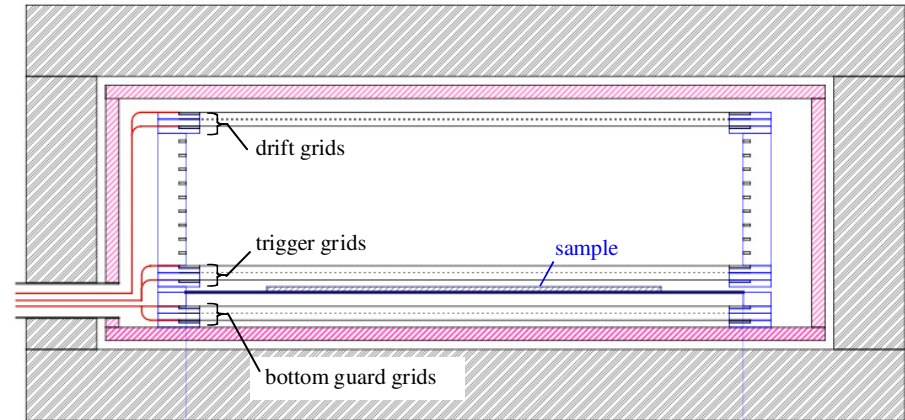


BetaCage

- Multiwire proportional counter
 - 100 cm x 100 cm x 50 cm high
 - \$400k DUSEL R&D FY2008-10
 - Way behind schedule due in part to my move to SU, other commitments of personnel
 - Progressing again and quickly
- Will be world's most sensitive screener for α 's, β 's
 - Expect β background $3 \times 10^{-5} \text{ keV}^{-1} \text{ cm}^{-2} \text{ day}^{-1}$ so screen 60-cm samples for 3 days to $10^{-5} \text{ keV}^{-1} \text{ cm}^{-2} \text{ day}^{-1}$ w/ bkgd subtraction
 - Expect negligible backgrounds for α 's
- Applications for rare-event searches and beyond
 - Industry: α emitters that cause single-event upsets in Si chips
 - Radioisotope dating with β sources competitive with AMS
 - $^{14}\text{C}/^{12}\text{C}$ to 10^{-18} , $^3\text{H}/\text{H}$ to 10^{-20} also ^{10}Be , ^{210}Pb , ^{36}Cl
 - Detect tracers used in uptake and transport in biology studies



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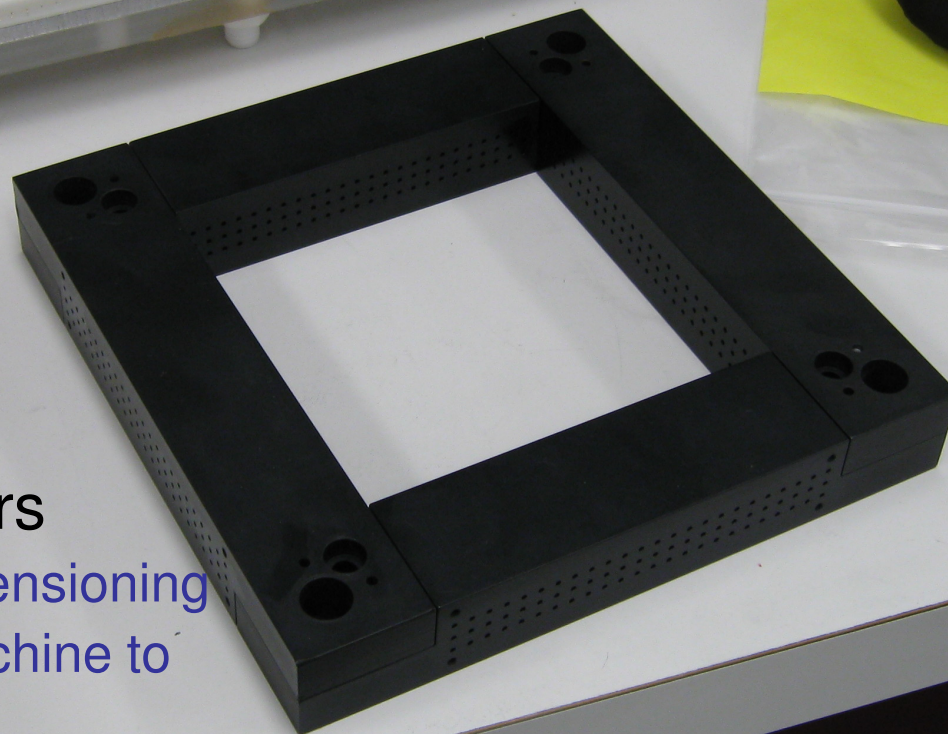


Low-radon
cleanroom
(vacuum-
swing
adsorption
after
Princeton
system)

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Prototype Grid

- Annealed Noryl bars
 - Strong enough for tensioning
 - Easy enough to machine to precision
 - Checking if radiopure enough

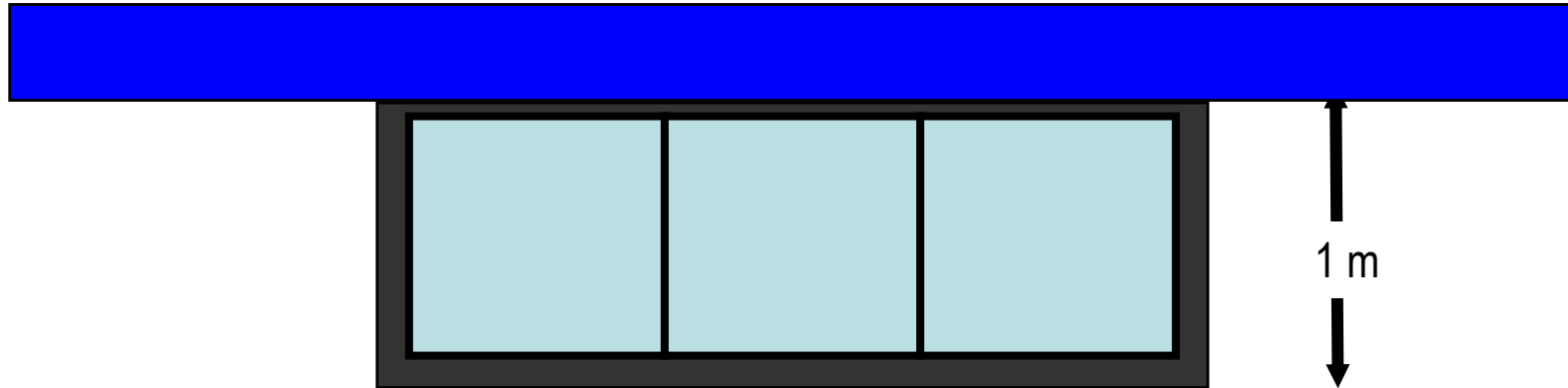


Cost of Additional BetaCages

- Estimated at \$135k each, but far from demonstrated and does not include contingency

Item	Cost
Vacuum chamber with HV feedthroughs	\$20k
MWPC grids/frames/shapers	\$25k
Gas handling	\$10k
High voltage	\$5k
Readout electronics	\$50k
Additional shielding	\$15k
Load/lock hardware, radon purge	\$10k

Layout for Alpha-Beta Screeners



Separate opening/load/lock for each

- Expect 1 m³ each, with additional shielding surrounding 3 detectors (need not be isolated from each other)
 - Doubled height to allow for likely screening of top and bottom surfaces at same time
 - Neon gas recirculation system nearby
 - Detector electronics nearby