Veto detector design options

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(showing work, plans of veto group)

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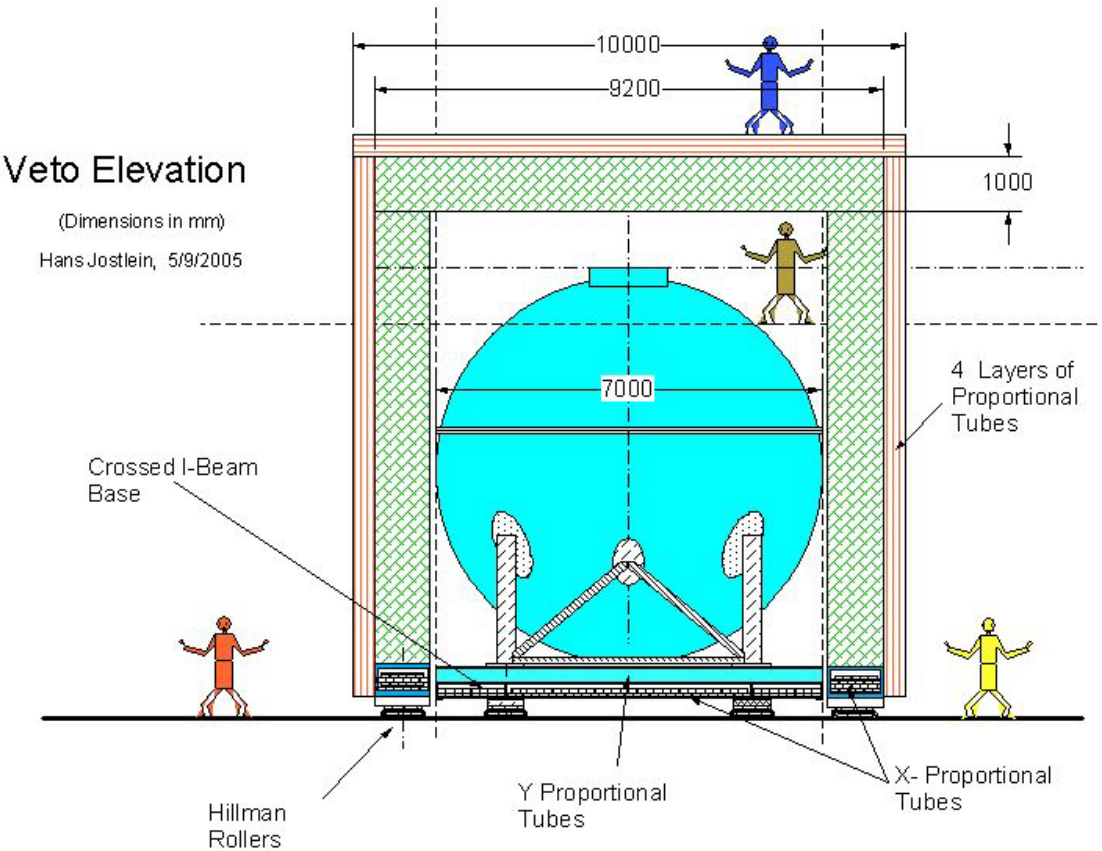
Design Requirements, status

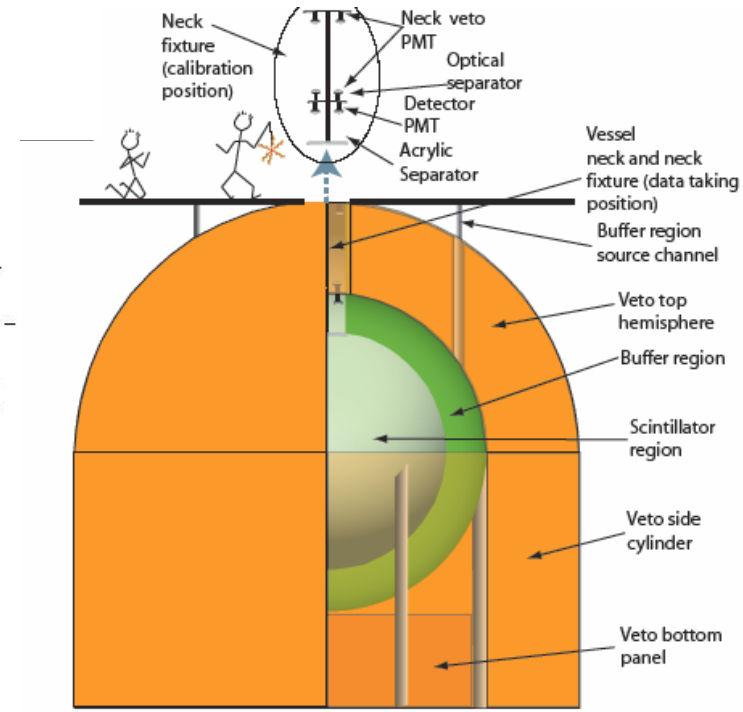
- Requirements
  - ✓Hermetic!!
  - ✓Position resolution ~20cm on all sides (mod. res. tracking)
  - ✓Access to neck to insert sources
  - ✓At least 7 attenuation lengths for neutrons
- Where we are
  - ✓Conceptual designs, thought expts.
  - ✓Using previous experience in HEP extensively
  - ✓Good costing for a major piece of the project

Need to come up with better, more detailed designs, simulations

Basic idea

passive	active
Simple high Z material + position detectors	Water is shielding and detector





overview

	Passive	Active
Workers	S. Dytman, J. Link, H. Jostlein, D. Naples, V. Paolone	S. Biller, P. Fisher, N. Stanton, R. Yamamoto
Materials	CHESS concrete (mostly Fe) or scrap iron sheets	Water or liquid scin.
detectors	RPC's or prop tubes	PMT's same as for inner detector

Hybrid designs also under consideration

Design - general

	Passive	Active
Neck access	From inside or outside shielding?	Hole in top
Keep cost* reasonable	$0.4M-$1.1M	$0.8M, $1.8M
Allow in situ tests, repairs	Put into design	Similar to inner detector
segmentation	≥3 layers, ~2000 ch/layer	8 segments, ~300 PMT's

*Detailed costing only done on components

Installation issues are similar for active, passive

- Assemble underground? Very likely, but how?
- How big are pieces to be lowered? (~2m x 8m?)
- Is their weight limit for lowering?
- Slide completed assembly into place?
- How important is disassembly?
- How do we fill water tanks, pour concrete underground?

These are issues relevant for inner detector, should be worked out jointly!

Detector design issues

	Passive	Active
Position res~20cm to allow tracking	Choose RPC, prop tube segmentation	Have working experience
Efficiency for MIP >99%	Edge effects, redundancy	Edge effects

Main job is to tag muons, but should also shield and tag hadrons

Some details

Passive needs

- Long-term stability
  - ✓Belle, ATLAS
- Nothing flammable
  - ✓Venting?

Active needs

- Scheme to monitor detector stability
- Catch basin?
- Light concentrators?

Both need

- Very heavy, strong frames
- Which geometry is optimal?
- Calibration
- HV/readout
- Separate event trigger

What's next?

- If you get the impression all jobs are covered, you are wrong.
  - ✓Starting to ramp up to next review
  - ✓Contact Peter Fisher (fisherp@mit.edu) or me (dytman@pitt.edu) to explore opportunities
- Excellent progress, but need improved, more quantitative designs!
  - ✓Strength, flexibility
  - ✓Detector vs. shielding aspects
  - ✓Better, more complete costing
- Continue to improve simulations (Geant4, Steve Sekula taking lead)
  - ✓Does active or passive have advantages in tagging, shielding?
  - ✓For passive, are position detectors inside shielding useful?
- Establish interdisciplinary installation planning group?