



# ATF2 Mover Software

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White (SLAC)





# Overview

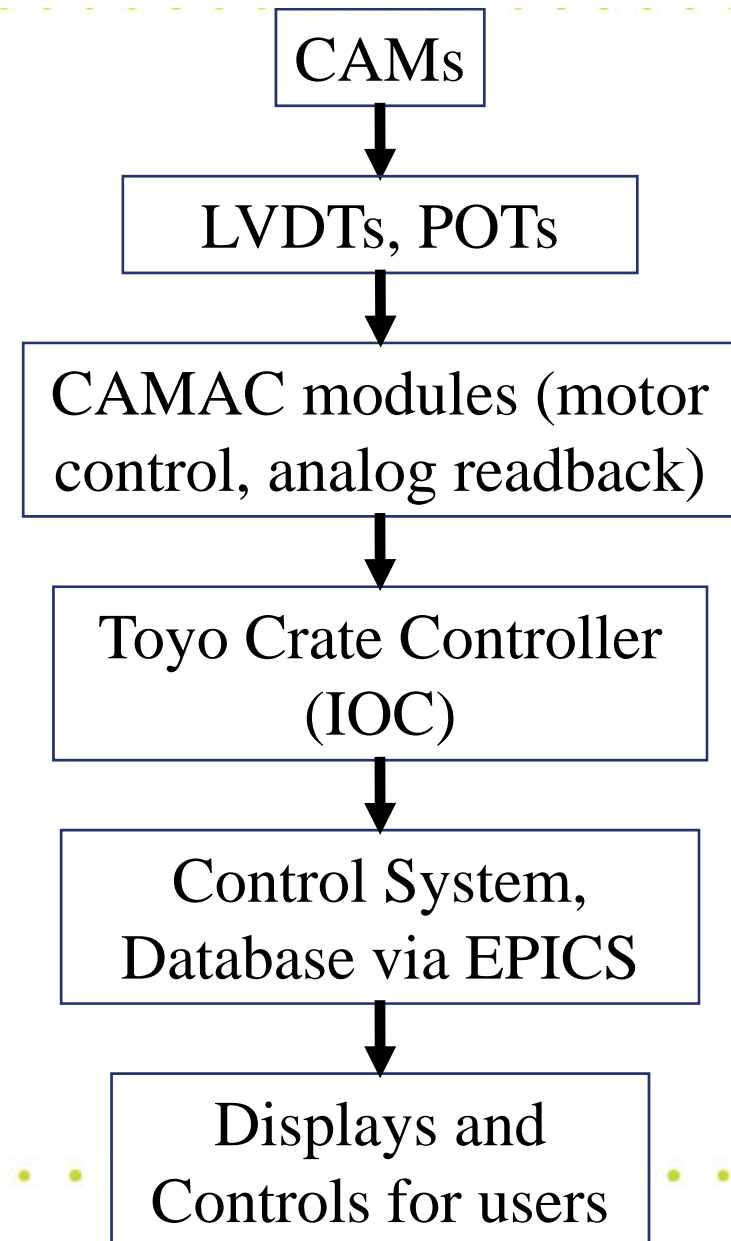
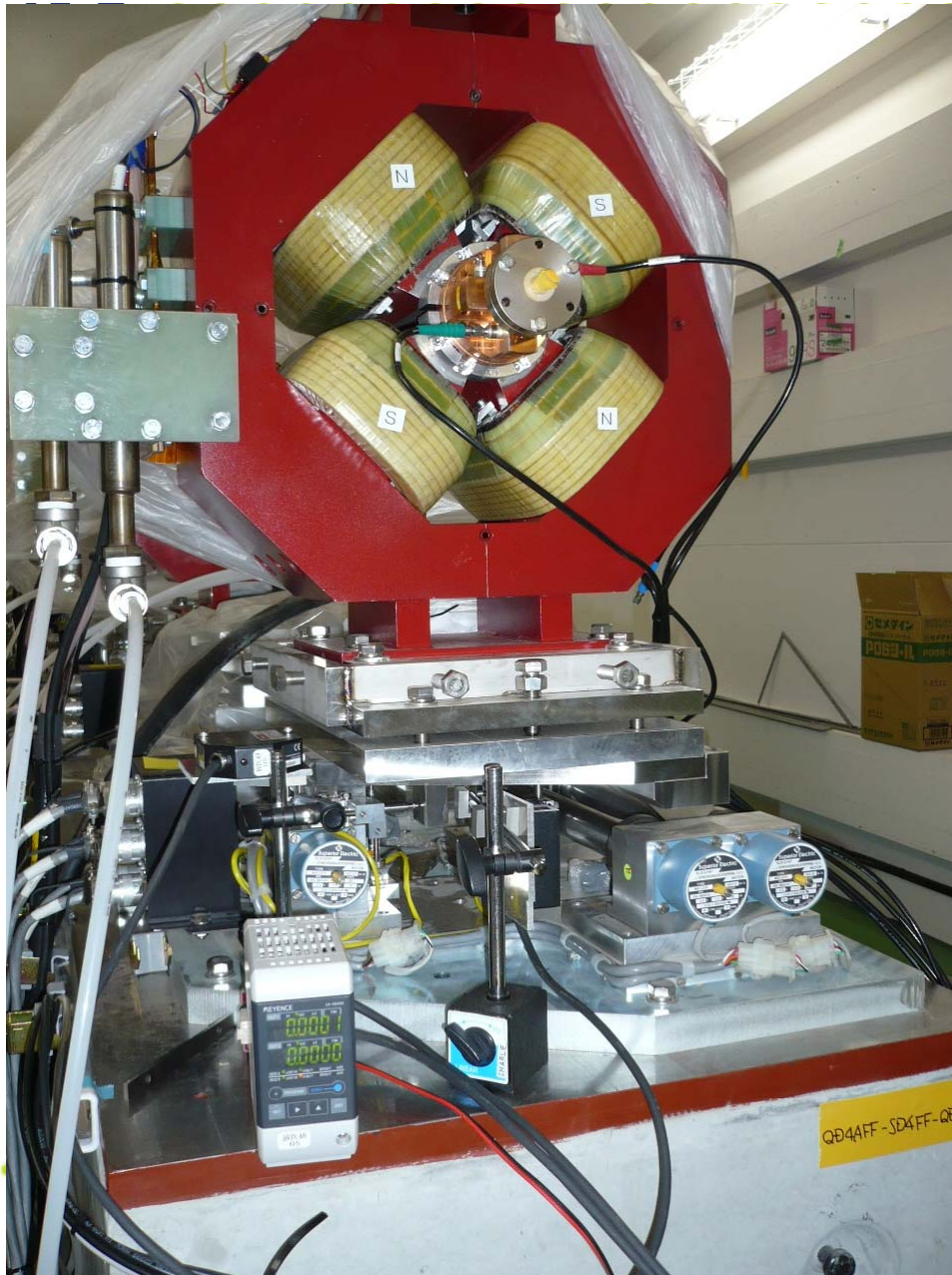
- Goal
- Current Status
- Setup
- Future Plans



# Goal & Current Status

- Goal
  - Move the ATF2 magnets (quadrupoles & sextupoles)
  - For BBA, orbit steering & feedback
- Current Status – EPICS IOC + displays
  - Basic move and trimming Functionality works
    - Calculate (and autoupdate) magnet position
    - Given a new requested position, move motors and recalculate the magnet position, and optionally trim.
    - Subtracts LVDT pedestals
    - Diagnostic control to send number of steps to each individual motor
  - Specs from Doug and the Bowden paper
    - Step size: ~300 nm.
    - Range:  $\pm 1.5$  mm / 10mrad
    - LVDT resolution (FFTB):  $0.18\mu\text{m} \pm 0.15\mu\text{m}$

- Control & readbk through EPICS via Toyo CAMAC crate controller to mover table on 3 cams with motors and readbk.





# Toyo + IOC

- **Toyo CAMAC crate controller**
  - **Runs Linux**
  - **Shares nfs space with atfsad**
  - **Camac command library allows communication with modules**
- **EPICS IOC**
  - **Runs on the Toyo**
  - **Use AsynDriver as wrapper to call Camac commands from EPICS database.**
  - **Use database subroutines to calculate positions from pot & lvdt readbacks and to calculate the number of motor steps required to go to a requested position.**
  - **SNL for trimming functionality.**



# Front EDM Mover Interface

- Single interface to all movers.
- Enter relative moves and trim
- Calibrated readback.
- Click magnet button for detailed display.

Magne: Display	x (um)	Readback		Enter Relative Move			
		y (um)	tilt (ur)	x (um)	y (um)	tilt (ur)	
AQM16FF	-5.400	1.520	4.884	0.000	0.000	0.000	trim
AQM15FF	1.249	0.163	-4.571	0.000	0.000	0.000	trim
AQM14FF	-4.586	1.810	2.857	0.000	0.000	0.000	trim
AFB2FF	5.880	77.347	-568.287	0.000	0.000	0.000	trim
AQM13FF	2.116	1.529	-13.199	0.000	0.000	0.000	trim
AQM12FF	13.290	5.800	-42.258	0.000	0.000	0.000	trim
AQM11FF	-1.011	4.348	-11.226	0.000	0.000	0.000	trim
AQD10BFF	0.663	1.520	-4.157	0.000	0.000	0.000	trim
AQD10AFF	-6.643	1.747	6.604	0.000	0.000	0.000	trim
AQF9BFF	-2.181	1.158	-1.726	0.000	0.000	0.000	trim
ASF6FF	-4.798	1.868	3.145	0.000	0.000	0.000	trim
AQF9AFF	0.481	1.219	-2.131	0.000	0.000	0.000	trim
AQD8FF	-0.614	-0.427	-0.518	0.000	0.000	0.000	trim
AQF7FF	-1.514	3.221	2.865	0.000	0.000	0.000	trim
AQD6FF	-9.329	-0.951	9.521	0.000	0.000	0.000	trim
AQF5BFF	11.958	-1.844	-18.733	0.000	0.000	0.000	trim
ASF5FF	-3.135	-0.952	9.808	0.000	0.000	0.000	trim
AQF5AFF	-5.384	2.216	0.021	0.000	0.000	0.000	trim
AQD4BFF	-4.410	3.161	6.325	0.000	0.000	0.000	trim
ASD4FF	-5.400	-0.423	-0.518	0.000	0.000	0.000	trim
AQD4AFF	2.845	0.468	-3.259	0.000	0.000	0.000	trim
AQF3FF	-2.856	4.523	21.957	0.000	0.000	0.000	trim



# Detailed Mover EDM Display

- Main Mover Display
  - Pot & LVDT readouts
    - Updated at 1/2 Hz
  - Calculated positions
  - Enter position changes
  - See motor steps sent
  - Access to diagnostic panels
  - Set to 0 position.

Current Position

x (um)	-5.400	y (um)	1.520	tilt (ur)	4.884
					-13.061

Enter Relative Move: 0.000 0.000 0.000

	Motor 1	Motor 2	Motor 3
Steps	0	0	0
N Steps Remaining	0	0	0

	POT volts	LVDT counts	LVDT Peds	LVDT (um) converted	Enter steps to Move
Motor 1	5.00085	20	0	3.535	0 Steps
Motor 2	5.00085	32	0	5.679	0 Steps
Motor 3	5.00415	-57	0	-10.200	0 Steps



# EDM Diagnostic Display

- Diagnostic Display
  - LVDT pedestals
  - Calculated positions
  - Send steps directly to motor
  - Set source for x, y, tilt calculations
  - Ideally can watch the number of steps the motor has yet to complete (future SNL code)

**QF9B** EXIT

**Crate 1 Mover 10**

c1:qmov:m10:pot1 5.00012 Update Readback

c1:qmov:m10:pot2 4.99890

c1:qmov:m10:pot3 5.00146 Disable Updating

	Raw	Ped	Converted	
c1:qmov:m10:lvdt127	0	0	4.77266	<span>Set Peds</span>
c1:qmov:m10:lvdt224	0	0	4.25897	
c1:qmov:m10:lvdt3-43	0	0	-7.56171e+00	

c1:qmov:motor1:stepdiag 0.00000 0 Steps Send Steps

c1:qmov:motor2:stepdiag 0.00000 0 Steps Send Steps

c1:qmov:motor3:stepdiag 0.00000 0 Steps Send Steps

	"Normal"	"Alternative"	
c1:qmov:m10:x	-1.22351e+00	-7.82248e+00	<span>UseSLC</span>
c1:qmov:m10:y	9.21279e-01	4.51581e+00	
c1:qmov:m10:tilt	5.59788e-06	3.13033e-06	<span>UsePOTs</span>

stop! 1073951923 Done. Done.

Constants		
c1:qmov:m10:motor1:nStepsRemain	0.00000	0
c1:qmov:m10:motor2:nStepsRemain	0.00000	0
c1:qmov:m10:motor3:nStepsRemain	0.00000	0
	0	

All Movers

Crate 1 Motor 10





# EDM Constants Display

- Constants Display
  - Constants originally loaded from an easy to edit excel spreadsheet
  - EDM display allows user edit
    - Will need save/restore function to maintain changes

<i>Constants for c1:qmov:m10</i>		cam1:	cam2:	cam3:	
name	<input type="text" value="QF9B"/>	offsX	<input type="text" value="2.90500e+05"/>	<input type="text" value="-3.49250e+04"/>	<input type="text" value="3.49250e+04"/>
update	<input type="text" value="80603"/>	offsY	<input type="text" value="0.00000e+00"/>	<input type="text" value="0.00000e+00"/>	<input type="text" value="0.00000e+00"/>
bore:offsX	<input type="text" value="145250"/>	offsRot	<input type="text" value="0.00000e+00"/>	<input type="text" value="2.35619e+00"/>	<input type="text" value="7.85398e-01"/>
bore:offsY	<input type="text" value="123952"/>	potMin	<input type="text" value="-2.00000e-01"/>	<input type="text" value="-2.00000e-01"/>	<input type="text" value="-2.00000e-01"/>
bore:offsRot	<input type="text" value="0"/>	potMax	<input type="text" value="1.02000e+01"/>	<input type="text" value="1.02000e+01"/>	<input type="text" value="1.02000e+01"/>
lvdt:chan	<input type="text" value="6"/>	potZAngle	<input type="text" value="0.00000e+00"/>	<input type="text" value="0.00000e+00"/>	<input type="text" value="0.00000e+00"/>
lvdt:offsX	<input type="text" value="0"/>		lvdt1:	lvdt2:	lvdt3:
		X	<input type="text" value="8.20500e+04"/>	<input type="text" value="8.20500e+04"/>	<input type="text" value="0.00000e+00"/>
lvdt:offsY	<input type="text" value="0"/>	Y	<input type="text" value="0.00000e+00"/>	<input type="text" value="0.00000e+00"/>	<input type="text" value="8.33000e+04"/>
lvdt:offsRot	<input type="text" value="0"/>	cal	<input type="text" value="0.00000e+00"/>	<input type="text" value="0.00000e+00"/>	<input type="text" value="0.00000e+00"/>
		n1	<input type="text" value="0.00000e+00"/>	<input type="text" value="0.00000e+00"/>	<input type="text" value="0.00000e+00"/>
		n2	<input type="text" value="1.76770e-01"/>	<input type="text" value="1.77460e-01"/>	<input type="text" value="1.75850e-01"/>
		n3	<input type="text" value="-1.83000e-01"/>	<input type="text" value="-1.22000e-01"/>	<input type="text" value="-8.17000e-01"/>
		n4	<input type="text" value="1.10200e-10"/>	<input type="text" value="1.11400e-10"/>	<input type="text" value="1.10600e-10"/>



## Continuing Plans

- Accommodate for the floor tilt
  - **Take a roll angle then rotate the coordinate system to get true x, y, and roll at the quad center**
  - **Do we want to track the pitch as well? Perhaps best to measure the roll at both the front and back of the quad.**
- “Trim” function
  - **Now implemented (JN last month)**
- Faster system for final focus sextupoles
  - **IP tuning takes a long time and heavily uses sextupole mover system, investigate new driver hardware to speed up moves**
    - OMS58 stepper motor drivers (left over from nanobpm)
    - VME3122 16-bit ADC instead of SAM.