

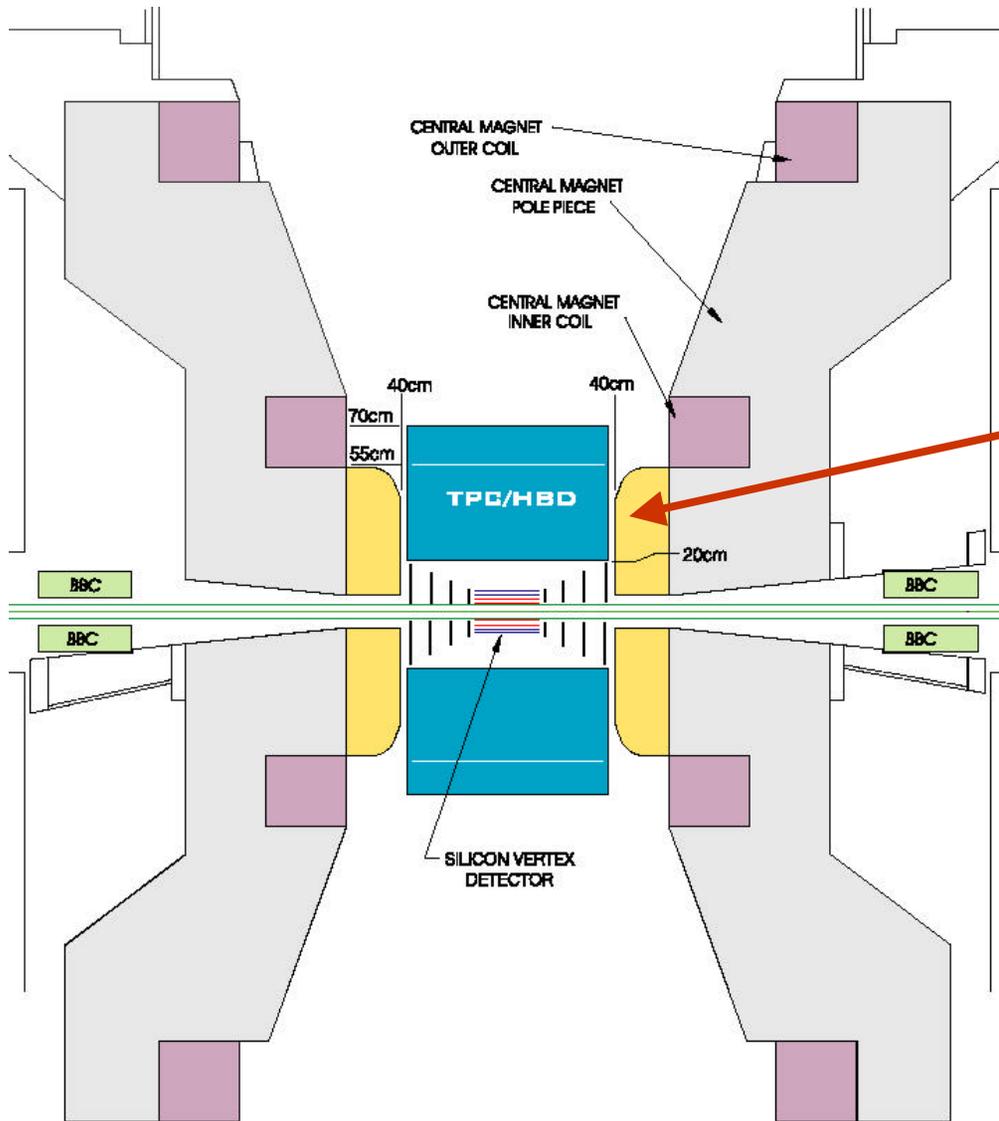


Infrastructure Issues in the Central Region

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BNL

Mini Workshop on PHENIX Upgrade Plans
August 6, 2002

PHENIX Central Region



You wanna put this where ?

Detectors Proposed for the Inner Central Region

❑ Silicon Vertex and Tracking Detectors

- Barrel pixel detector (~1.5M chs)
- Endcap pixel detectors (~4.0 M chs)
- Strip detector (~165K chs)

❑ TPC/HBD

- TPC (~80K chs)
- HBD (2-8K chs)

❑ NTC/NTC'

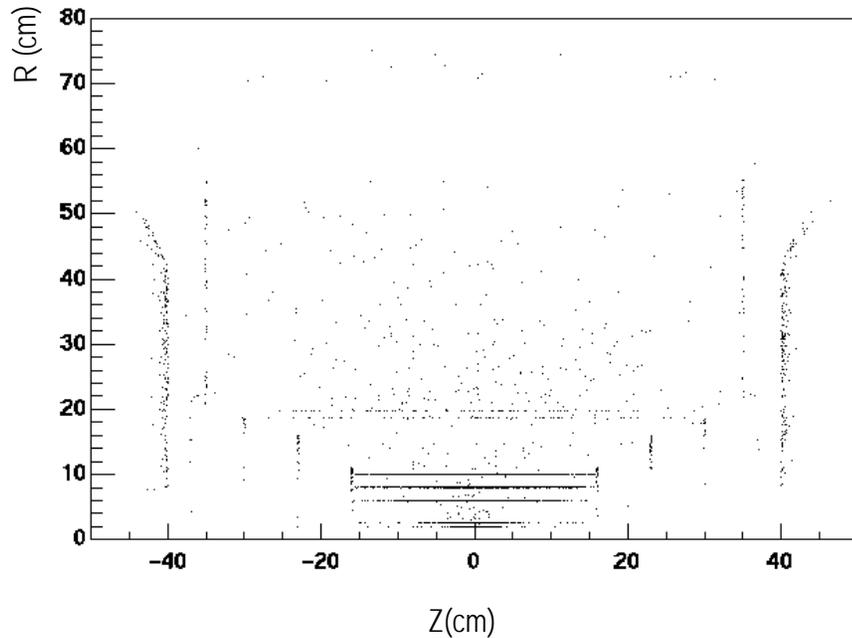
❑ Nose Cone Calorimeter (?)

Issues

- Space
- Power & cooling
- Cables & fibers
- Affect on other PHENIX detectors
- Radiation length budget
- Backgrounds for Muon Arms
- Access and installation
- Schedule

Photon Conversions

Radiography



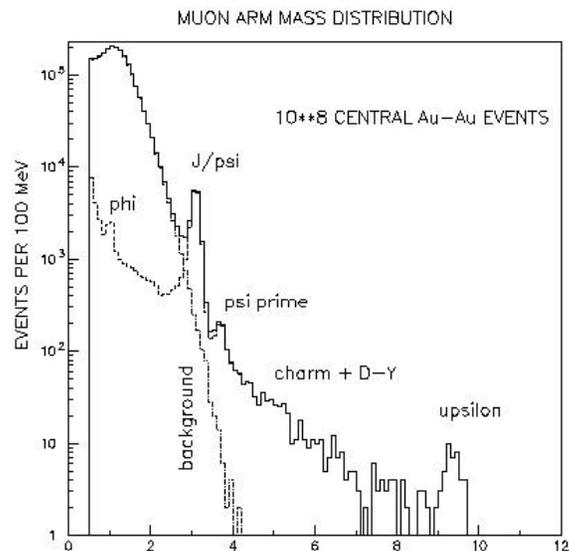
All Conversions, integrated over $2p$
 e^+ or e^- having at least one hit in TPC

C.Aidala

Averaged over 200 events	No Si	Si (1%/layer)
No field (Tracking to 1 MeV)	19.5	50.1
No field (Tracking to 10 MeV)	17.5	43.9
No field (Tracking to 20 MeV)	16.3	42.3
Field (Tracking to 1 MeV)	28.4	59.8
Field (Tracking to 10 MeV)	25.3	56.5
Field (Tracking to 20 MeV)	22.6	51.6

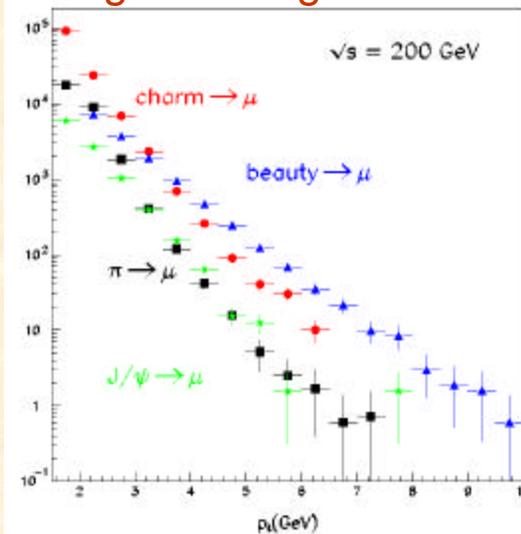
Muon Performance with Various Nosecone Configurations

- 1 cm shorter nosecone
 - decay muons increases by ~4%
 - punch-through π and K also increase by few to several percent
- 3 cm shorter nosecone
 - decay muons increases by ~10% (vertex distribution dependent. This is for vertex $\sigma=22$ cm) NOTE: dimuon background from this will increase by ~ 20%
 - punch-through π and K increase by ~25%
- Addition of scintillator material in front of nosecone did not change rates noticeably
- Addition of copper behind central magnet yoke can help punch-through rate



Signal:background reduction and continuum contains more combinatorial background. (Issue for comparing J/psi to continuum)

Note: Hiroki's calculations show even poorer signal:background



Decay μ increases as does background from misidentified π /K (more prevalent at higher p)

M.Brooks, Apr-02

Conclusions

- 1 cm shorter nosecone is acceptable
- 3 cm shorter nosecone results in significant background increase which is not acceptable without some very strong justification
- Can improve punch-through rate by addition of material behind yoke, but decay background increase for dimuons is not affected and increase is not insignificant

Sermon

- The inner central region of PHENIX is highly subscribed for both present and future detectors
- Any upgrade plan must involve careful planning and integration of space and resources in this region (similar to what was done for the construction of the main PHENIX detectors), and must address both near and long term issues.
- PHENIX management and engineering staff must be kept fully aware of new proposed detectors and their development. Any new detector must go through the PHENIX approval process (see Axel's talk from Dec '01), and may also have to go through an external review process. CAD will also require safety approval.