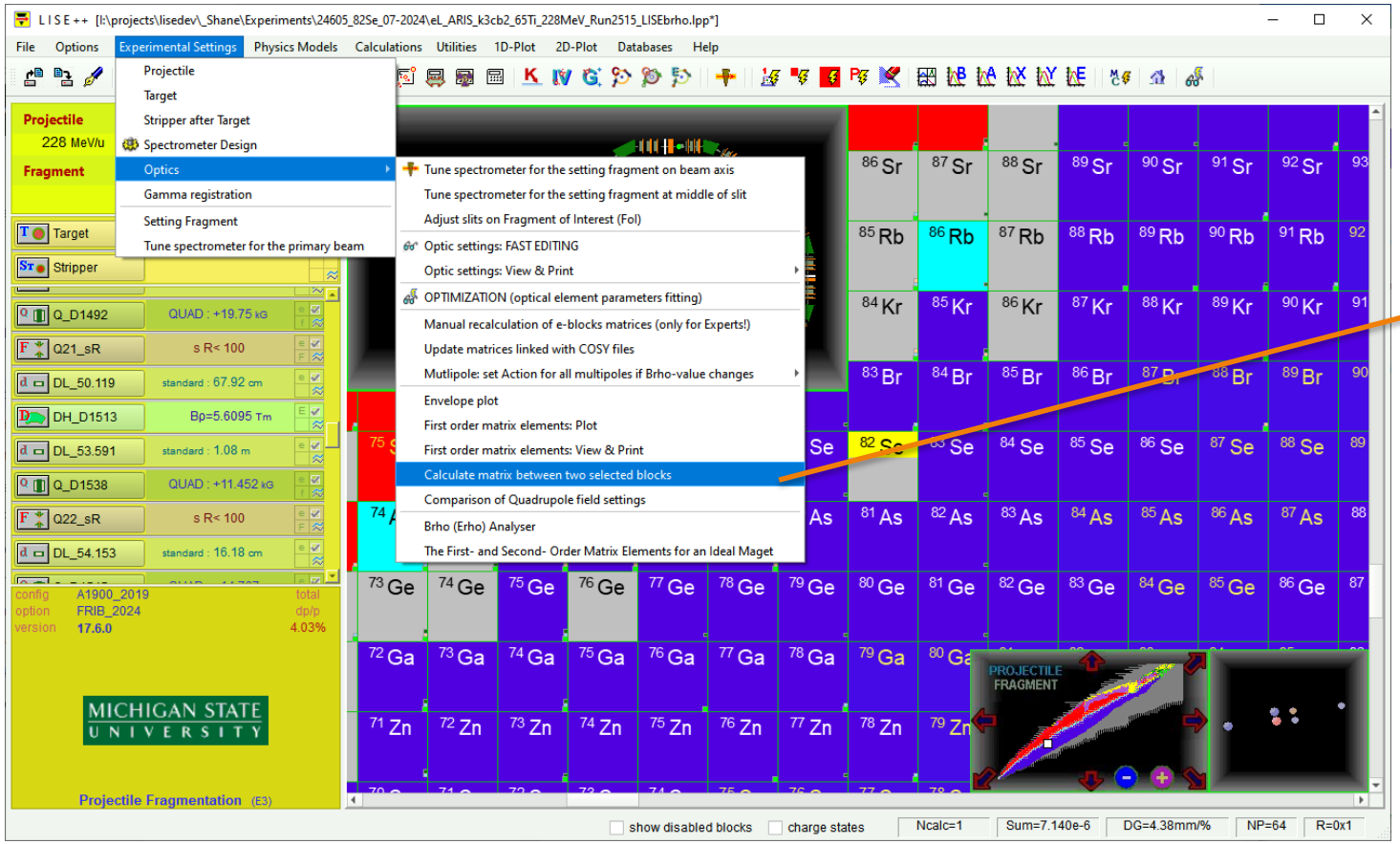


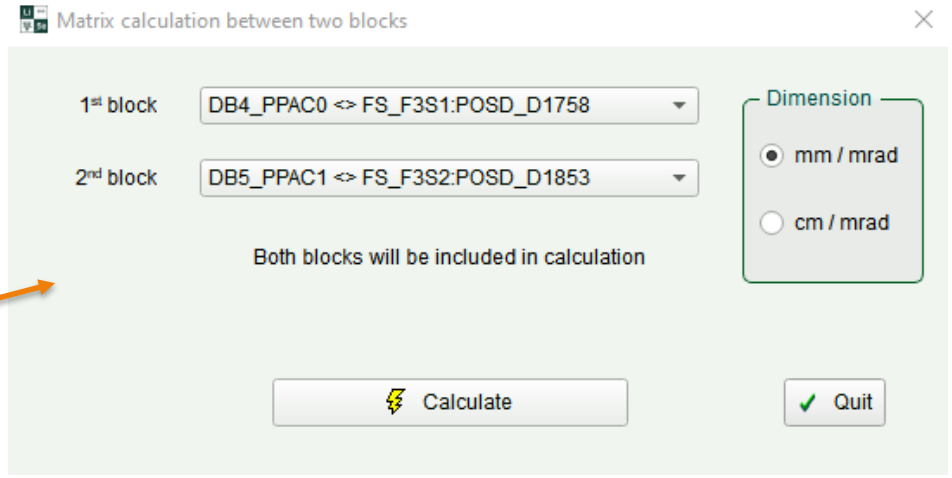
Make sure to load the values into LISE and calculate the new matrices!

These will input the magnetic fields from the saveset.

Extracting Matrices in LISE

- 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.

Extracting Matrices in LISE

```
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.

Transporting to PID SpecTcl format

/user/arisdaq/PID/Develop/v27/calibrations/matrix

CB2_Dip34_run2515.tcl

```
#-------- Dip34   exp 24605   db3.pppac1 - db4.ppac0
puts -nonewline  "matrix CB2_Dip34 run 2515*"
#-----------------------------------------
set aris.Dip34.brho0 5.30480;

set aris.Dip34.matr.xx -1.7803;
set aris.Dip34.matr.xa  0.89367
set aris.Dip34.matr.xd  23.272;

set aris.Dip34.matr.ax  0.16204;
set aris.Dip34.matr.aa -0.64306;
set aris.Dip34.matr.ad -0.28103;

set aris.Dip34.matr.yy -1.1337;
set aris.Dip34.matr.yb  -0.35053;

set aris.Dip34.matr.by  0.88480;
set aris.Dip34.matr.bb -0.60850;

set aris.Dip34.matr.lx  0.32707;
set aris.Dip34.matr.la -1.4714;
set aris.Dip34.matr.ld -1.0761;


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

set aris.Dip34.delta_method 0; # forward

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

CB2_Dip45_run2515.tcl

```
#-------- Dip45      e24605  db4.ppac0 db5.ppac1
puts "matrix CB2_Dip45 run 2515 *"
#-----------------------------------------
set aris.Dip45.brho0 5.30340;
#---------------------------------

set aris.Dip45.matr.xx -0.68635;
set aris.Dip45.matr.xa  -0.12382;
set aris.Dip45.matr.xd  15.739; #

set aris.Dip45.matr.ax  0.0094403;
set aris.Dip45.matr.aa -1.4553;
set aris.Dip45.matr.ad  0.029456;

set aris.Dip45.matr.yy -0.39847;
set aris.Dip45.matr.yb  -0.32287;

set aris.Dip45.matr.by  1.5201;
set aris.Dip45.matr.bb  -1.2779;

set aris.Dip45.matr.lx  0.016880;
set aris.Dip45.matr.la -2.2901;
set aris.Dip45.matr.ld -1.0753;

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

set aris.Dip45.delta_method 1; # reverse
```

/user/arisdaq/PID/Develop/v27/calibrations/

pid.tcl

```
} else {   ;# 2500-2540 e24605 82Se

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

        source ./calibrations/matrix/CB2_Dip34_run2515.tcl
        source ./calibrations/matrix/CB2_Dip45_run2515.tcl
}
```