

PHENIX December Decadal R&D Workshops

R&D workshops in early December to begin exploring the most promising technologies to support the PHENIX upgrades plans for the next decade, as outlined in the recently completed PHENIX Decadal Plan,

http://www.phenix.bnl.gov/phenix/WWW/docs/decadal/2010/phenix_decadal10_full_refs.pdf

For these initial workshops we intend to focus on three general areas:

1. Calorimetry (compact emCal, HCal,...) - Woody, and ??
2. Tracking (GEM's, Silicon,...) - Hemmick, and ??
3. PID (ToF, RICH,...) - Chiu, and ??

Each workshop for one day and at different times so that people can participate in multiple workshops. Dates are being explored in the range Dec 6-19

Conveners for these December workshops would lead in organization of each of the three mini-workshops. One or two conveners for each of the three areas

They will help determine the date and schedule, work to bring PHENIX experts in for the workshop(s), help establish the key questions to focus on, arrange for any talks that would enable critical discussions, and be at BNL for the workshops.

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The charge to the three groups will include:

1. A set of questions for each group prepared by PM and the conveners ahead of time - which will be discussed and answered.
2. A representative from each group will present at the January collaboration meeting.
3. Out of each group should come one or more R&D proposals that should be submitted to myself and Ed O'brien to obtain RHIC R&D funding on a timescale of late January to early February.

General questions:

- resolution, occupancy, etc. requirements?
- how it contributes to the Decadal physics goals?
- what prototypes or staged approach would work?
- ballpark cost & schedule?
- draw in non-BNL groups including University groups, other Nat. Labs., foreign groups?

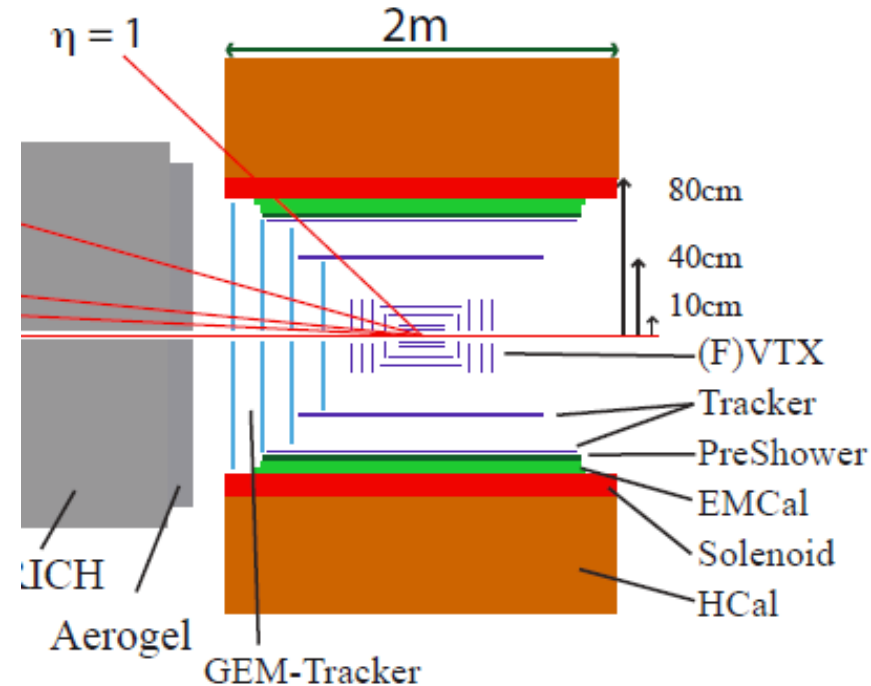
PHENIX Decadal Plan - Technologies?

Mid-rapidity requirements:

- $|\eta| < 1$, with full 2π in ϕ
- precision tracking, displaced vertices
- highly segmented emCal; full HCal
- electron PID; γ/π^0 separation to $p_T > 40$ GeV/c
- high rate, zero deadtime, etc.

Technical solutions?

- solenoid magnet
 - silicon strips + VTX
 - GEM tracking
 - compact emCal: Focal techn.; W with scint. readout projective shashlik; high-density scint. crystals
 - preshower
 - HCal: scint. tiles with wavelength shifter; scint. fibers; cerenkov fibers
 - hi-res TOF: RPC; MCP-PMT; HPD?
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- FEM upgrades for silicon, calorimetry, GEMs, TOF?
 - DAQ upgrades beyond DCM IIs?



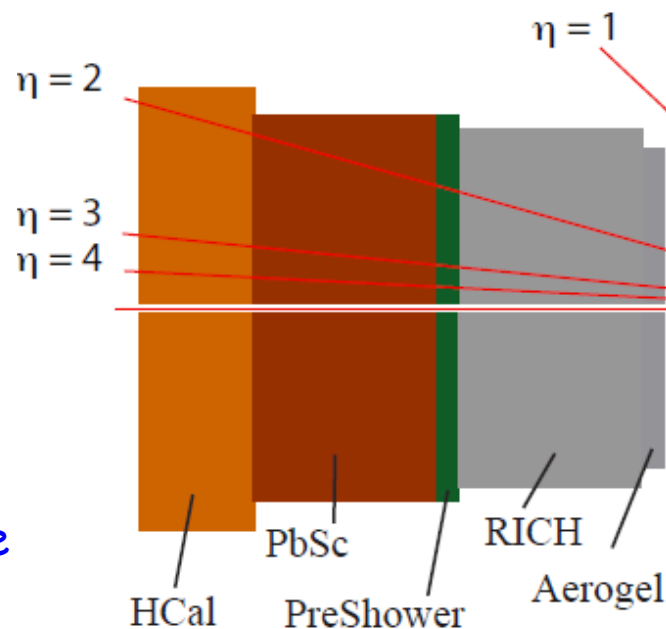
PHENIX Decadal Plan - Technologies?

Forward-rapidity requirements:

- tracking $\Delta p/p \sim 2\%$; RICH $\text{eff}_e > 9.4\%$ for $p > 10 \text{ GeV}/c$
- emCal $6\%/\sqrt{E}$; HCal $50\%/\sqrt{E}$
- displaced vertex - very thin, 2-D, $10 \mu\text{m}$ resolution, ≥ 3 layer pixels

Technical solutions?

- magnet?
- MAPS (like HFT?) very thin hybrid pixels
- GEM tracking
- reuse existing PbSc, PbGl?
- preshower - Focal technology?
- HCal - CALICE HCAL & TCMT with muon capability?
- RICH - dual radiator for extended PID range
- Roman pots for (very forward) diffractive physics



PHENIX Internal Detector R&D Proposal and Review Process

Scope

- Develop an effective plan for competition for and allocation of detector R&D funds that advances the PHENIX future physics program in alignment with the Decadal Plan
- Not intended for maintenance or refurbishment

Schedule

- Call for proposals - Jan collaboration meeting
- Proposal deadline - mid Feb(?) (proposals available to collaboration)
- (Open) Review - end Feb(?) by (mostly) internal committee

Charge (proposal to be 10 pages max - hard limit)

- Relevance to Decadal plan; context for physics goals
- Deliverable (e.g. prototype board, detector; test beam result)
- Soundness of plan and schedule; assessment of risk
- Budget estimate & detailed justification; other sources of funding
- Competence and size of team

Funding

- \$200-300k/year total (Ed holds ~\$100k in reserve)
- Committee should give an ordered list with recommended allocation for each project
- PHENIX PM will decide on final ordering and total allocation cutoff (leaving some reserves, and consistent with maintenance/refurbishment needs)

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Started listing more specific questions - under construction:

CemCal

- performance in central Au+Au?
- trigger, given VTX & solenoid conversions?
- also very high-pT trigger?
- forward calorimeter near beam, rates, occupancy?
- HCal?

Tracking

- GEM: tracking: precision, occupancy, cost?
- Vertex detectors:
 - requirements and cost of mid-rapidity strips?
 - viability of VTX?
 - extremely thin (MAPS) pixels for forward electrons?
 - viability of FVTX?

PID?