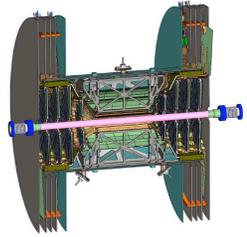


FVTX Detector Assembly Plan

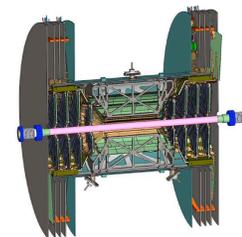
Stephen Pate
New Mexico State University
(FVTX Assembly Management
WBS 1.7)



Talk Outline

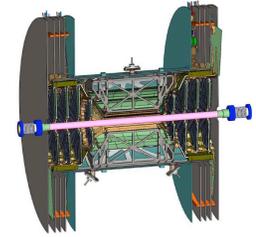
- Scope
- Assembly Schedule
- Support Structures and Assembly Fixtures
- Assembly Lab Area at BNL
- Assembly Procedure --- from wedges to cages
- Installation in PHENIX IR
- Summary

Scope



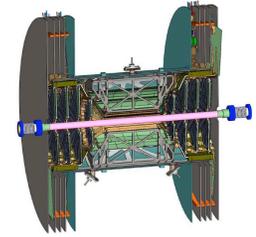
- Prepare assembly lab at BNL
- Receive wedges, ROCs, and support structures
- Build up half-disks and half-cages
- Metrology and Survey of sensors
 - Sensors located to 10 microns in x and y in each plane
- Testing of sensors and ROCs
 - Functioning and noise levels in all components
- Coordination of Installation in PHENIX

Assembly Schedule



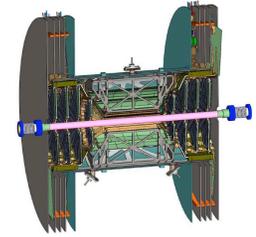
- Assembly fixtures manufactured by 3/5/09
- Support structures manufactured by 12/25/09
- Testing of wedge assemblies 8/9/10 – 3/4/11
- Vendor Q/A of ROCs 1/7/10 – 3/15/10
- Start date for detector assembly is 9/6/10
- Cages completed and surveyed by 6/29/11
- Install in PHENIX IR during 6/22/11 – 10/25/11
- Commission during 6/29/11 – 10/25/11

Support Structures & Assembly Fixtures



- HYTEC is designing the Support Structures (WBS 1.6.2-1.6.4) and the Assembly Fixtures (WBS 1.6.5);
- After delivery of support structures, we will test them using “dummy wedges”
- See Walt Sondheim’s talk for more details

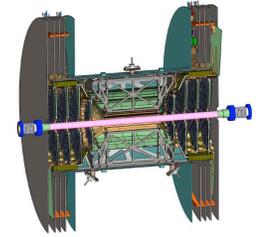
Assembly Lab Area



- Some minimum requirements for this lab:
 - Just “clean” enough; sticky pad at door to minimize dust, proper handling procedures for wedges, dry box to store wedges
 - Basic electronic equipment
 - Four people should be able to work there
 - Sufficient room for surveying
 - Space for “mini-DAQ” and cooling system

A single room with ~1000 sq ft would be sufficient.

Assembly Lab Area



Two rooms to be used in Physics Building:

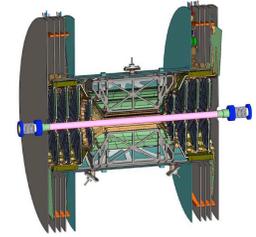
(1) Room 1-116

- ~ 250 sq ft; will be used largely for storage of items before and after assembly
- Can do survey of finished half-cages there
- Needs: Clean entry; dry box for storage; air filter

(2) Room 2-91

- ~ 400 sq ft; active assembly and testing area
- Needs: Clean entry; dry box; air filter; electronics

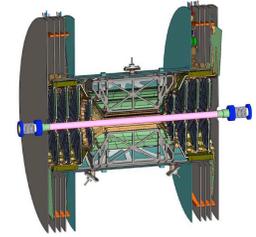
Assembly Lab Area



Room 1-116



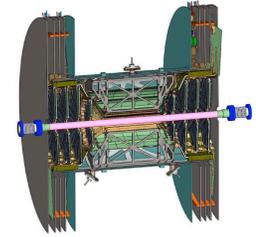
Assembly Lab Area



Room 1-116



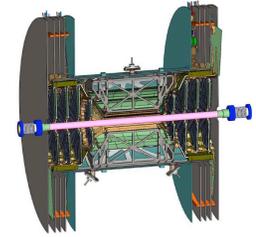
Assembly Lab Area



Room 2-91



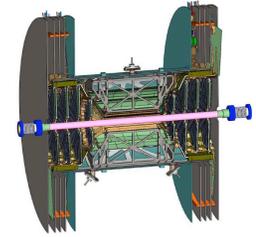
Assembly Lab Area



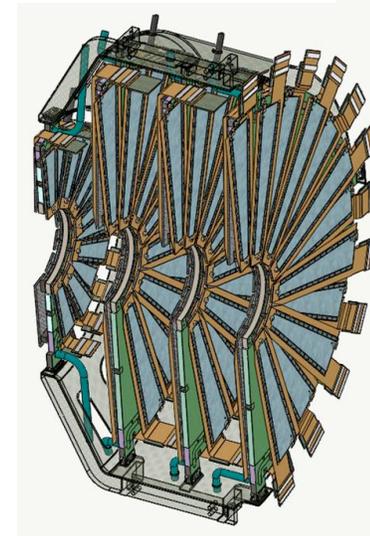
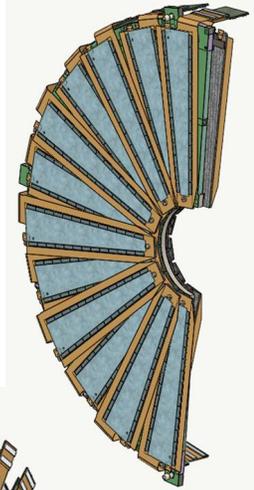
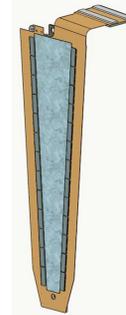
Room 2-91



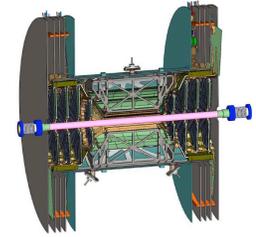
Assembly Procedure



1. Re-testing of wedges delivered from SiDet; re-testing of manufactured ROCs
2. Build up a half-disk as wedges and ROCs become available; mechanical testing
3. Electronic testing of half-disk; do all wedges and ROCs still function?
4. Metrology of sensors on half-disk
5. When sufficient half-disks are available, then move on to a half-cage
6. Survey of half-disks in half-cages
7. Electronic testing of half-cage with mini-DAQ

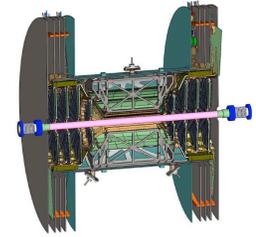


Alignment and Survey



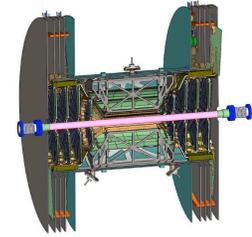
- Goal is to locate the sensors in a plane to within ~ 10 microns in x and y
- The strip-to-strip spacing within a wedge will be much better than that. So the issues reduces to the metrology of the sensors in a half-disk, the survey of the half-disks into a half-cage, and the survey of the half-cages in the IR.
- Surveying can get you to ~ 50 - 100 microns
- Analysis of track data needed to reach ~ 10 microns

Alignment and Survey



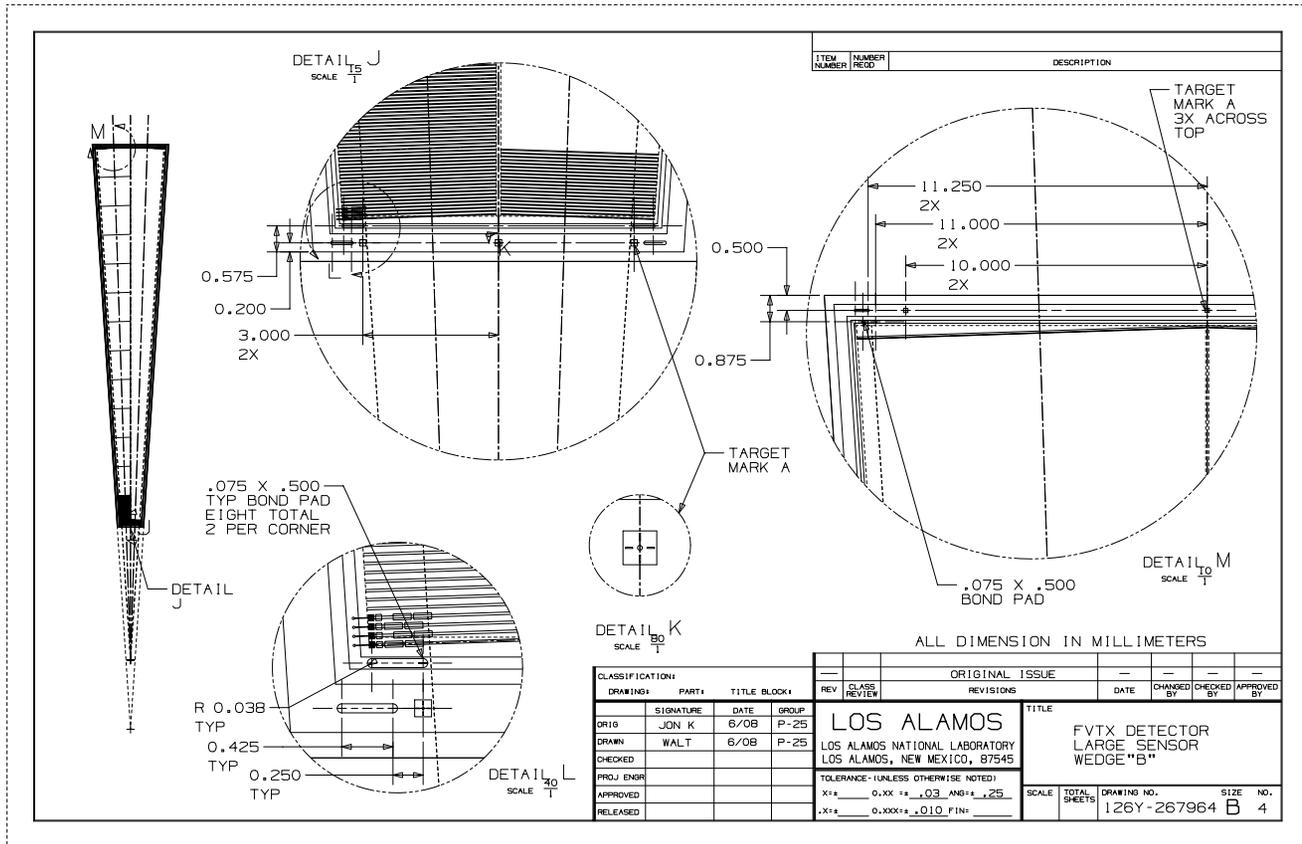
- Procedure:
 - There are 6 target marks on each wedge
 - Wedges are mounted on a half-disk; the half-disk fixtures will include survey targets (details remain to be finalized)
 - Target marks and survey targets will be located using a camera mounted on a CMM machine in the main BNL shop
 - Survey half-disks within a half-cage after assembly
 - Survey the half-disks into the IR during installation

Alignment and Survey

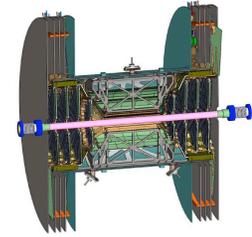


Each sensor has 6 alignment marks placed with high precision by sensor vendor.

These marks will be optically located by a camera mounted above an xy-table in the BNL shop.



Alignment and Survey

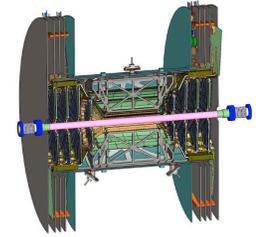


xy-table in main BNL shop
(camera would replace drill bit...)

5 μm positioning
in x and y;
*everything on a
half-disk will be
internally located
to this accuracy*

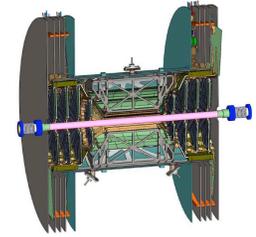


Installation in PHENIX IR



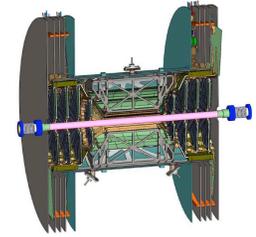
- Major integration activity, planned in close cooperation with BNL/PHENIX scientists and technicians
- PHENIX tech crew responsible for installation; BNL will survey location in IR; PHENIX scientists (see later slide) will connect cables, test detector functions, commission, etc...
- Lots of experience in LANL/NMSU/UNM team

Integration with VTX



- Mechanical (Sondheim), Electrical (Mannel) and Integration (Pak) coordinators are identical in the VTX and FVTX projects
- We plan a full scale combined system test in the PHENIX Hall (1008) before installation in the IR, in early 2011

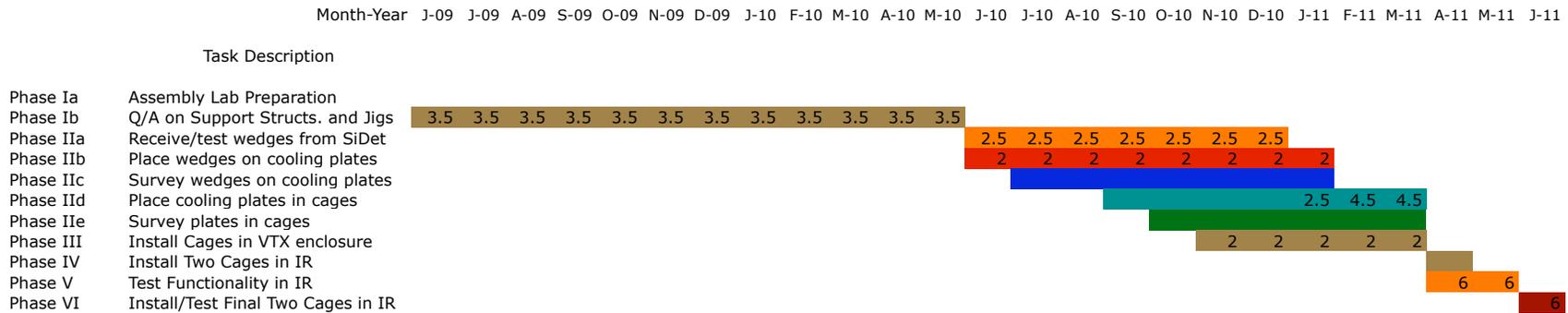
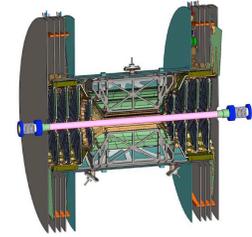
Near-term Activities



- Work with BNL shop to verify functionality of *xy*-table camera and positioning accuracy
- Establish assembly labs (1-116 and 2-91) as useful workspaces
- Begin work on positioning and alignment software and data-basing



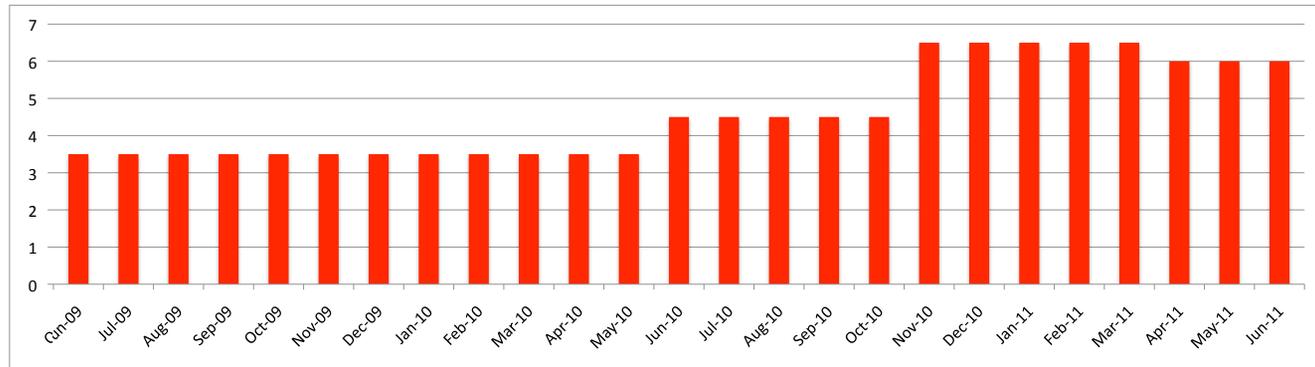
Workforce Summary



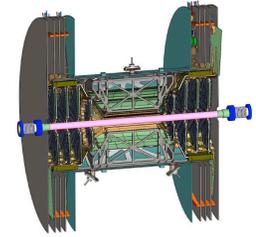
Workforce Sums

3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 4.5 4.5 4.5 4.5 4.5 6.5 6.5 6.5 6.5 6.5 6 6 6

Workforce Timeline



Summary



- We have identified rooms at BNL for the assembly labs
- Procedures for assembly and surveying have been thought out
- Workforce needs have been anticipated
- One year from now the labs will be set up and some prototyping may be ongoing in them