

---

---

# A1900 fragment separator and selected NSCL control applications

Mini-lecture series for HiRA group

By Michal Mocko

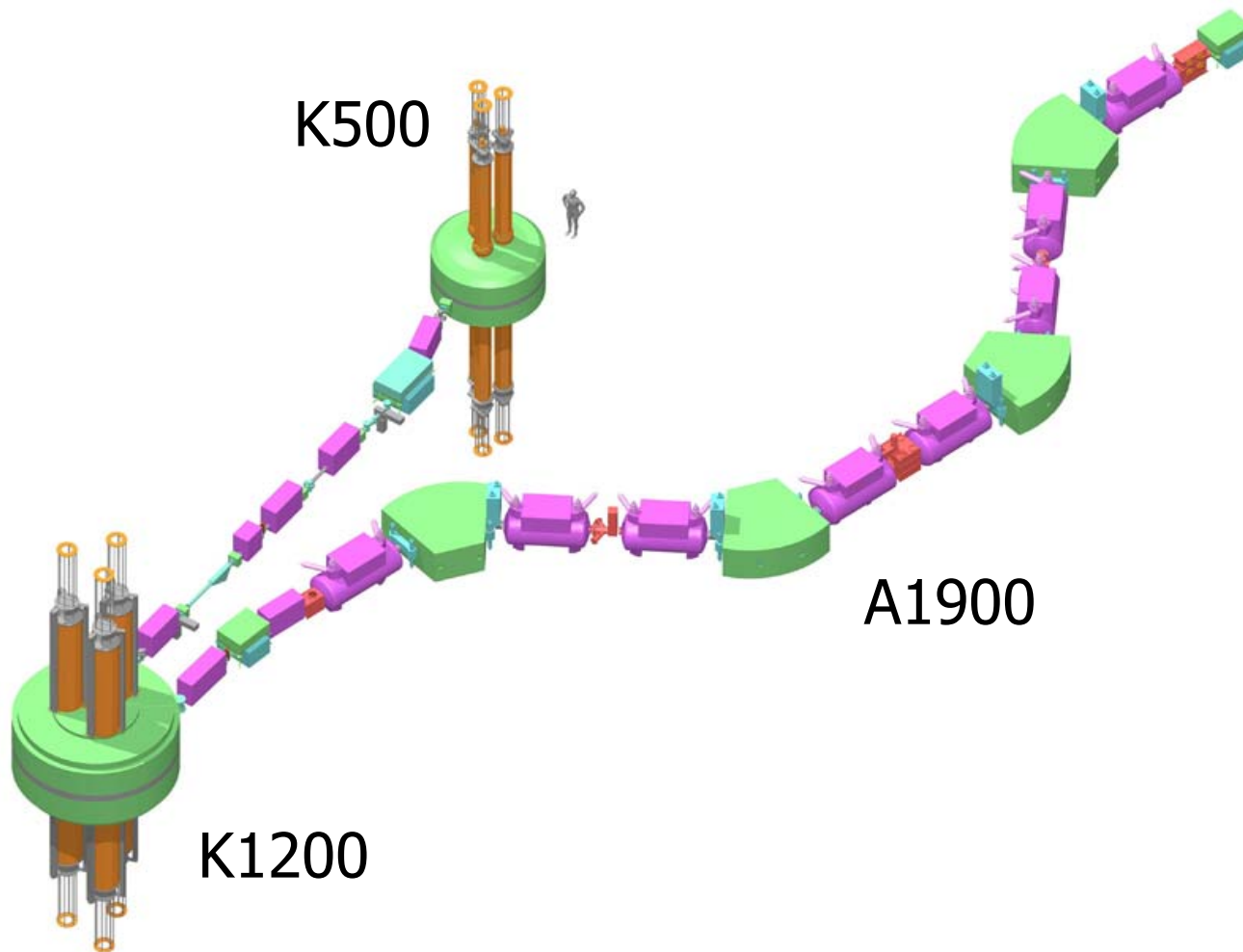
# Part I

---

- A1900 overview (what it consists of...)
- A1900 detectors
- Particle identification in the A1900
- Method of separation using the A1900

# Coupled Cyclotron Facility

---



Beam list:

$^{40}\text{Ca}$  – 15pA

$^{48}\text{Ca}$  – 15pA

$^{58}\text{Ni}$  – 5pA

$^{64}\text{Ni}$  – 7pA

$^{86}\text{Kr}$  – 15pA

etc.

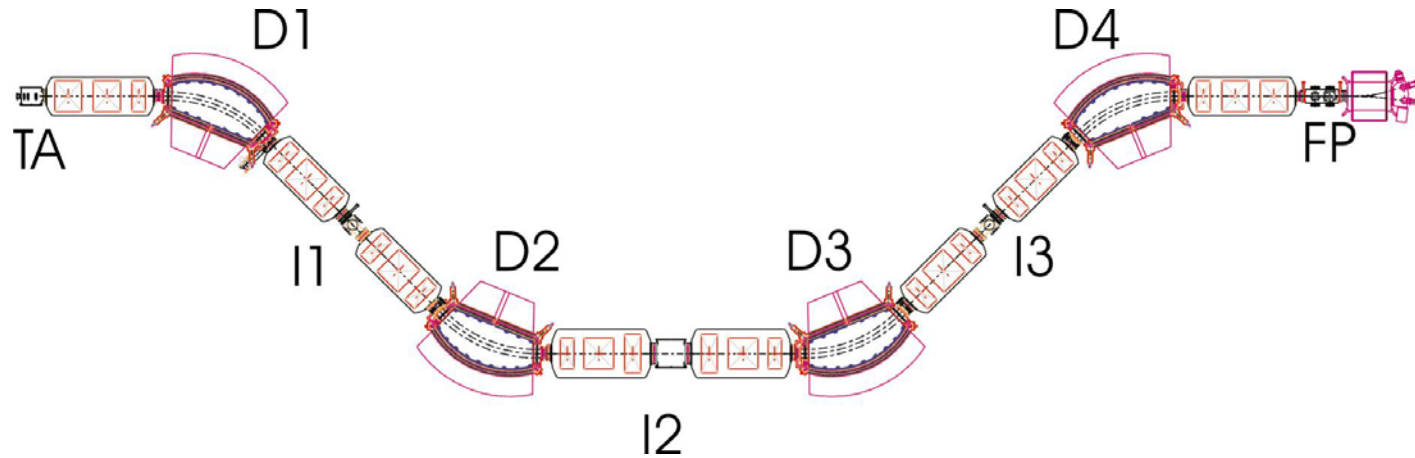
At 140MeV/u

# A1900 – fragment separator

---

- Magnetic spectrometer
- Filter of projectile fragmentation products
- Five image planes
- Mirror symmetry about I2
- Selected properties:
  - Length 37m
  - 4x 45° dipoles
  - 24 quadrupoles
  - $dp/p = 5\%$
  - $\delta = 59\text{mm}/\%$
  - $d\Omega = 8\text{msr}$
  - $B\rho_{\text{max}} = 6\text{Tm}$

# A1900 - overview



- *Image 1:*
  - Wedge
  - Slit (remote)
- *Image 2:*
  - Slit
  - PPACs (2x)
  - Wedge (3x)
  - Scintillator (ToF)
- *Image 3:*
  - Slit system (remote)
- *Focal plane:*
  - PPACs (2x)
  - dE detector (PIN diode)
  - Scintillator (ToF)

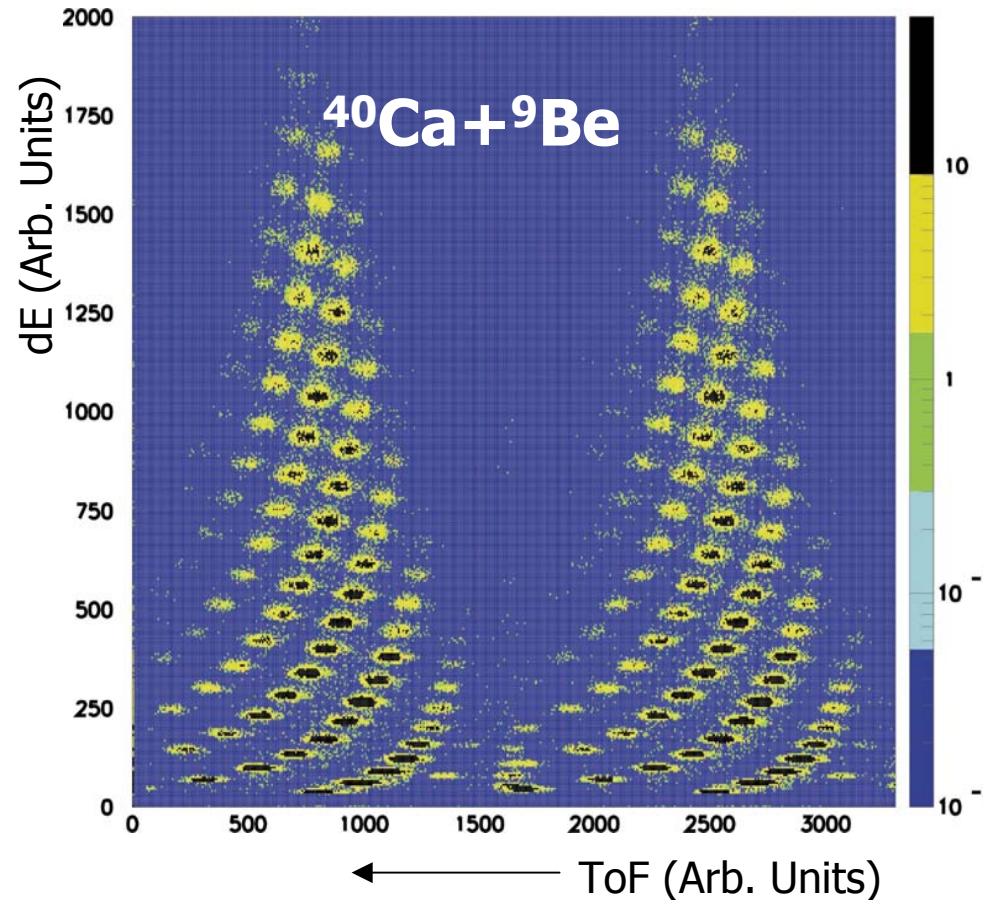
# Particle identification (PID)

- Method:  $B\rho$ -ToF-dE

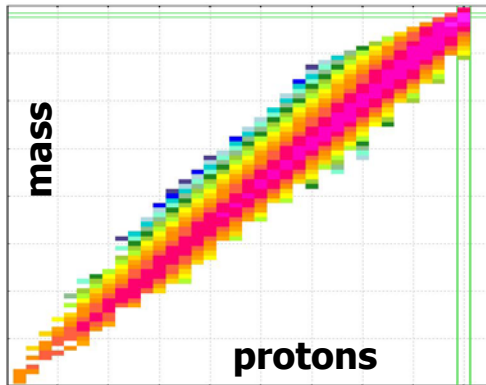
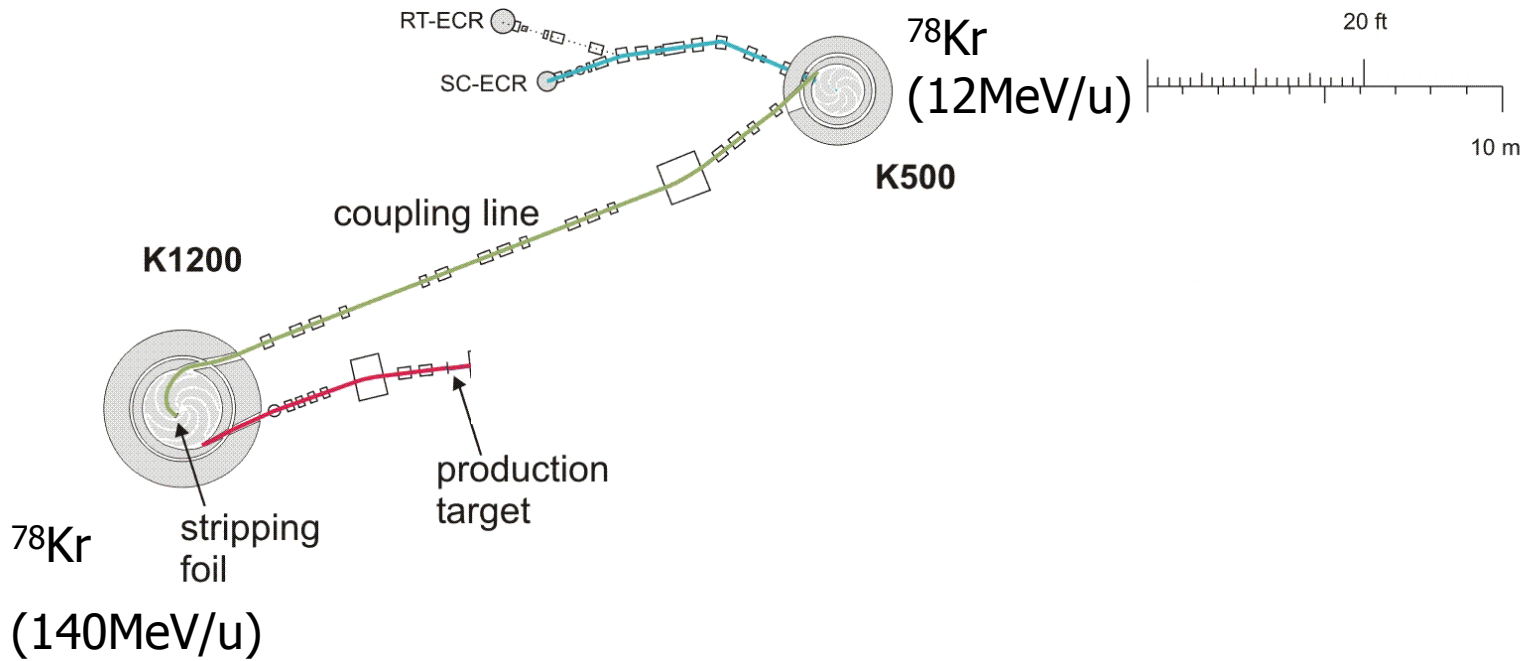
$$B\rho = \frac{p}{Q} \quad dE \approx \frac{Z^2}{v^2}$$

$$ToF \approx v$$

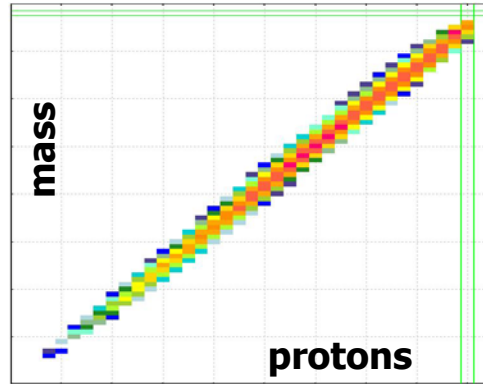
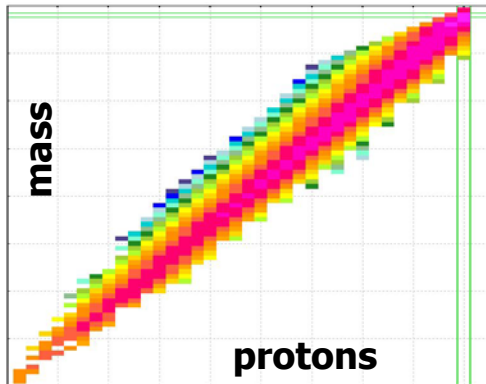
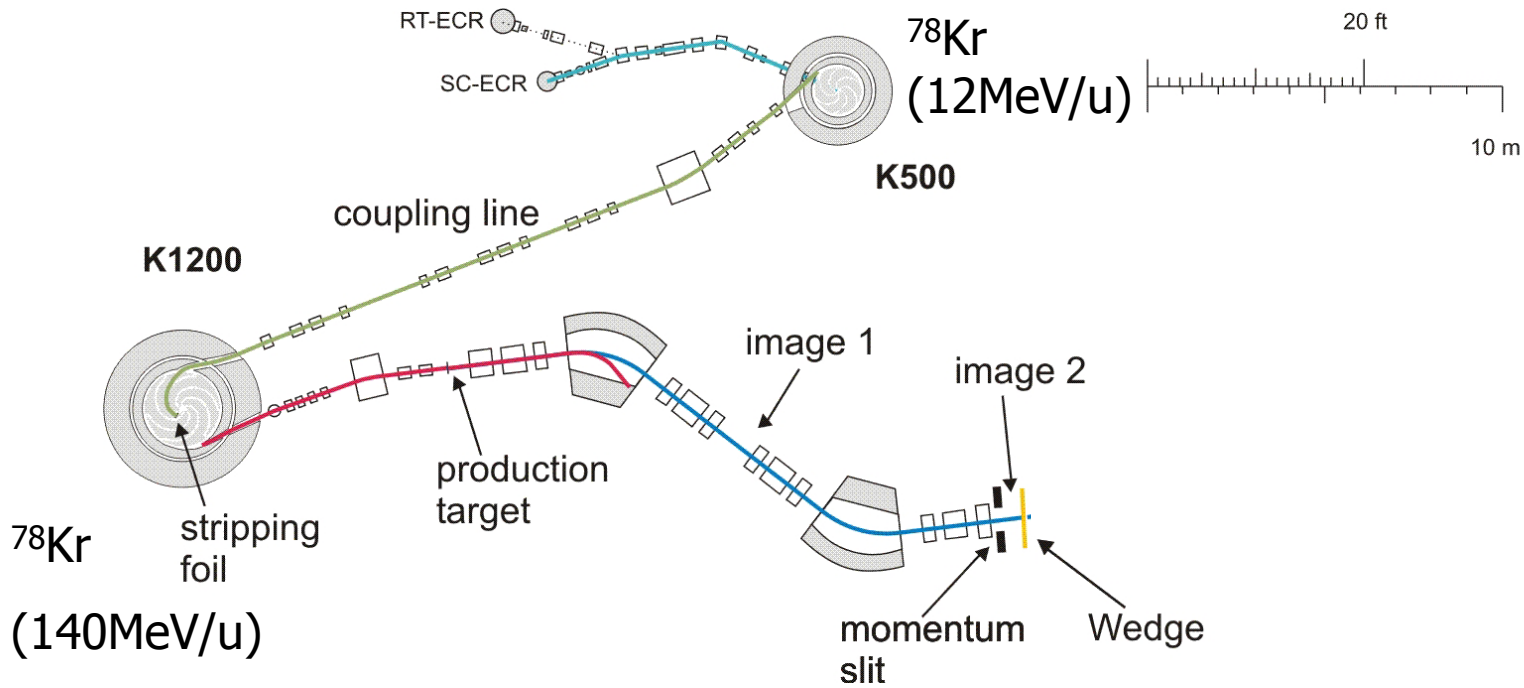
- Assuming  $Q=Z$
- $\rightarrow$  dE versus ToF is a simple PID plot



# Fragment separation

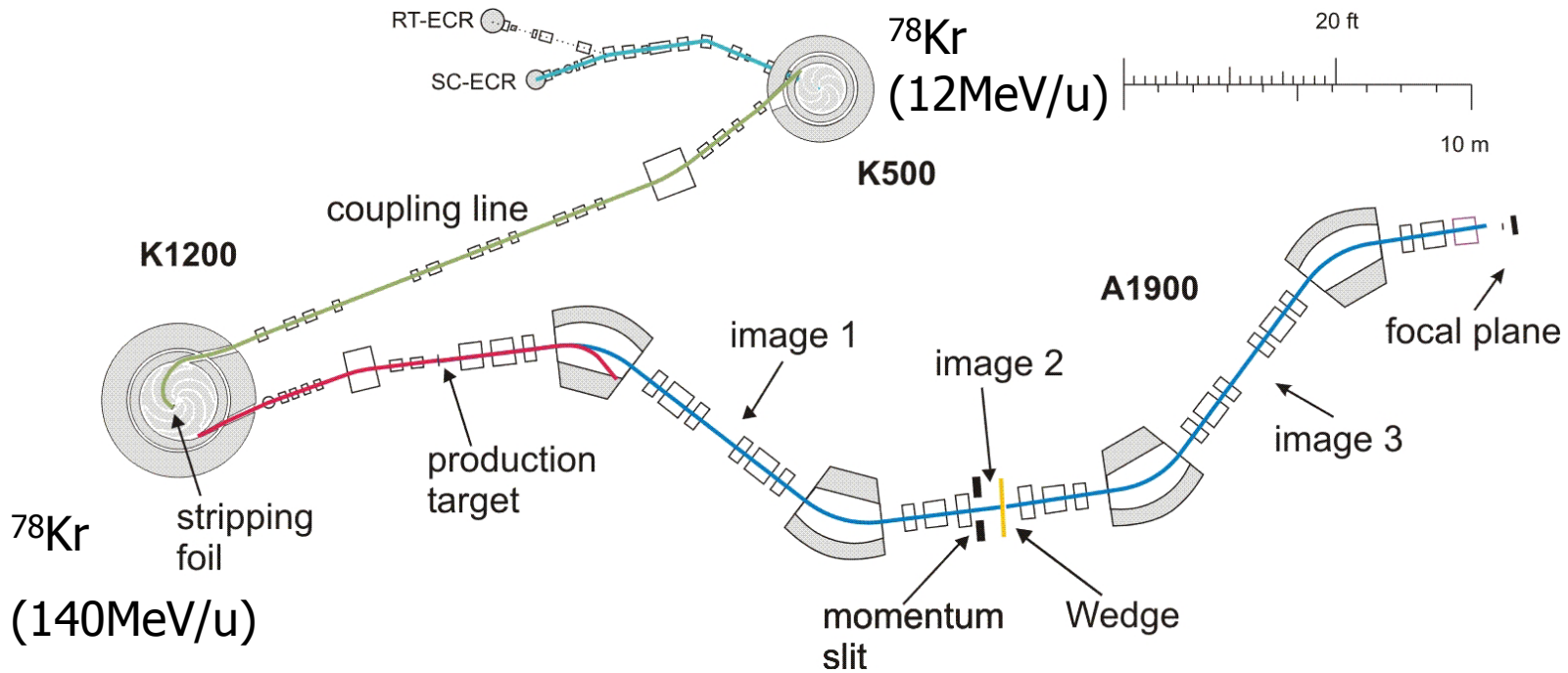


# Fragment separation

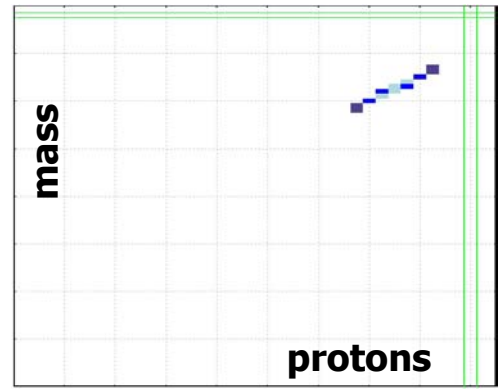
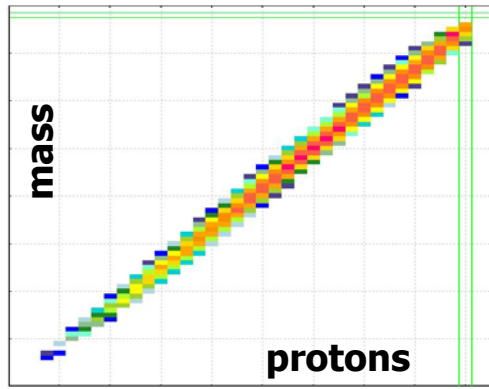
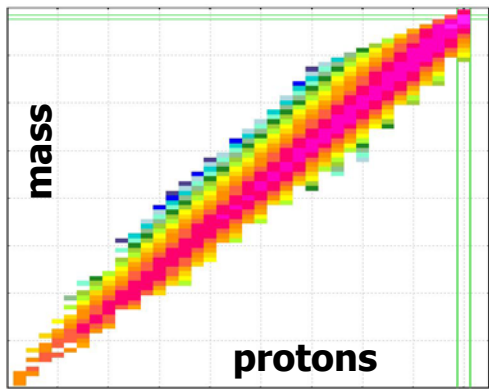




# Fragment separation



$^{78}\text{Kr}$   
(140MeV/u)



# Part II

---

- Control system - Barney
- Controlling A1900
- Barney printout
- What to look for during an experiment

# Barney main page

/home/barney/edl/frontpage.edl  
 MoeV3 running...

## Barney Main Page

Buncher  off  
 Inf Mode:  off  
 Coupled Mode

RT ECR  off  
 SC ECR  off  
 Src/Aper[mm]: RTECR 15.0; 50.0; 50.0

J035 Camera  
 J041 Camera  
 J055 Camera

Monitor Choice: 1 2 3 4 5 6  
 Camera: 28

K500  
 K1200  
 A1900

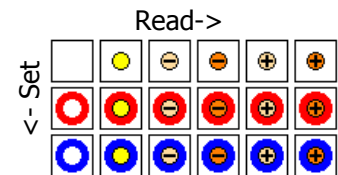
Details: RTECR K500 CpLin K1200 A1900  
 SCECR

Attenuators: Att 1

Action History:  
 09Jun14:06 CpL: New Optics  
 09Jun14:05 A19: Replace Optics File  
 09Jun14:05 A19: Replace Optics File

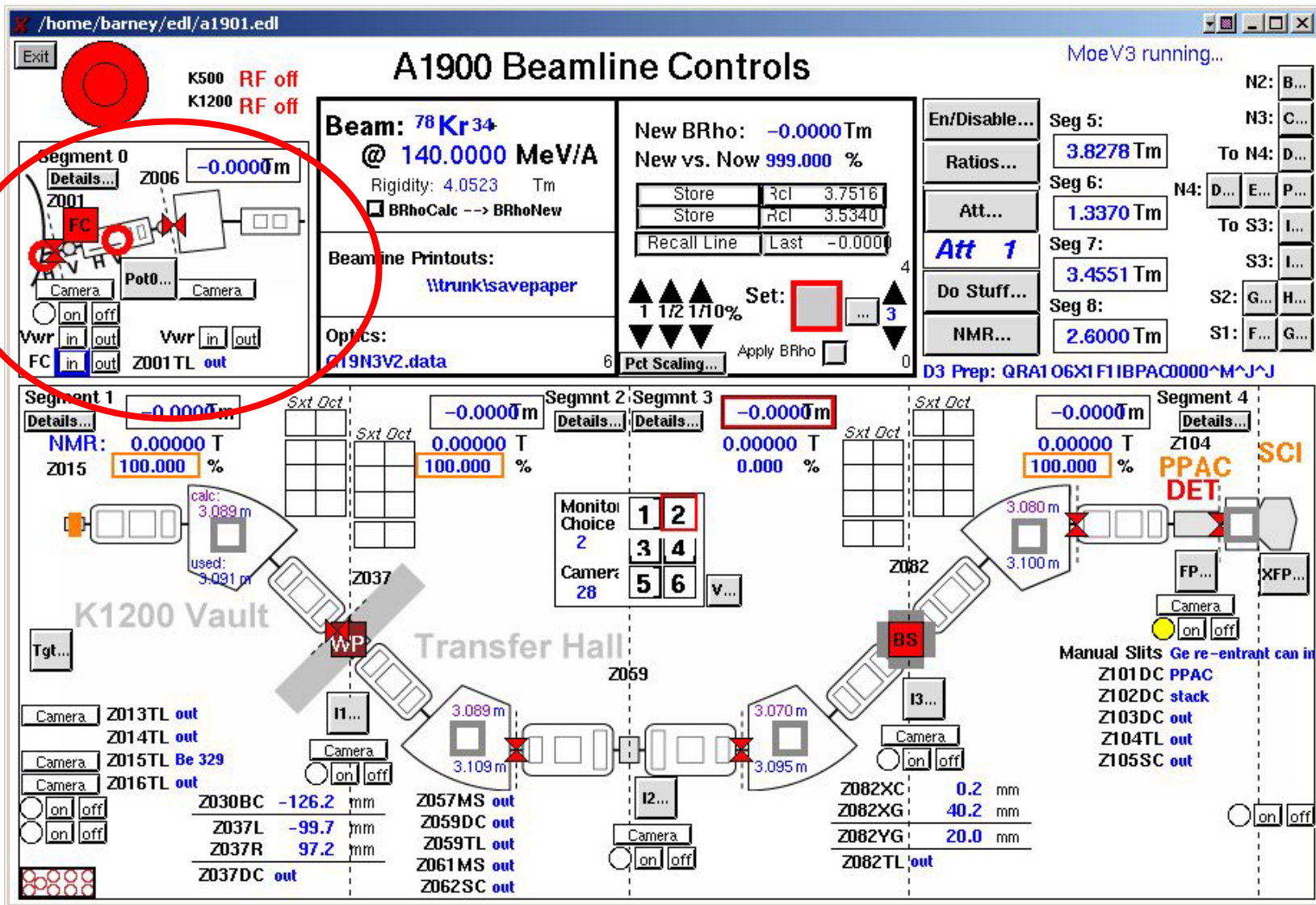
Moe Who???, Loss, NMR, BCMS, Is Moe Running?, New Beam, RadSafety, Print/Save All, Video, P

Summary of Barney states:

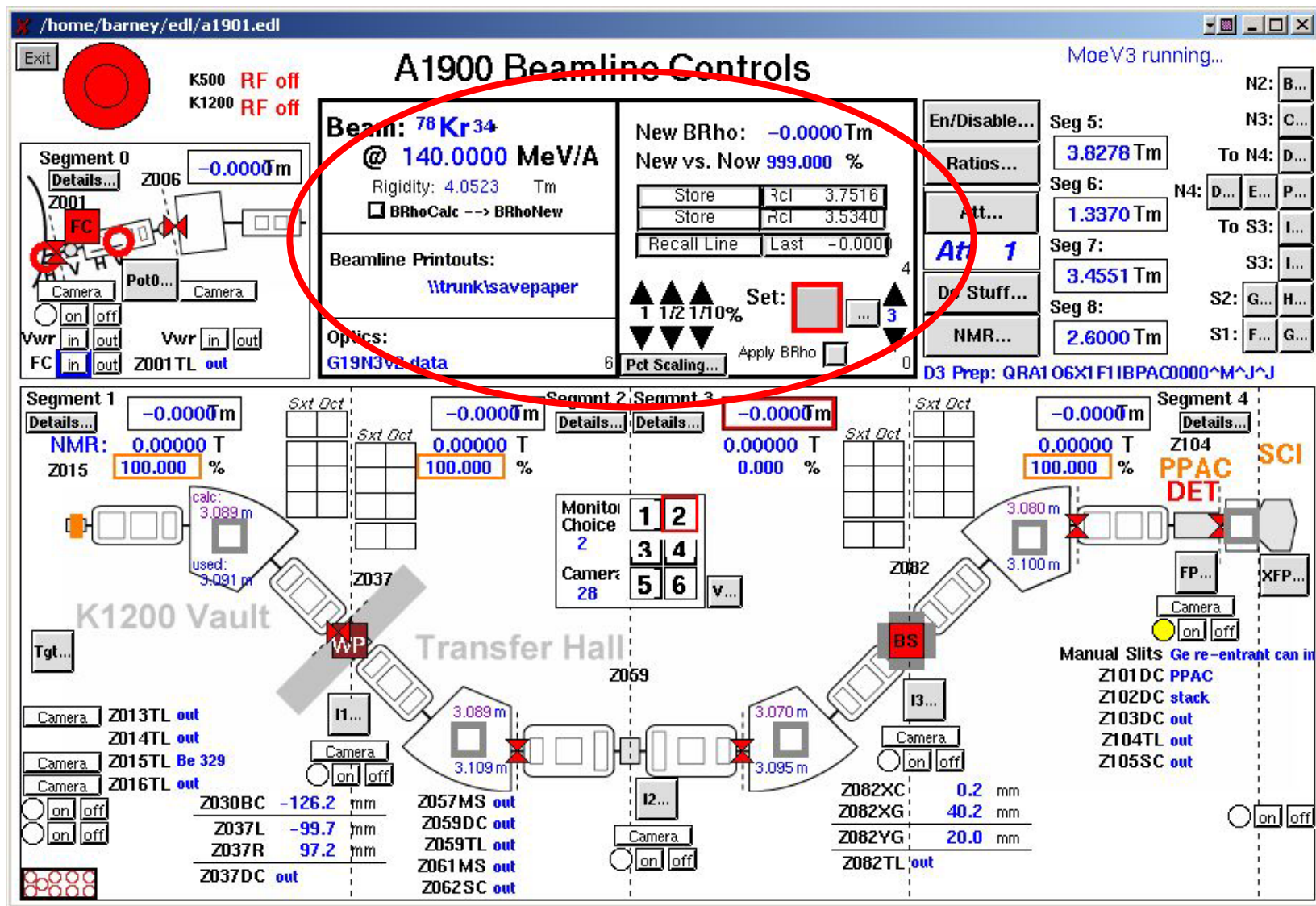


A1900

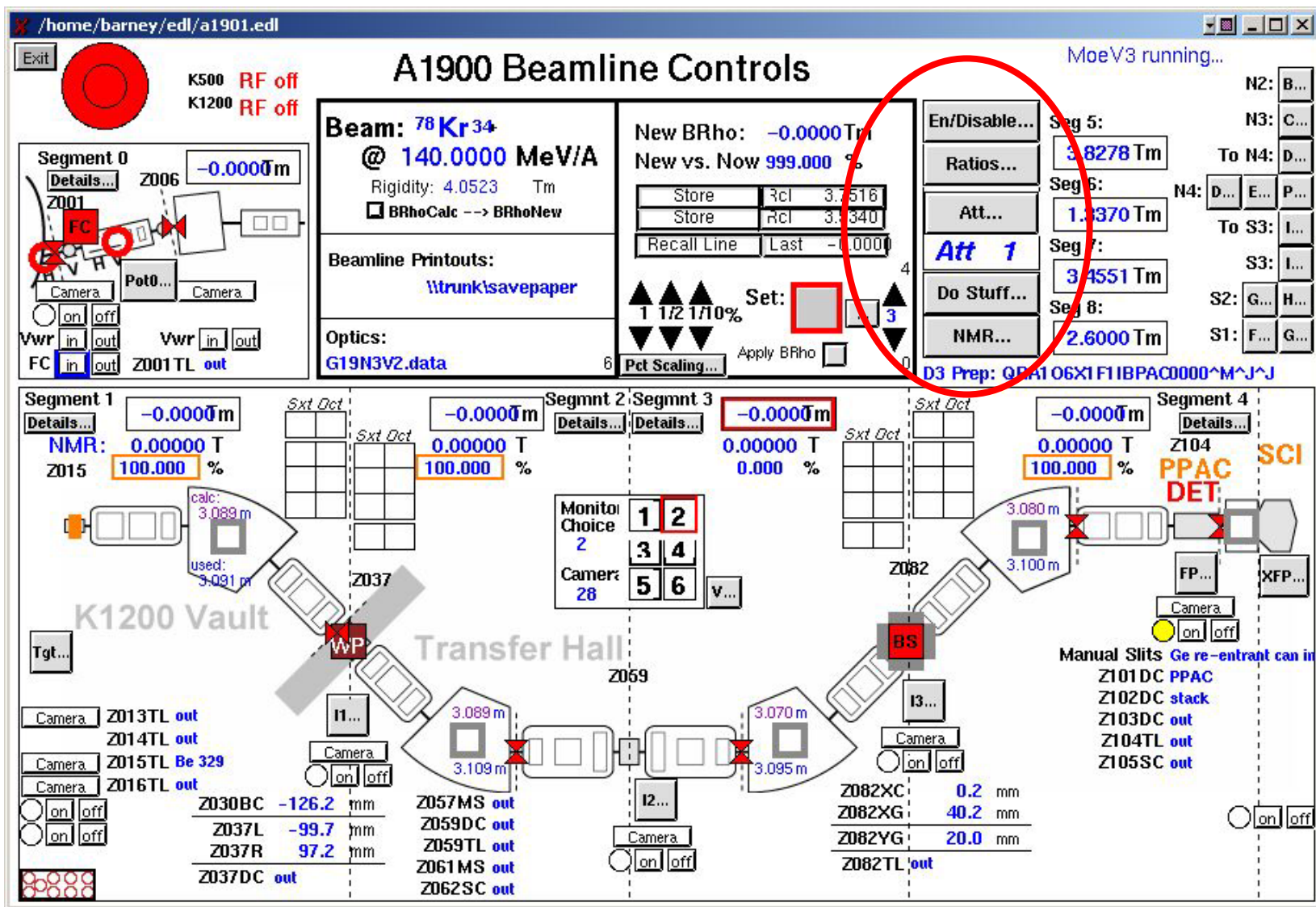
# A1900 main page



# A1900 main page



# A1900 main page



# A1900 main page

The screenshot displays the A1900 main page interface, which is divided into several functional areas:

- K500/CCP Attenuators:** A window on the left containing a grid of buttons for selecting attenuation levels (1, 3, 10, 30, 100, 300, 1k, 3k, 10k, 30k, .1M, .3M, 1M, 3M). Below this grid are controls for "Beam Stop (FC3)", "Attenuators disabled: 0", and "Att 1".
- Attenuator Diagrams:** Two diagrams labeled "R012FC" and "S012FC" show the physical layout of the attenuators with "in" and "out" ports.
- Controls Panel:** A central panel with various buttons including "En/Disable...", "Ratios...", "Att...", "Do Stuff...", and "NMR...". A red arrow points from the "Att..." button to the "Att 1" label in the K500/CCP Attenuators window.
- Beamline Diagram:** A detailed schematic of the beamline components, including cameras, slits, and detectors. Key components include Z013TL, Z014TL, Z015TL, Z016TL, Z030BC, Z037L, Z037R, Z037DC, Z057MS, Z059DC, Z059TL, Z061MS, Z062SC, Z082XC, Z082XG, Z082YG, Z082TL, Z104, Z105SC, and PPAC DET. Distances between components are marked in meters (e.g., 3.089 m, 3.109 m, 3.070 m, 3.095 m, 3.080 m, 3.100 m).
- Segment 4 Details:** A section on the right showing parameters for Segment 4, including "Details...", "Z104", "PPAC DET", "SCI", "FP...", "XFP...", and "Camera" controls.
- Manual Slits:** A list of manual slits and their status: Z101DC PPAC, Z102DC stack, Z103DC out, Z104TL out, Z105SC out.

# A1900 main page

The screenshot displays the A1900 Target Box control interface. The main window is titled "A1900 Target Box" and shows four target boxes: Z013TL, Z014TL, Z015TL, and Z016TL. Each target box has a vertical stack of components and a "Camera" button below it. The Z015TL target box is highlighted with a red box and shows a value of 3.998. The interface includes various control buttons like "Camera", "on/off", and "dim/bright". A red arrow points to a "Tgt..." button in the left sidebar.

| Target Box     | Component | Value / Status |
|----------------|-----------|----------------|
| Z013TL         | Out       | out            |
|                | 1"        |                |
|                | 2"        | viewer         |
|                | 3"        | RW AI 78       |
|                | 4"        | Be 47          |
|                | 5"        | Be 94          |
|                | 6"        | AI 54          |
|                | 7"        | AI 74          |
|                | 8"        | AI 108         |
| 9"             | Be 611    |                |
| Z014TL         | Out       | out            |
|                | 1"        |                |
|                | 2"        | Empty          |
|                | 3"        | FC             |
|                | 4"        | Be 1           |
|                | 5"        | RW AI 13       |
|                | 6"        | RW AI 26       |
|                | 7"        | RW AI 39       |
|                | 8"        | RW AI 52       |
| 9"             | RW AI 65  |                |
| Z015TL (3.998) | Out       | out            |
|                | 1"        |                |
|                | 2"        | viewer         |
|                | 3"        | Be 282         |
|                | 4"        | Be 329         |
|                | 5"        | Be 564         |
|                | 6"        | Be 611         |
|                | 7"        | Be 658         |
|                | 8"        | Be 987         |
| 9"             | empty     |                |
| Z016TL         | Out       | out            |
|                | 1"        |                |
|                | 2"        | viewer         |
|                | 3"        | C 5.2          |
|                | 4"        | RW AI 34       |
|                | 5"        | RW AI 38       |
|                | 6"        | RW AI 42       |
|                | 7"        | 2 mm HM app    |
|                | 8"        | 4 mm HM app    |
| 9"             | Be 141    |                |



# A1900 main page

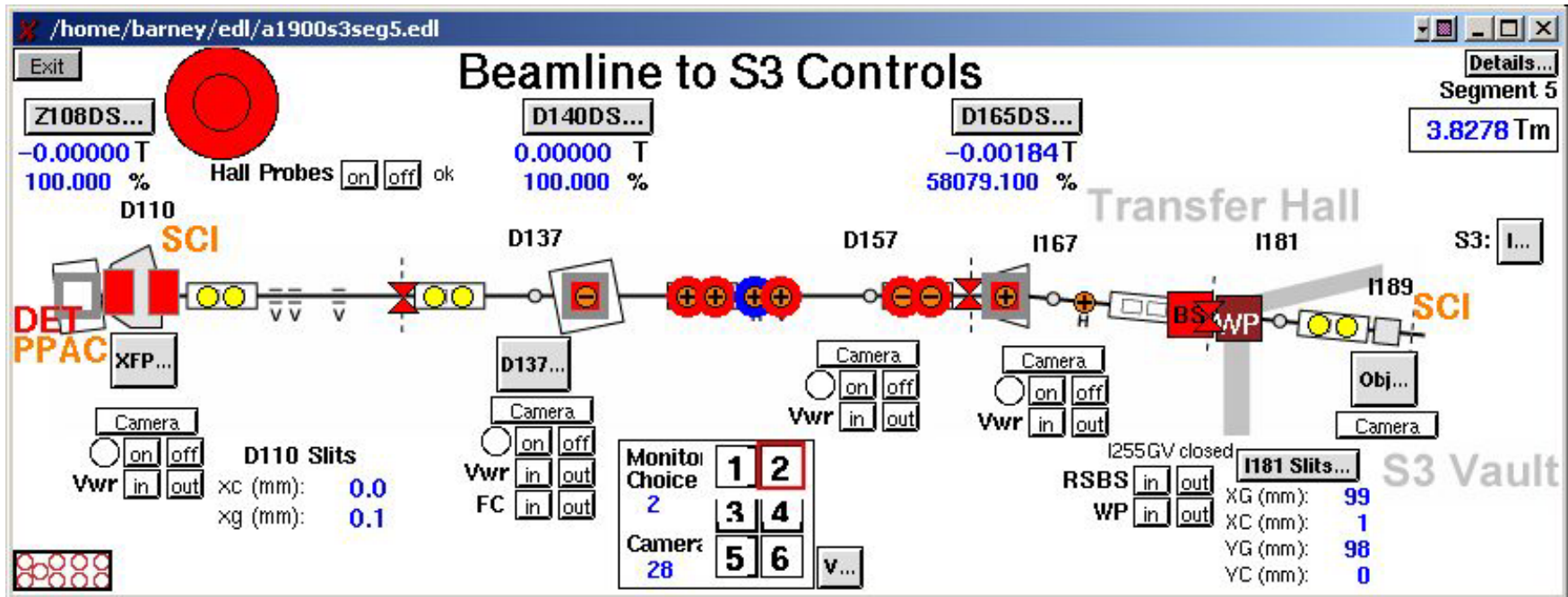
The screenshot displays the 'A1900 Image 2 Box' control interface, showing a side view of the detector assembly. The main window title is '/home/barney/edl/a19image2box.edl'. The interface includes several panels and controls:

- Top Left:** A red circular indicator and a status panel showing 'K500' and 'K1200'.
- Top Center:** 'A1900 Image 2 Box (SIDE VIEW)' with a 'Camera' control (on/off) and 'I2 PPAC gas status: gas off'.
- Left Panel:** 'Segment 0' and 'Segment 1' details, including 'Z006 -0.0', 'Z001', 'FC', 'Pot0...', 'Vwr in out', and 'Z001TL out'. 'Segment 1' shows 'NMR: 0.0000 T', 'Z015 100.000 %', and 'K1200 Val'.
- Center:** A vertical stack of components: 'Z059DC PPACs', 'POWER OFF', 'Z057MS out (.5 pct)', 'Z059TL out (2" viewer, 4" acrylic 971, 6" AI 300, 8" AI 240)', and 'Z061MS out (1 pct)'. A red arrow points to the 'I2...' camera control at the bottom.
- Right Panel:** 'MoeV3 running...' status, temperature readings (eg 5: 3.8278 Tm, eg 6: 1.3370 Tm, eg 7: 3.4551 Tm, eg 8: 2.6000 Tm), and 'Segment 4' details including 'Z104 PPAC DET SCI', 'FP...', 'XFP...', and 'Manual Slits Ge re-entrant can in'.
- Bottom:** A detailed view of the detector assembly with various camera controls (Z013TL, Z014TL, Z015TL Be 329, Z016TL) and distance measurements (3.089m, 3.109m, 3.070m, 3.095m). A table of component positions is shown below:

|        |           |        |     |        |         |
|--------|-----------|--------|-----|--------|---------|
| Z030BC | -126.2 mm | Z057MS | out | Z082XC | 0.2 mm  |
| Z037L  | -99.7 mm  | Z059DC | out | Z082XG | 40.2 mm |
| Z037R  | 97.2 mm   | Z059TL | out | Z082YG | 20.0 mm |
| Z037DC | out       | Z061MS | out | Z082TL | out     |
|        |           | Z062SC | out |        |         |



# Beam Line to S800



# S800 main page

**S800 Dipole Matching**

| ID     | Tm     | T       | Radius  | Status |
|--------|--------|---------|---------|--------|
| I200DS | 1.3370 | 0.00000 | 3.14204 | Ready  |
| I205DS | 1.3370 | 0.00000 | 3.14204 | Ready  |
| I223DS | 3.4551 | 0.00000 | 3.09708 | Ready  |
| I228DS | 3.4551 | 0.00000 | 3.17034 | Ready  |
| I265DS | 2.6000 | 0.00000 | 2.80280 | Ready  |
| I269DS | 2.6000 | 0.00000 | 2.80280 | Ready  |

**S800 dipoles (big)**

# Printout generation

The screenshot displays the A1900 control interface with several windows open. The main window shows a beamline diagram with segments 0, 1, and 4. A red circle highlights the 'FC' button in the Segment 0 diagram. A large red arrow points from this circle to the 'Print/Save...' button in the 'A1900 Buttons' menu. Another red arrow points from the 'Print/Save...' button to the 'Printout' checkbox in the 'Edit the Comment, then Print' dialog box. The 'Printout' checkbox is also circled in red. The 'Printers...' button is visible in the bottom right of the dialog box.

**A1900 Buttons**

- Print/Save...
- New Optics...
- Load from File...
- Ratios...
- Enable/Disable...
- A1900 Setup...

**Edit the Comment, then Print**

Printout

Printers...

# Barney printout

```
A1900 "print18May05_13150.txt" wednesday 15:30:58 2005-05-18 A1900
*** test ***
Expt: 03031 "Fragmentation of Ni-68" [Betty Tsang] Line: s800 [8]
Beam: 76 Ge 12+ 11.59 Mev/nuc (K500) 30+ 130.00 Mev/nuc (K1200)
<Att 1> ECR, Apertures: RTECR 50.0; 15.0; 50.0 mm RHVBI: 25.4900 kv
K500 a,b: 0 A, 0 A K1200: 0 A, 0 A RF: 22.49300 MHZ
A1900 optics: G1953V13_30x20Focus60x30.data
Rigidity      Field      Radius      (live)      Difference (Field*Radius)
Seg 0: 4.32100 Tm
Seg 1: 3.83030 Tm 1.23568 T 3.09882 m 3.09974 m 0.02983 % (3.82916 Tm)
Seg 2: 3.83030 Tm 1.23520 T 3.10148 m 3.10095 m -0.01712 % (3.83096 Tm)
Seg 3: 3.52600 Tm 1.13931 T 3.09502 m 3.09487 m -0.00483 % (3.52617 Tm)
Seg 4: 3.52600 Tm 1.13852 T 3.09582 m 3.09700 m 0.03794 % (3.52466 Tm)
Seg 5: 3.50350 Tm
Seg 6: 3.46338 Tm
Seg 7: 3.45510 Tm
Seg 8: 2.60000 Tm
Z108DS      0.50040 T 7.04675 m 7.04918 m 0.03449 %
D140DS      0.00145 T 2282.62069 m 2416.20690 m 5.85232 %
D165DS      0.37016 T 9.46362 m 9.46477 m 0.01219 %
I200DS      1.10232 T 3.14194 m 3.14190 m -0.00125 %
I205DS      1.10223 T 3.14204 m 3.14216 m 0.00373 %
I223DS      1.11579 T 3.09708 m 3.09655 m -0.01710 %
I228DS      1.08990 T 3.17034 m 3.17011 m -0.00734 %
I265DS      0.93431 T 2.80280 m 2.78280 m -0.71349 %
I269DS      0.92819 T 2.80280 m 2.80115 m -0.05885 %
Z001TL: out, Z013TL: out; Z014TL OUT
Z015TL: OUT, Z016TL OUT
Z030BC Beam Stop: -126.22 mm
Z037L,R: -4.70, 9.35 mm; Z037DC: *out*
Z057MS: out, Z061MS: out
Z059DC: out, Z062SC: out, Z057TL:
Z082 XC,G,YG: 0.16, 203.50, 201.37 mm Z082Deg: out
Z101DC: in, Z102DC: out; Z103DC: out, Z105SC: out
B110 Cent,Gap: -0.09, -0.04 mm; D110 -3.01, 10.00 mm F110 0.15, 0.69 mm
B110DC: out, D110DC: out, D111DC: 5 mil BC-404, F110DC: out
slits: I181 XC,G,YC,G: 0.79, 98.98; -0.00, 98.39
I187: [3"]obj scint, I188: [0"] out, I189: , I190: [0"] out
I213: [0"] out, I214: [0"] out, I215: [0"] out, I216: [0"] out
I214DC Detector Drive: _PPAC_
Extra Drive: Z059TL.VAL = *out*
```

Run title

# Barney printout

```
A1900 "Print18May05_13h30.txt" wednesday 13:30:58 2005-05-18 A1900
*** test ***
Expt: 03031 "Fragmentation of Ni-68" [Betty Tsang] Line: s800 [8]
Beam: 76 Ge 12+ 11.59 Mev/nuc (K500) 30+ 130.00 Mev/nuc (K1200)
<Att 1> ECR, Apertures: RTECR 50.0: 15.0: 50.0 mm RINVD1: 25.4900 kV
K500 a,b: 0 A, 0 A K1200: 0 A, 0 A RF: 22.49300 MHZ
A1900 optics: G1953V13_30x20Focus60x30.data
Rigidity      Field      Radius      (live)      Difference (Field*Radius)
Seg 0: 4.32100 Tm
Seg 1: 3.83030 Tm 1.23568 T 3.09882 m 3.09974 m 0.02983 % (3.82916 Tm)
Seg 2: 3.83030 Tm 1.23520 T 3.10148 m 3.10095 m -0.01712 % (3.83096 Tm)
Seg 3: 3.52600 Tm 1.13931 T 3.09502 m 3.09487 m -0.00483 % (3.52617 Tm)
Seg 4: 3.52600 Tm 1.13852 T 3.09582 m 3.09700 m 0.03794 % (3.52466 Tm)
Seg 5: 3.50350 Tm
Seg 6: 3.46338 Tm
Seg 7: 3.45510 Tm
Seg 8: 2.60000 Tm
Z108DS      0.50040 T 7.04675 m 7.04918 m 0.03449 %
D140DS      0.00145 T 2282.62069 m 2416.20690 m 5.85232 %
D165DS      0.37016 T 9.46362 m 9.46477 m 0.01219 %
I200DS      1.10232 T 3.14194 m 3.14190 m -0.00125 %
I205DS      1.10223 T 3.14204 m 3.14216 m 0.00373 %
I223DS      1.11579 T 3.09708 m 3.09655 m -0.01710 %
I228DS      1.08990 T 3.17034 m 3.17011 m -0.00734 %
I265DS      0.93431 T 2.80280 m 2.78280 m -0.71349 %
I269DS      0.92819 T 2.80280 m 2.80115 m -0.05885 %
Z001TL: out, Z013TL: out; Z014TL OUT
Z015TL: OUT, Z016TL OUT
Z030BC Beam Stop: -126.22 mm
Z037L,R: -4.70, 9.35 mm; Z037DC: *out*
Z057MS: out, Z061MS: out
Z059DC: out, Z062SC: out, Z057TL:
Z082 XC,G,YG: 0.16, 203.50, 201.37 mm Z082Deg: out
Z101DC: in, Z102DC: out; Z103DC: out, Z105SC: out
B110 Cent,Gap: -0.09, -0.04 mm; D110 -3.01, 10.00 mm F110 0.15, 0.69 mm
B110DC: out, D110DC: out, D111DC: 5 mil BC-404, F110DC: out
slits: I181 XC,G,YC,G: 0.79, 98.98; -0.00, 98.39
I187: [3"]obj scint, I188: [0"] out, I189: , I190: [0"] out
I213: [0"] out, I214: [0"] out, I215: [0"] out, I216: [0"] out
I214DC Detector Drive: _PPAC_
Extra Drive: Z059TL.VAL = *out*
```

Experiment  
name and  
beam

# Barney printout

```
A1900 "Print18May05_13h30.txt" wednesday 13:30:58 2005-05-18 A1900
*** test ***
Expt: 03031 "Fragmentation of Ni-68" [Betty Tsang] Line: s800 [8]
Beam: 76 Ge 12+ 11.59 Mev/nuc (K500) 30+ 130.00 Mev/nuc (K1200)
<Att 1> ECR, Apertures: RTECR 50.0; 15.0; 50.0 mm RHVBI: 25.4900 kv
K500 a,b: 0 A, 0 A K1200: 0 A, 0 A RF: 22.49300 MHZ
A1900 optics: G1953V13_30x20Focus60x30.data
Rigidity Field radius (cm) difference (Field*Radius)
Seg 0: 4.32100 Tm
.23568 83 % (3.82916 Tm)
.23520 12 % (3.83096 Tm)
.13931 T 3.09502 m 3.09487 m -0.00483 % (3.52617 Tm)
.13852 T 3.09582 m 3.09700 m 0.03794 % (3.52466 Tm)
Seg 5: 3.50350 Tm
.50040 T 7.04675 m 7.04918 m 0.03449 %
0.00149 T 5232 %
0.37016 T 9 %
1.10232 T 5 %
1.10223 T 3.17204 m 3.17210 m 0.00033 %
1.11579 T 3.09708 m 3.09655 m -0.01710 %
1.08990 T 3.17034 m 3.17011 m -0.00734 %
0.93431 T 2.80280 m 2.78280 m -0.71349 %
0.92819 T 2.80280 m 2.80115 m -0.05885 %
Z001TL: out, Z013TL: out; Z014TL OUT
Z015TL: OUT, Z016TL OUT
Z030BC Beam Stop: -126.22 mm
Z037L,R: -4.70, 9.35 mm; Z037DC: *out*
Z057MS: out, Z061MS: out
Z059DC: out, Z062SC: out, Z057TL:
Z082 XC,G,YG: 0.16, 203.50, 201.37 mm Z082Deg: out
Z101DC: in, Z102DC: out; Z103DC: out, Z105SC: out
B110 Cent,Gap: -0.09, -0.04 mm; D110 -3.01, 10.00 mm F110 0.15, 0.69 mm
B110DC: out, D110DC: out, D111DC: 5 mil BC-404, F110DC: out
slits: I181 XC,G,YC,G: 0.79, 98.98; -0.00, 98.39
I187: [3"]obj scint, I188: [0"] out, I189: , I190: [0"] out
I213: [0"] out, I214: [0"] out, I215: [0"] out, I216: [0"] out
I214DC Detector Drive: _PPAC_
Extra Drive: Z059TL.VAL = *out*
```

A1900 segments

S800 segments

B<sub>p</sub> settings of Segments  
Very important!



# Barney printout

**A1900 Target Box**

dim  on  off  
bright  on  off

| Station         | 1"  | 2"     | 3"       | 4"       | 5"       | 6"       | 7"          | 8"          | 9"       |
|-----------------|-----|--------|----------|----------|----------|----------|-------------|-------------|----------|
| Z013TL          | out | viewer | RW Al 78 | Be 47    | Be 94    | Al 54    | Al 74       | Al 108      | Be 611   |
| Z014TL          | out | Empty  | FC       | Be 1     | RW Al 13 | RW Al 26 | RW Al 39    | RW Al 52    | RW Al 65 |
| Z015TL (3.998") | out | viewer | Be 282   | Be 329   | Be 564   | Be 611   | Be 658      | Be 987      | empty    |
| Z016TL          | out | viewer | C 5.2    | RW Al 34 | RW Al 38 | RW Al 42 | 2 mm HM app | 4 mm HM app | Be 141   |

Camera  on  off

00 kV  
00 MHz  
field\*Radius)  
(3.82916 Tm)  
(3.83096 Tm)  
(3.52617 Tm)  
(3.52466 Tm)  
2 %

```
Z001TL: out, Z013TL: out; Z014TL OUT
Z015TL: OUT, Z016TL OUT
Z020BC Beam Stop: 126.22 mm
Z037L,R: -4.70, 9.35 mm; Z037DC: *out*
Z057MS: out, Z061MS: out
Z059DC: out, Z062SC: out, Z057TL:
Z082 XC,G,YG: 0.16, 203.50, 201.37 mm Z082Deg: out
Z101DC: in, Z102DC: out; Z103DC: out, Z105SC: out
B110 Cent,Gap: -0.09, -0.04 mm; D110 -3.01, 10.00 mm F110 0.15, 0.69 mm
B110DC: out, D110DC: out, D111DC: 5 mil BC-404, F110DC: out
slits: I181 XC,G,YC,G: 0.79, 98.98; -0.00, 98.39
I187: [3"]obj scint, I188: [0"] out, I189: , I190: [0"] out
I213: [0"] out, I214: [0"] out, I215: [0"] out, I216: [0"] out
I214DC Detector Drive: _PPAC_
Extra Drive: Z059TL.VAL = *out*
```

Target drives  
Z015TL is the TGT position

# Barney printout

```

A1900 "Print18May05_13h30.txt" wednesday 13:30:58 2005-05-18 A1900
***
Exp1 /home/barney/edl/a1900image1box.edl s800 [8]
Bear (k1200)
<Att1 /BI: 25.4900 kv
K500 F: 22.49300 MHZ

A1900 Image 1 Box Camera
(NORTH) (TOP VIEW) out
Z037DC
AI 193 Profile
Z030BC Z037L In
S: -126.3 mm S: -99.7 mm Out
R: -126.2 mm R: -99.7 mm
WP WP in out in
R: 97.2 mm Out
S: 97.2 mm In
(SOUTH) Z037R viewer
Z037VP out

0.02983 % (3.82916 Tm)
-0.01712 % (3.83096 Tm)
-0.00483 % (3.52617 Tm)
0.03794 % (3.52466 Tm)

0.03449 %
5.85232 %
0.01219 %
-0.00125 %
0.00373 %
-0.01710 %
-0.00734 %
-0.71349 %
-0.05885 %

Z001TL: out, Z013TL: out, Z014TL: out
Z015TL: out, Z016TL: out
Z030BC Beam Stop: -126.22 mm
Z037L,R: -4.70, 9.35 mm; Z037DC: *out*
Z057MS: out, Z061MS: out
Z059DC: out, Z062SC: out, Z057TL:
Z082 XC,G,YG: 0.16, 203.50, 201.37 mm Z082Deg: out
Z101DC: in, Z102DC: out; Z103DC: out, Z105SC: out
B110 Cent,Gap: -0.09, -0.04 mm; D110 -3.01, 10.00 mm F110 0.15, 0.69 mm
B110DC: out, D110DC: out, D111DC: 5 mil BC-404, F110DC: out
Slits: I181 XC,G,YC,G: 0.79, 98.98; -0.00, 98.39
I187: [3"]obj scint, I188: [0"] out, I189: , I190: [0"] out
I213: [0"] out, I214: [0"] out, I215: [0"] out, I216: [0"] out
I214DC Detector Drive: _PPAC_
Extra Drive: Z059TL.VAL = *out*
  
```

Image 1 drives  
Z037L,R = I1 slit

# Barney printout

Exit

## A1900 Image 2 Box

(SIDE VIEW)

Camera  on  off

I2 PPAC gas status: gas off

POWER OFF

Out In

2" 4" 6" 8" 10" out

viewer acrylic 971 AI 300 AI 240

Out In

Out In

Out In

Out In

.5 pct Z057MS out

1 pct Z061MS out

C9H10, 28.397m Z062SC out

Z059TL out

00 [8]  
1200)  
: 25.4900 kV  
22.49300 MHZ  
ence (Field\*Radius)  
02983 % (3.82916 Tm)  
01712 % (3.83096 Tm)  
00483 % (3.52617 Tm)  
03794 % (3.52466 Tm)  
03449 %  
5.85232 %  
01219 %  
00125 %  
00373 %  
01710 %  
00734 %  
71349 %  
05885 %

Z030BC Beam Stop: -126.22 mm  
Z0371 R: -4.70 9.35 mm: Z037DC: \*out\*  
**Z057MS: out, Z061MS: out, Z059DC: out, Z062SC: out, Z057TL: out**  
Z082 XC,G,YG: 0.16, 203.50, 201.37 mm Z082beg: out  
Z101DC: in, Z102DC: out; Z103DC: out, Z105SC: out  
B110 Cent,Gap: -0.09, -0.04 mm; D110 -3.01, 10.00 mm F110 0.15, 0.69 mm  
B110DC: out, D110DC: out, D111DC: 5 mil BC-404, F110DC: out  
slits: I181 XC,G,YC,G: 0.79, 98.98; -0.00, 98.39  
I187: [3"]obj scint, I188: [0"] out, I189: , I190: [0"] out  
I213: [0"] out, I214: [0"] out, I215: [0"] out, I216: [0"] out  
I214DC Detector Drive: \_PPAC\_  
Extra Drive: Z059TL.VAL = \*out\*

Image 2 drives



# Barney printout

```

A1900 "Print18May05_13h30.txt" wednesday 13:30:58 2005-05-18 A1900
*** test ***
Expt: (
Beam:
<Att
K500 a

```

**A1900 Focal Plane** (SIDE VIEW)

PPAC Z101DC

PPAC

Z103 Manual Slits: **Ge re-entrant can installed**

FP PPAC gas status: **gas off**

PPACDET

stack Z102DC stack

PIN Z103DC out

viewer Z104TL out

scintillator Z105SC out

Camera  on  off

```

e: s800 [8]
uc (K1200)
RHVBI: 25.4900 kv
RF: 22.49300 MHZ
Difference (Field*Radius)
0.02983 % (3.82916 Tm)
-0.01712 % (3.83096 Tm)
-0.00483 % (3.52617 Tm)
0.03794 % (3.52466 Tm)
0.03449 %
m 5.85232 %
0.01219 %
-0.00125 %
0.00373 %
-0.01710 %
-0.00734 %
-0.71349 %
-0.05885 %
Z030BC Beam Stop: -126.22 mm
Z037L,R: -4.70, 9.35 mm; Z037DC: *out*
Z057MS: out, Z061MS: out
Z059DC: out, Z062SC: out, Z057TL:
Z082 XC,G,YC,G: 0.16, 203.50, 201.37 mm Z082Deg: out
Z101DC: in, Z102DC: out; Z103DC: out, Z105SC: out
F110 Cent,Gap: 0.00, 0.04 mm; F110 3.01, 10.00 mm F110 0.15, 0.69 mm
B110DC: out, D110DC: out, D111DC: 5 mil BC-404, F110DC: out
Slits: I181 XC,G,YC,G: 0.79, 98.98; -0.00, 98.39
I187: [3"]obj scint, I188: [0"] out, I189: , I190: [0"] out
I213: [0"] out, I214: [0"] out, I215: [0"] out, I216: [0"] out
I214DC Detector Drive: _PPAC_
Extra Drive: Z059TL.VAL = *out*

```

Focal plane drives

# Conclusion

---

- Part I:
  - A1900 layout presented
  - Principle of particle identification
  - Separation of fragmentation products showed
- Part II
  - Control system (Barney) introduced
  - Control pages for A1900, S800 presented
  - Barney printout explained