

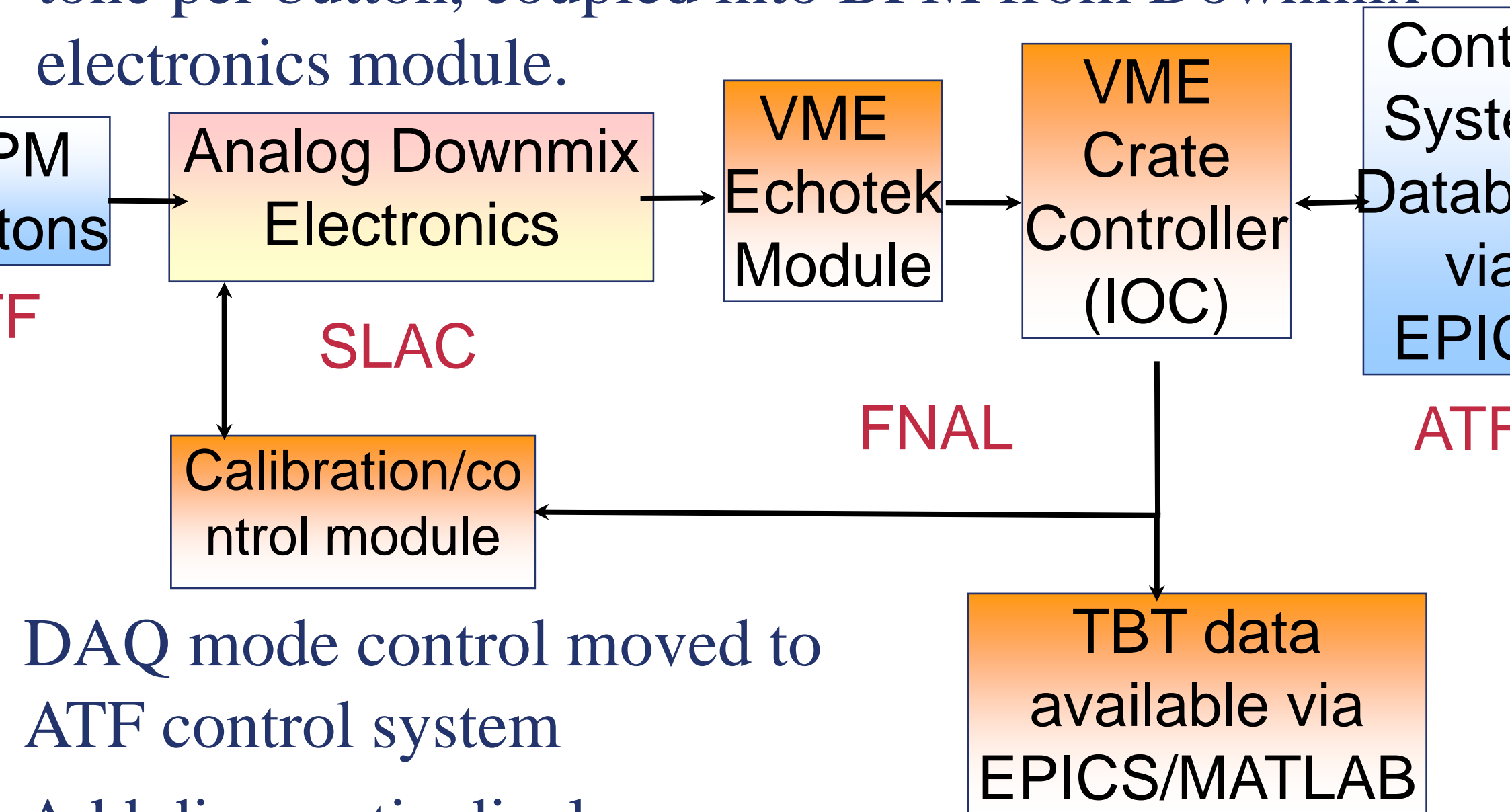
ATF Instrumentation

Status and Planning

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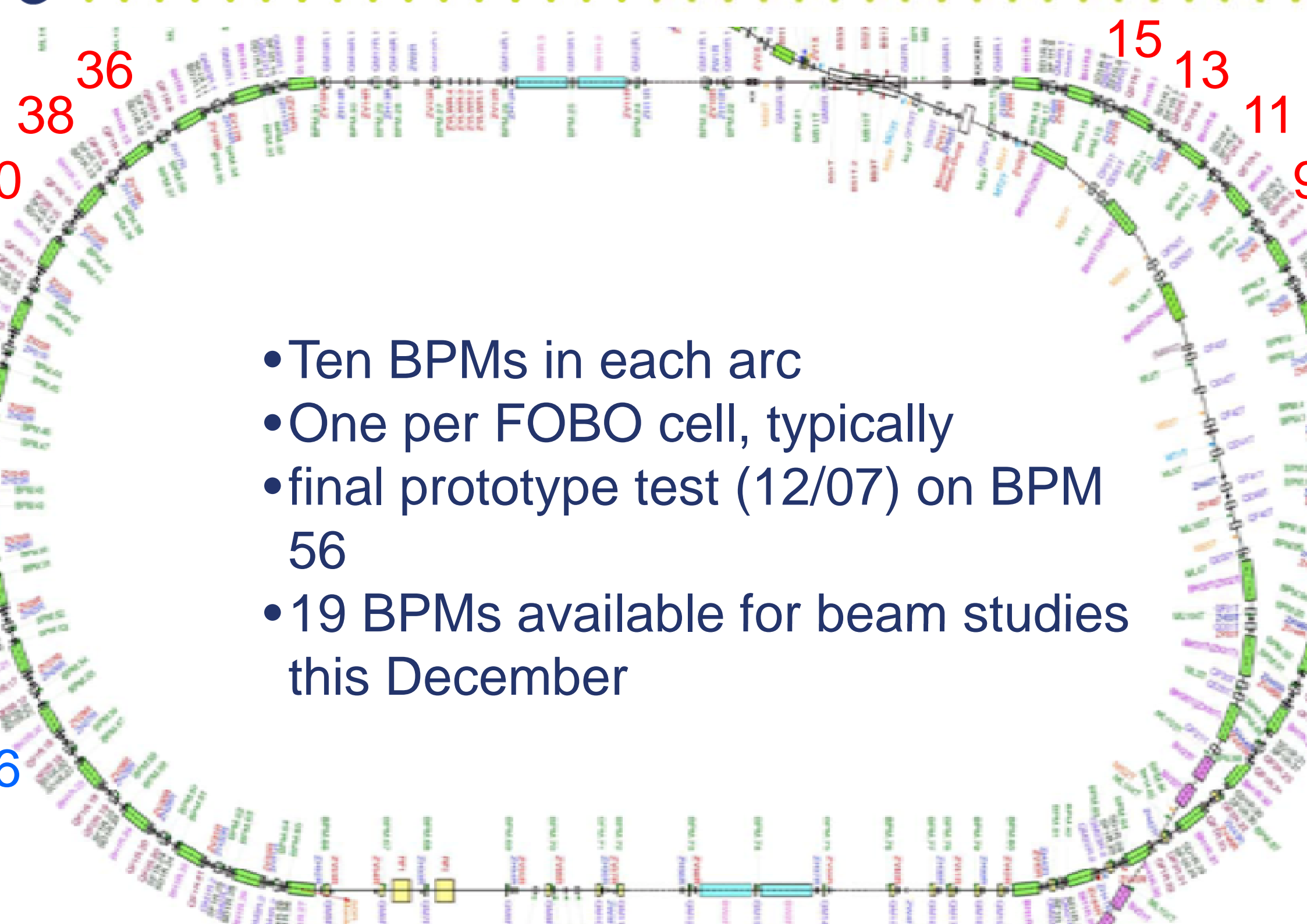
- ATF DR BPM
- ATF2 Magnet Movers and BPMs
- OTR
- IP Wire Scanner

- Calibration tones produced locally from LO tone, one tone per button, coupled into BPM from Downmix electronics module.

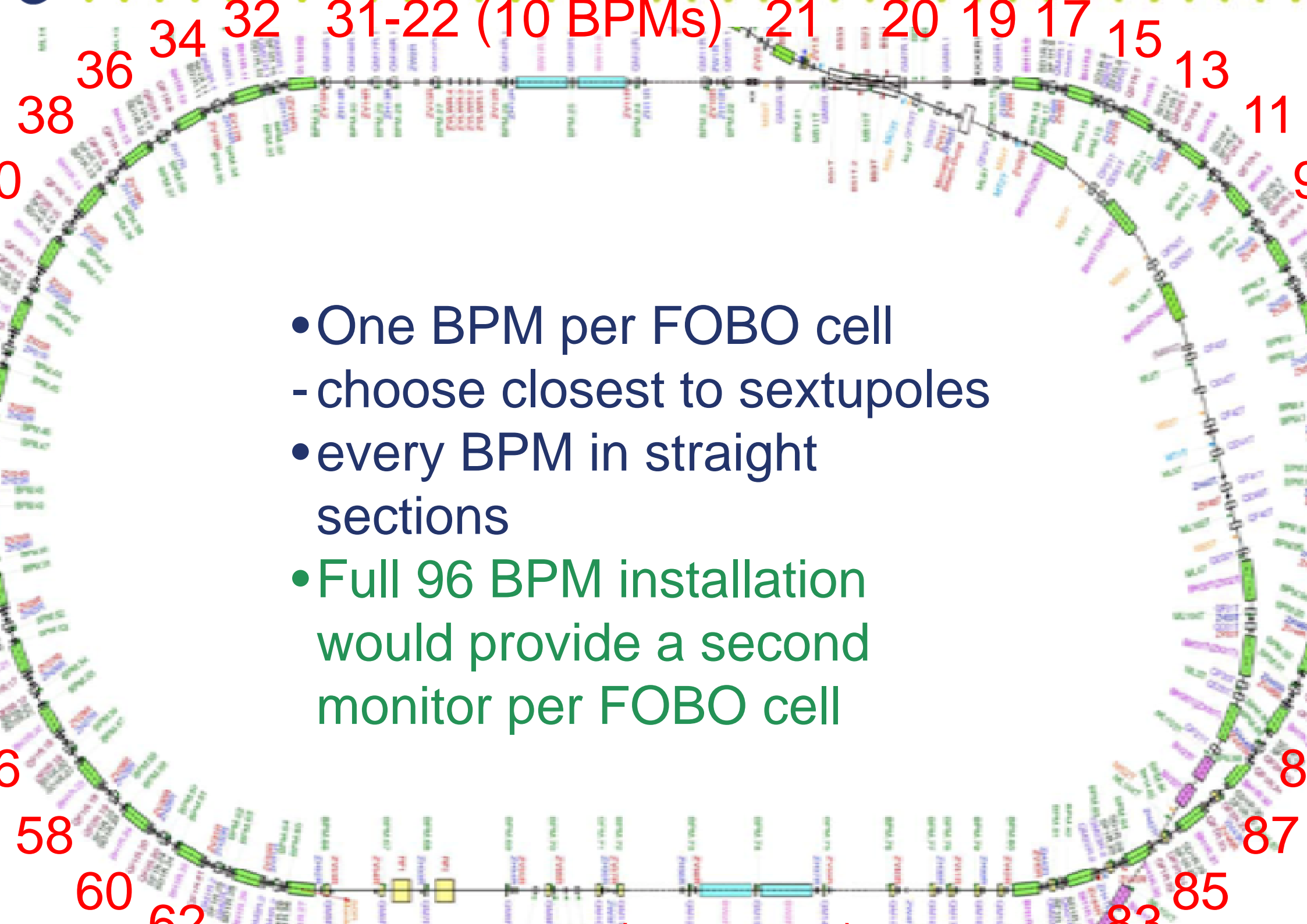


DAQ mode control moved to ATF control system

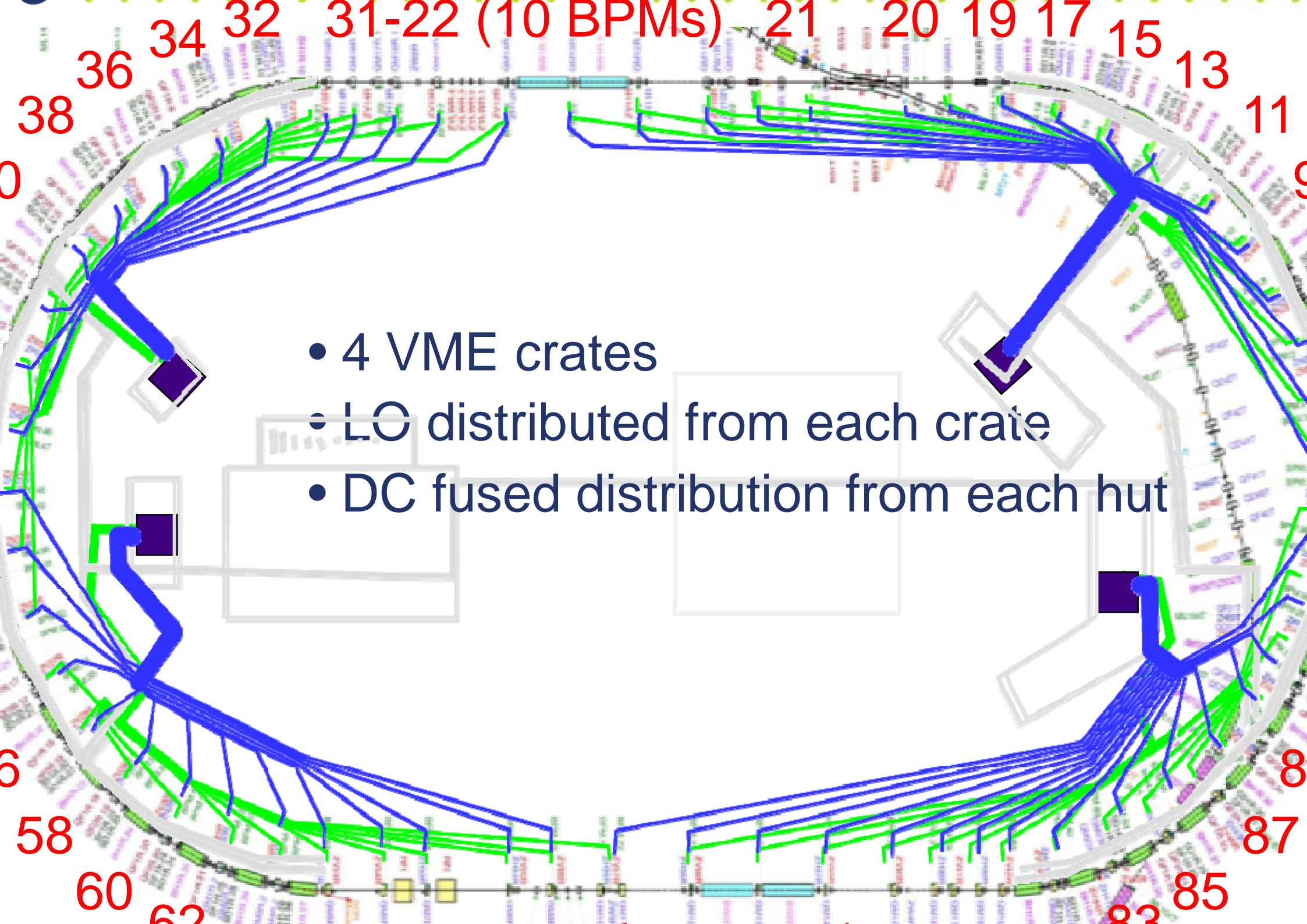
Add diagnostic displays



- Ten BPMs in each arc
- One per FOBO cell, typically
- final prototype test (12/07) on BPM 56
- 19 BPMs available for beam studies this December



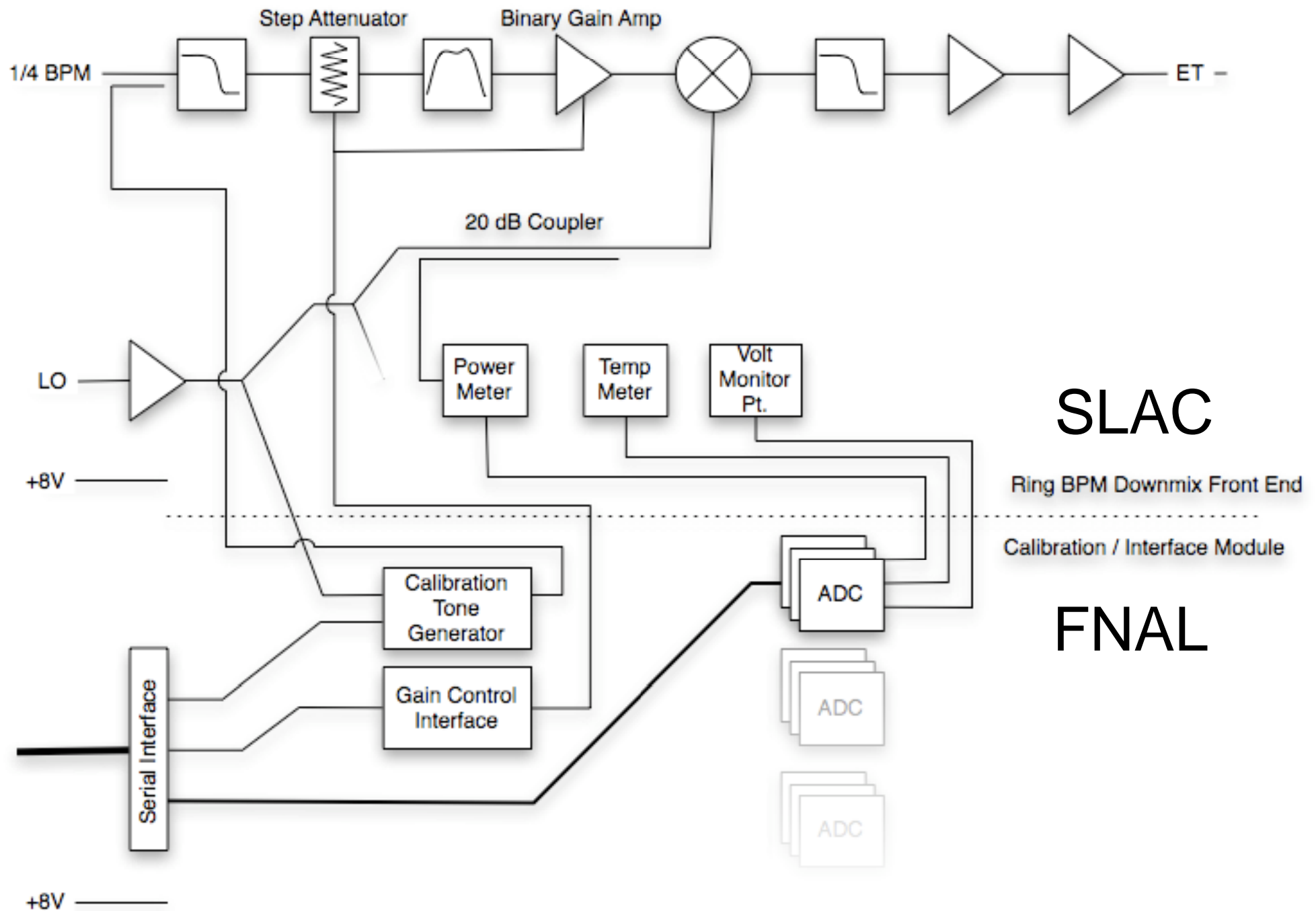
- One BPM per FOBO cell
- choose closest to sextupoles
- every BPM in straight sections
- Full 96 BPM installation would provide a second monitor per FOBO cell



- 4 VME crates
- LO distributed from each crate
- DC fused distribution from each hut

- Four VME crates, one in each RF hut
 - 1 IOC, 1 timing module, 8 Echoteks in each
 - **12 Echoteks each for full 96 BPMs**
 - **ADC, DIO, serial communication in one crate**
- LO and DC distribution
 - each VME crate (4) to provide an LO source
 - **high-power amplifier in each RF hut, split in tunnel between two 8-way splitters (straight and arc)**
 - **DC source with fused distribution panel in each RF hut, individual supply to each BPM**
- New electronics housings
 - calibration/control module isolated from analog receiver
 - smaller boards, smaller enclosure (for downmix)
 - two 2-channel boards (one BPM) per box
 - **adequate isolation has been demonstrated with boards back-to-back**

- Analog downmix electronics have been upgraded with additions:
 - digital step attenuator (0-28 dB, 4 dB steps) at input
 - on-board temperature sensor, current and voltage monitor
 - on-board directional coupler for calibration tone
 - improved match into LO power meter
- and subtractions:
 - manual switch for RF amplifier gain setting (remote only)
 - on-board Cal amplifier (not used, cross-talk too great)
- and changes:
 - smaller board
 - several components upgraded to newer models
 - additional filtering on analog diagnostic read backs



Electronics Required for each of four BPM channels
 All Four channels housed within one BPM box and one CAL box

Prototype PCB layout and manufacture complete.

Assembly in progress

- Five boards due back from loaders 10/30
- Some hand-finishing in house, eleventh hour components

Bench tests at SLAC

- characterize RF performance, digital response
- tune analog signal ranges

Bench tests at FNAL

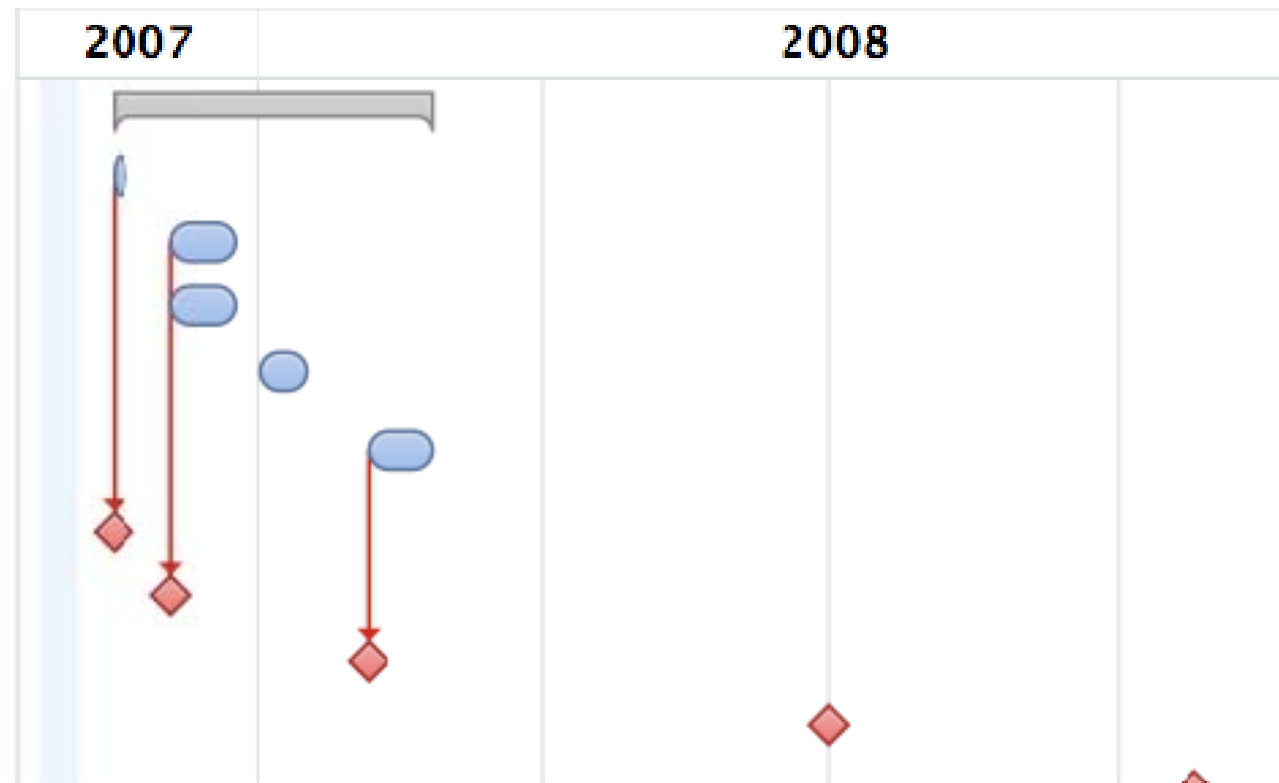
- Deliver two boards Nov. 14-16
- Interface SLAC electronics with FNAL cal/control module
- Leave boards with FNAL team for further testing & development

- FNAL team to bring complete prototype set to ATF late Nov '07 for commissioning and testing
 - Complete setup: two 2-channel boards in new enclosure with (2x2) calibration tones and control interface
 - Successful tests are the final step before upgrading 63 BPMs.
- 19 original ET BPMs available for beam studies
 - Several new participants from FNAL and SLAC eager to make use of TBT and high resolution capabilities.
- Test septum area BPM with SLAC downconverter + Echotek (proposed)
- Study septum aperture vs. EXT emittance

- **Produce enough downmix boards for 63 ATF BPMs**
 - **(plus spares!)**
 - **have begun ordering parts for those elements of design and installation which are unlikely to change**
- **Install and test system in late Spring**
 - **Beam physics studies as soon as system is available:**
BBA, ORM

Task

- 1) DR BPM
 - 1.1) CAL / Electronics Test @ FNAL
 - 1.2) Beam Tests of CAL (+interface)
 - 1.3) Beam Studies
 - 1.4) Full Purchasing and Production
 - 1.5) Full Installation and Commissioning
- 6) FNAL Trip
- 7) ATF Trip
- 8) ATF Trip
- 9) ATF Trip
- 10) ATF2 Beam Operation



Mover
Operation

Commissioning
Utility

EPICS IOC

VSystem
Interface

CAMAC Routines

Coordinate Transforms

Dec. 07

Current Progress

- Initial software developed for testing and commissioning runs outside of EPICS/VSystem
- Ongoing work to fix minor issues and develop an EPICS version
 - **Mover calibration algorithms require more testing**
- December '07
 - **Test new version of libraries (written for both EPICS and the standalone system)**
 - **Provide interim GUI interface to CAMAC/Mover for ATF personnel**
 - **If available, test EPICS mover system**
- Plan to have full system ready for test in Spring '08

- Purchasing on-going to load out remaining boards
- Purchasing cables for LO, CAL, and DC distribution
- Single pulse calibration
 - **Still waiting on alignment measurement of BPM to verify sign of single pulse calibration scheme**
 - **Amplitude calibration good to $\sim 100 \mu\text{m}$**
- December '07
 - **Re-check phasing of LO cables**
 - **Repeat sign (phase) calibration tests**

• Late Spring '08

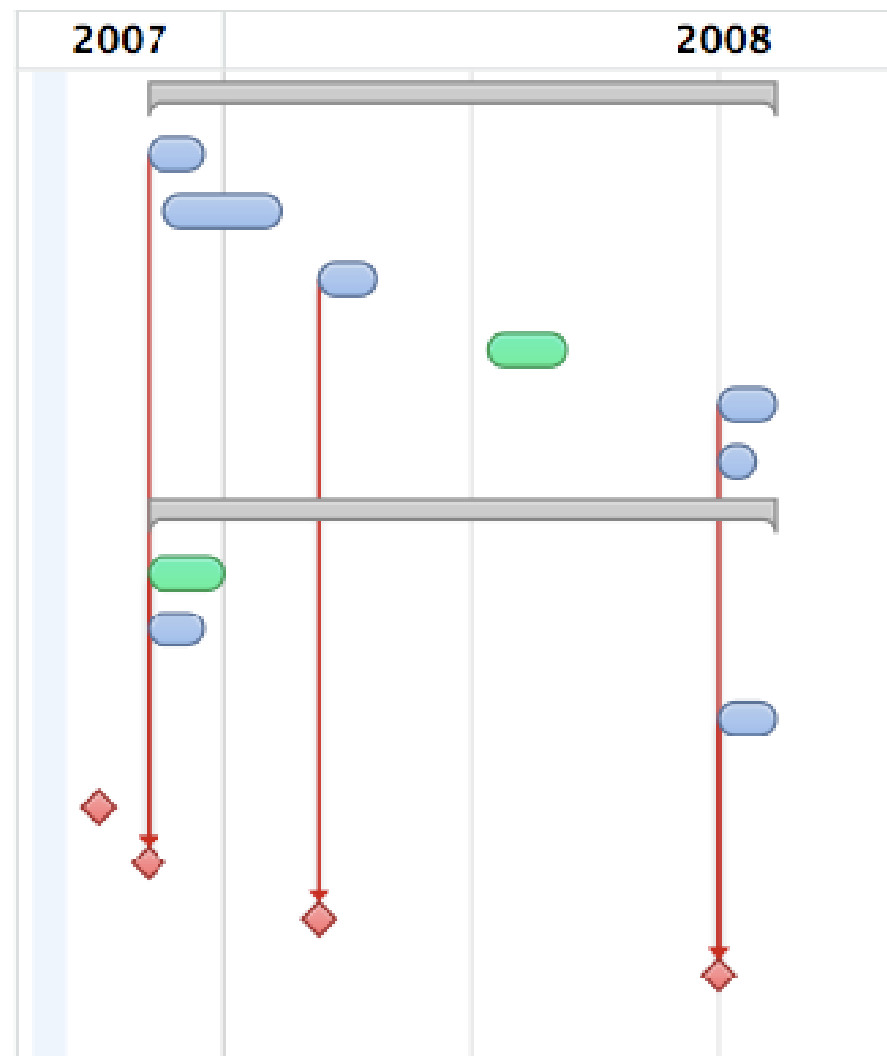
- Test BPM and Mover interface and operation
- Develop EPICS/VSystem single pulse calibration interface

• Fall '08

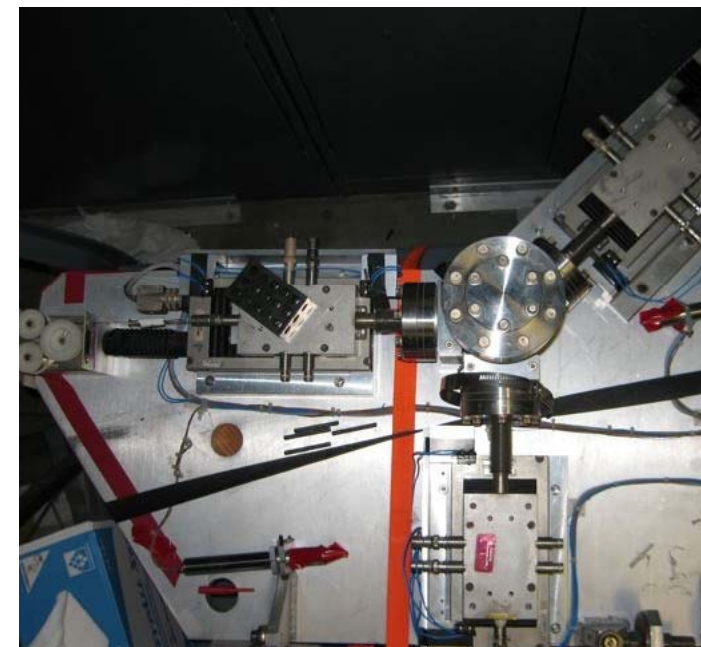
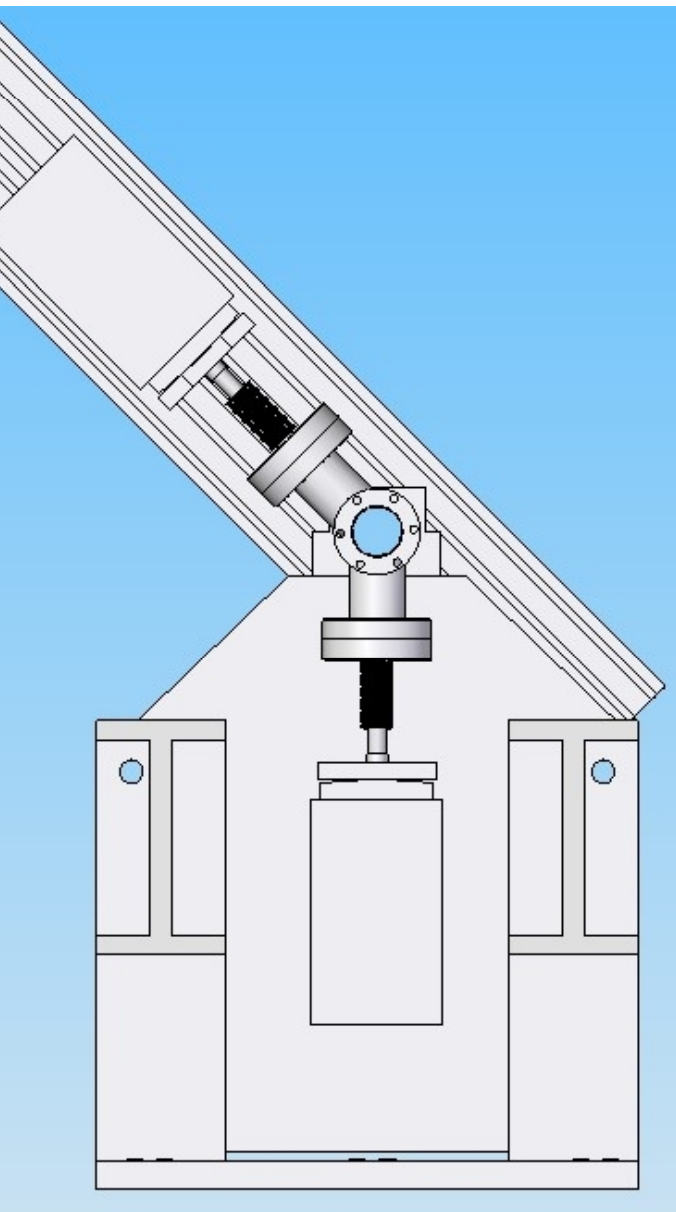
- Commission
- system with
- beam

Task

- 2) ATF2 Magnet Movers
 - 2.1) Operation Tests
 - 2.2) EPICS Integration
 - 2.3) VSystem tests and Control System Integration
 - 2.4) Mover Installation
 - 2.5) Mover Setup
 - 2.6) Final Checkout
- 3) ATF2 QBPMs
 - 3.1) Control System Integration
 - 3.2) First Pulse Operation Tests
 - 3.3) Installation and Setup (Including First Pulse required measurements)
- 6) FNAL Trip
- 7) ATF Trip
- 8) ATF Trip
- 9) ATF Trip
- 10) ATF2 Begins Operation



- Combine two FFTB scanners into single IP carbon wire scanner for ATF2
- Fabrication and re-work on-going
- Should ship in Spring '08
 - **Work required to interface SLAC scanner with ATF software**



Install two wire scanners in a very small space to allow measurement of large and small sizes.

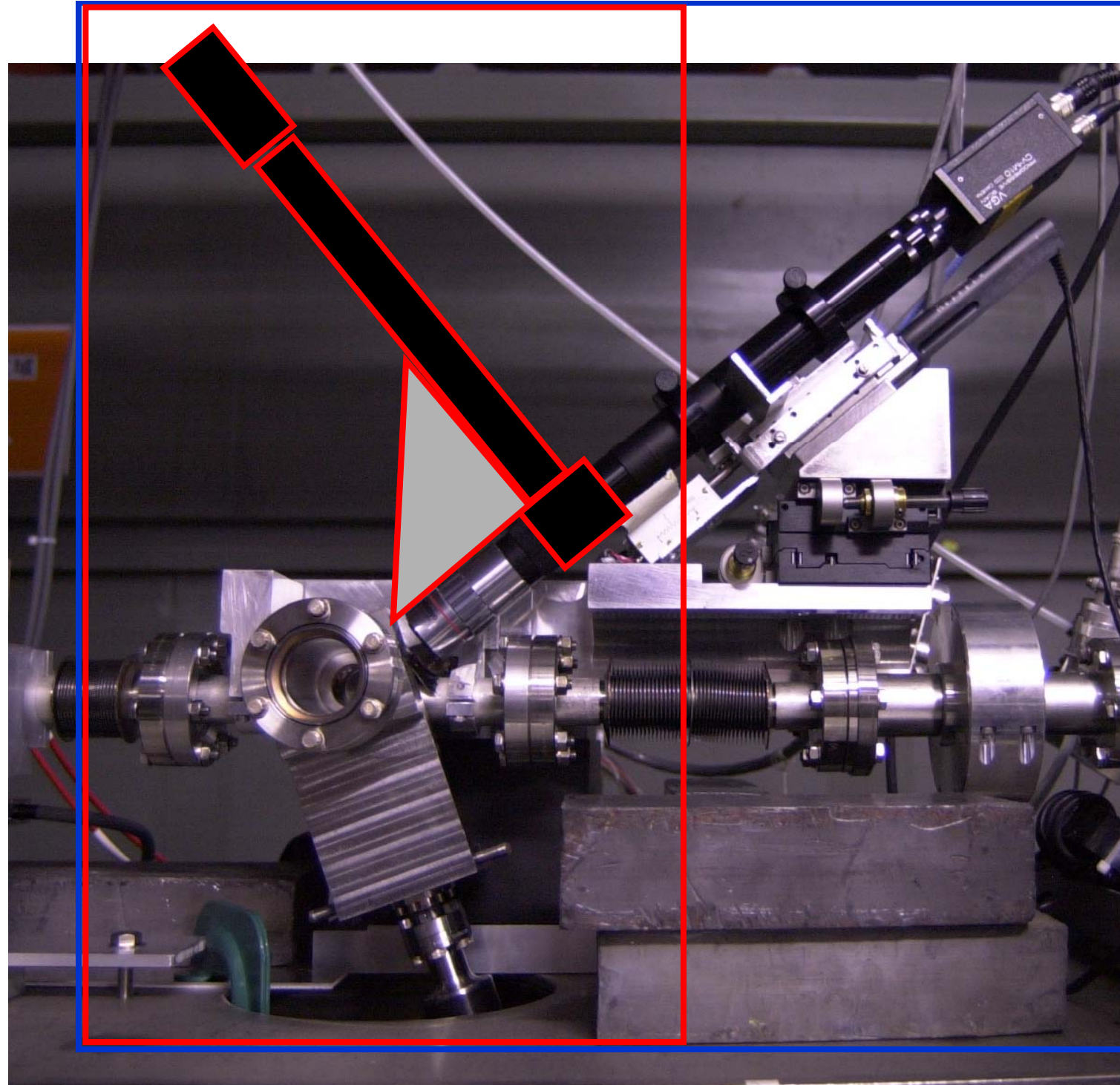
Required parts are in hand except for new vac chamber.

Construction to be finished by Feb '08

Installation in ATFC in June '08

- **Purpose:**
 - **Examine beam spot after Septum to look for emittance blow-up (DR to EXT)**
- **Work needed:**
 - **Change camera optics to fit in required space**
 - **Parts ordered**
 - **December '07**
 - **Retrofit optics at ATF with possible installation**

- Due to space limitations, a small modification to the existing OTR monitor will allow it to be used right after the extraction septum.



• DR BPMs

- **Test redesigned analog downmix electronics, calibration, and system control interface in Dec '07**
- **Plans for 63 instrumented BPMs in Spring '08**

• ATF2

- **Magnet mover control tests ongoing, with plans for testing Dec '07, completed system by Spring '08**
- **QBPM tests in Dec '07, installation complete by Summer '08 for beam operation Fall '08**

• IP Wire Scanner

- **Modifications ongoing, ship to ATF in Spring '08**

• OTR