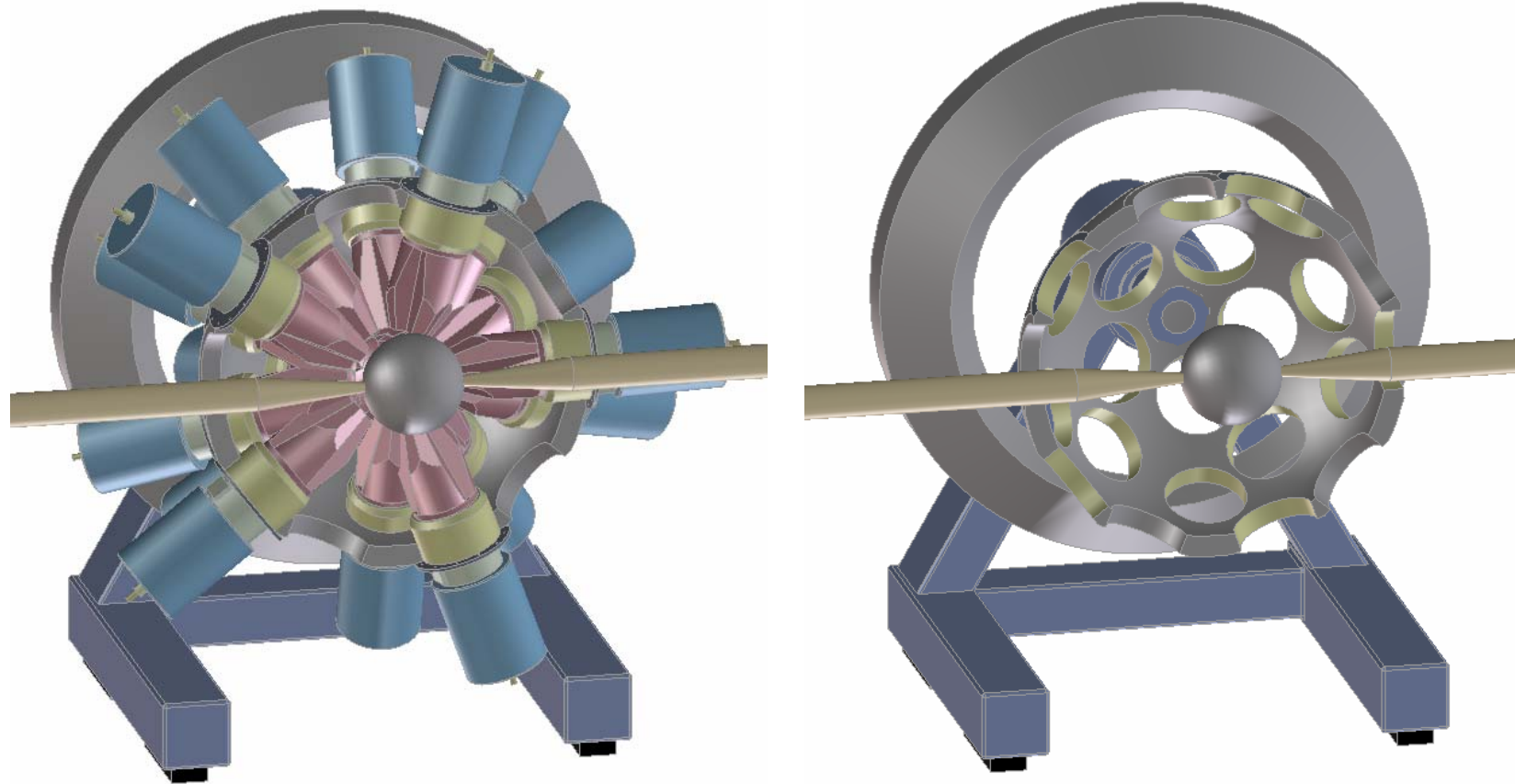


GRETINA Detector Workshop

Jim Comins - LBNL

Steve Virostek - LBNL

Mechanical Systems

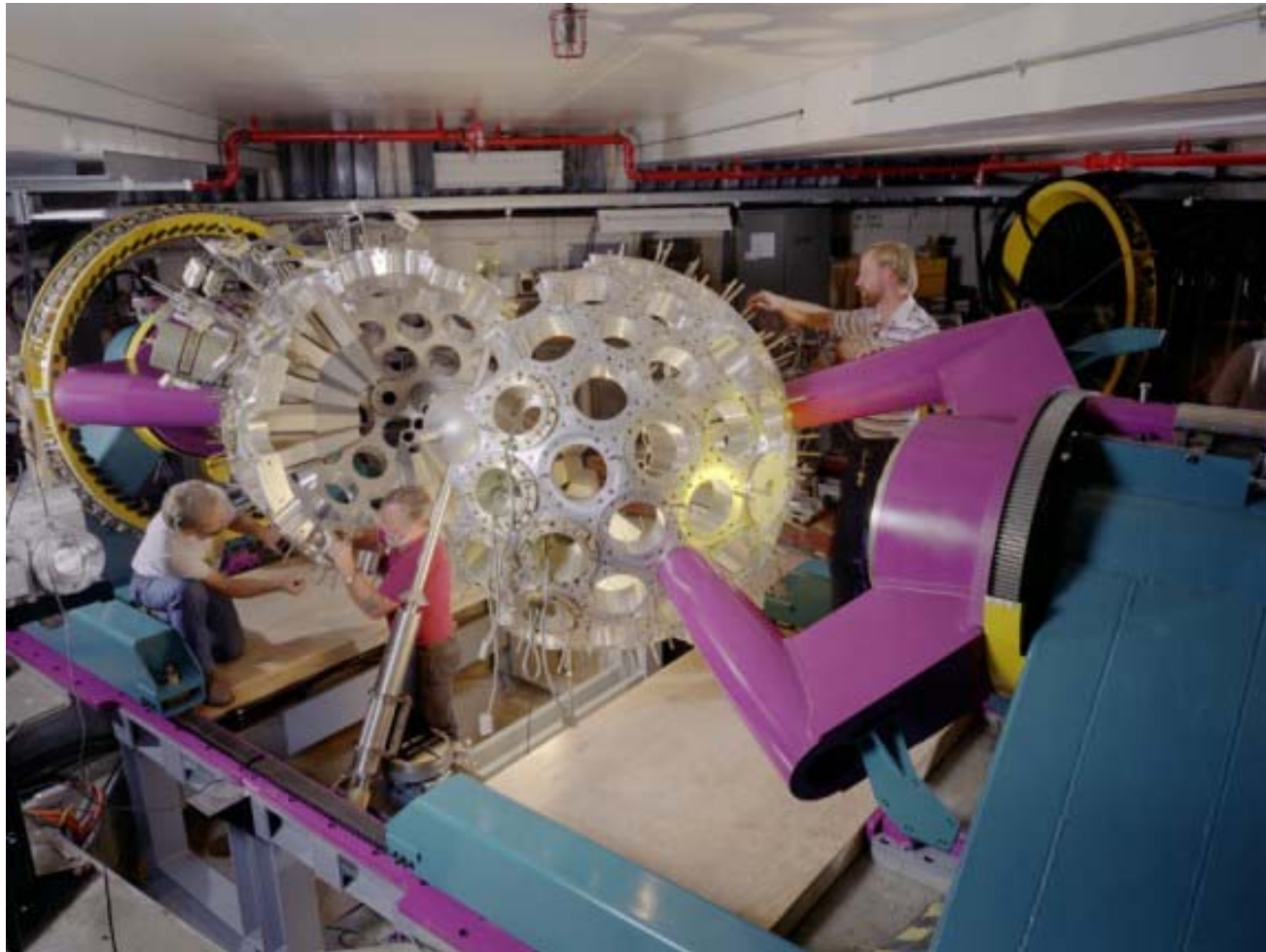


Support Structure

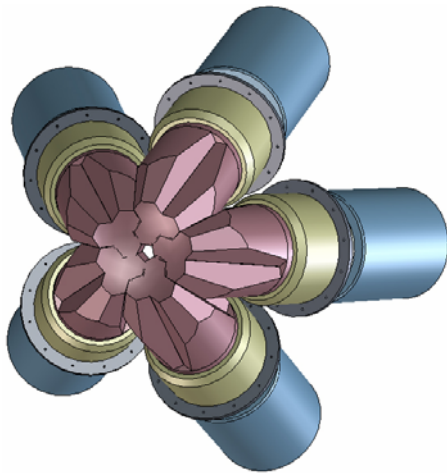


- Minimal deviation from nominal geometry
- Requirements
 - Provide structural support for 10 Ge detector modules
 - Provide means for installing/removing detector modules
 - Provide access to target chamber
 - Accommodate LN system
 - Moveable

GammaSphere Support Structure



Hemisphere - *Function*



- Detector module support
- Minimal deformation/
distortion under load
- Close tolerance; minimal gap
between modules
- Electrical isolation between
detector modules
- Accurate position/ pointing/
azimuthal orientation

Hemisphere - *Features*



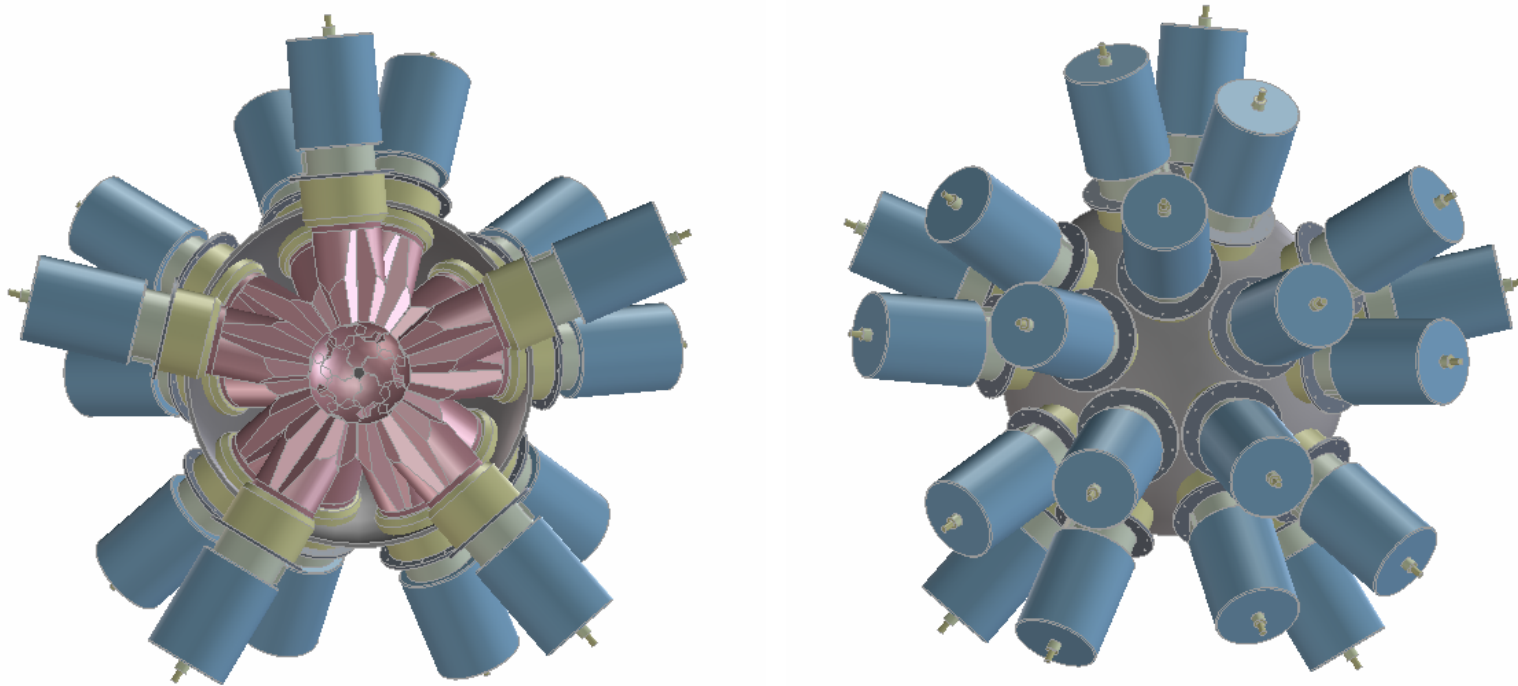
- Monolithic
- Aluminum forging - 6061
- ~ 48" OD
- ~ 2" thick
- Heat treat to T6 after rough machining

Hemisphere - *Features* (cont)

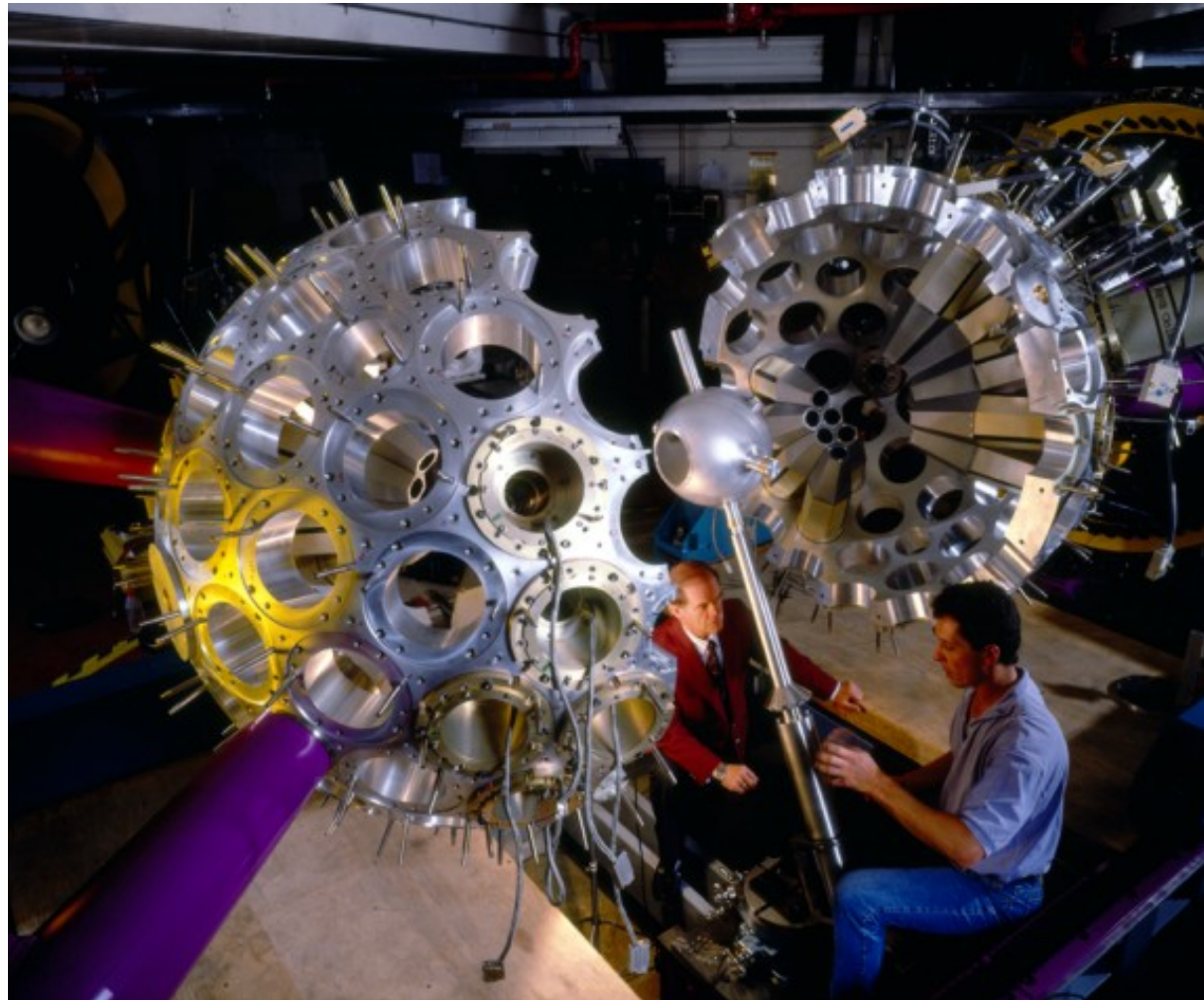


- 10 half bores for detector modules
- Counter-bores for detector module mount
- Position locating/azimuthal indexing features
- Minimal deformation/distortion
- 15 full bores for detector modules
- 1 mm nominal gap between detector modules

Hemisphere - *20 detector modules*



GammaSphere Hemispheres



Structure/Tracks - *Function*



- Hemisphere support
- Access for installing/removing detectors
- Access to target chamber
- Accommodate LN system
- Reasonably moveable

Structure and Tracks - *Features*



- Welded rigid frame
- Steel box tubing
- Powder coat finish
- THK type linear rails
- Provision for LN system
- Provision for electrical cables
- Provision for detector array alignment

Translation/Rotation - *Features*

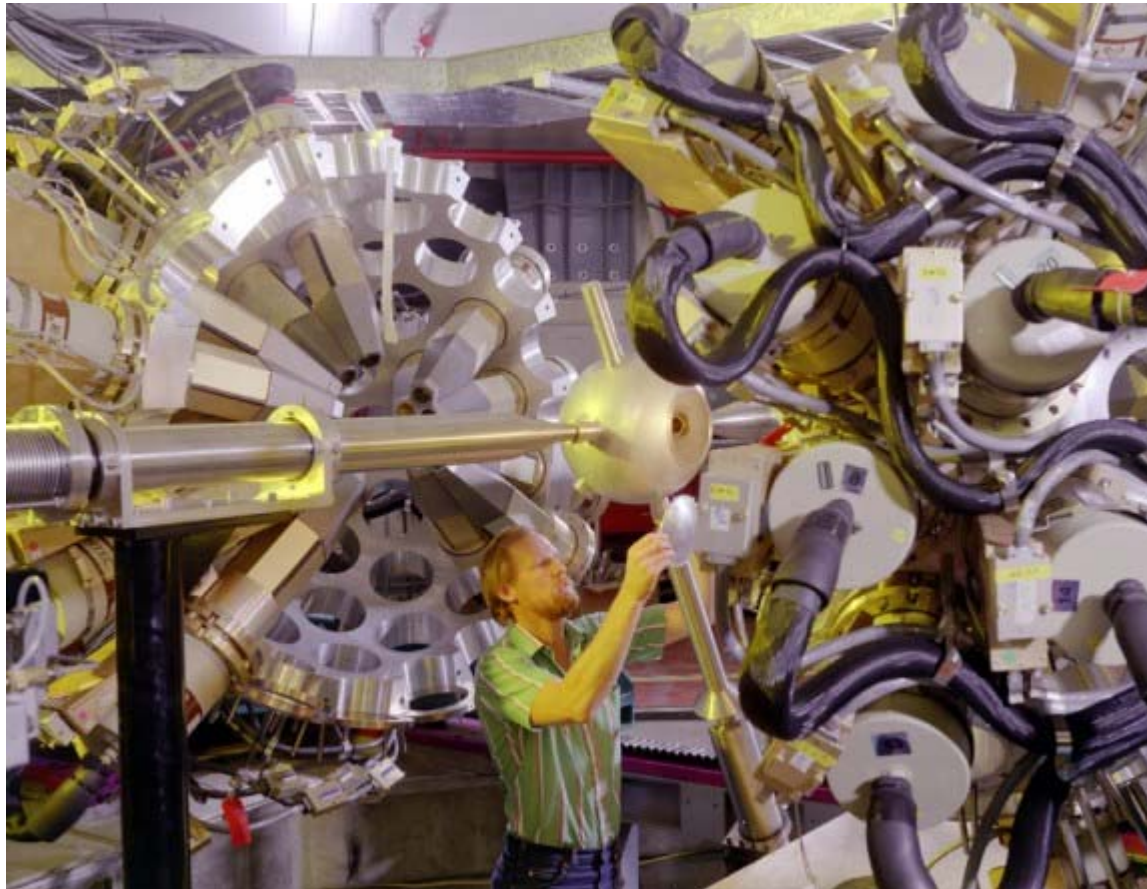


- Translation
 - Linear drive
 - DC drive motor
 - 30” travel
 - Hard stops
 - Limit switches
 - Interlock w/rotation
- Rotation
 - Spur gears
 - Double worm gear box
 - DC drive motor
 - +/- 90 deg rotation
 - Hard stops
 - Limit switches
 - Interlock w/translation

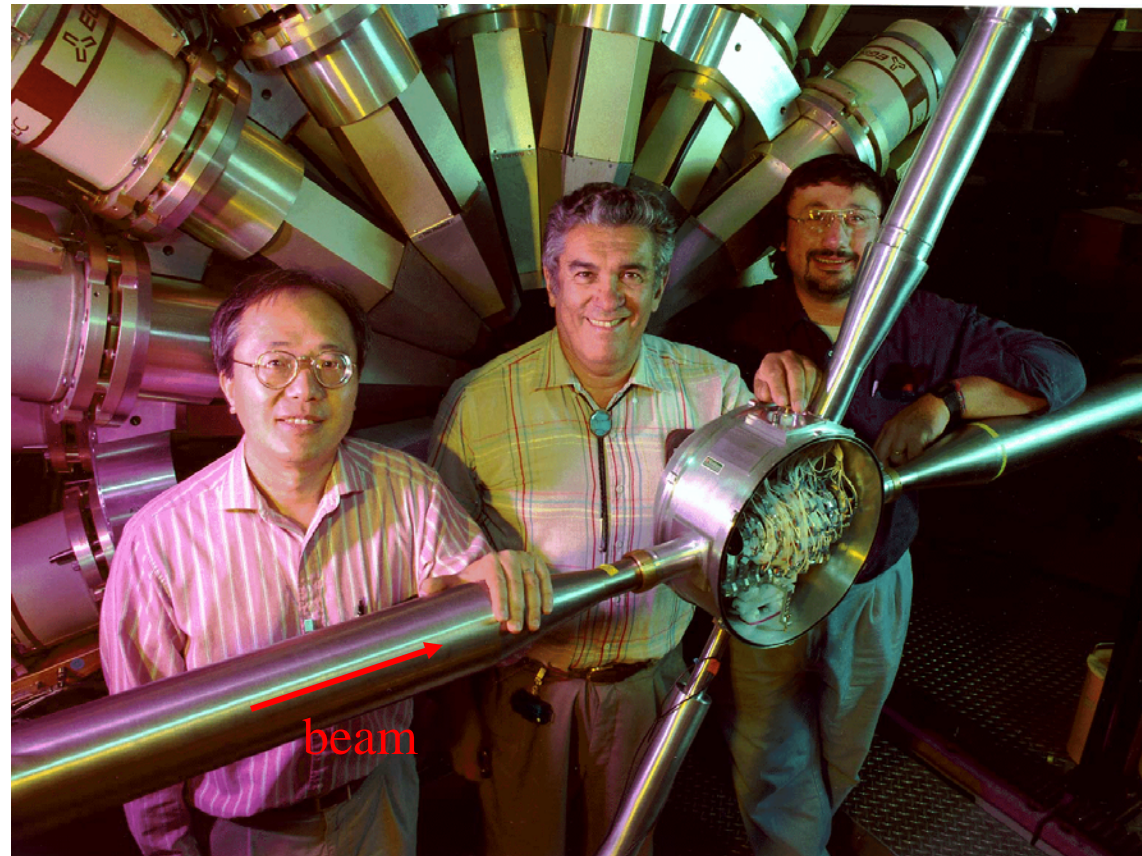
*Gamma*sphere Translation/Rotation

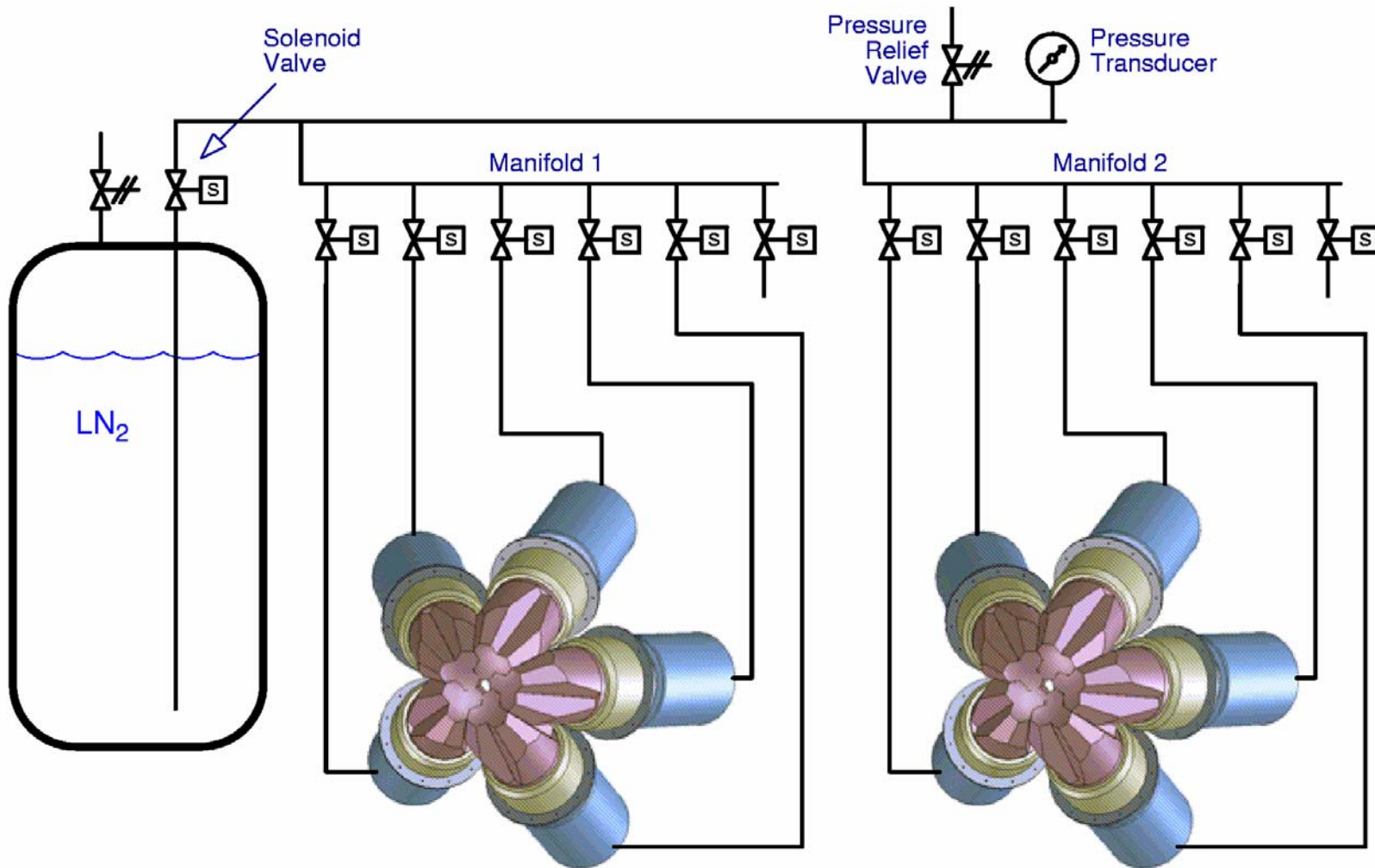


GammaSphere Target Chamber



Auxiliary Detector - *Microball*

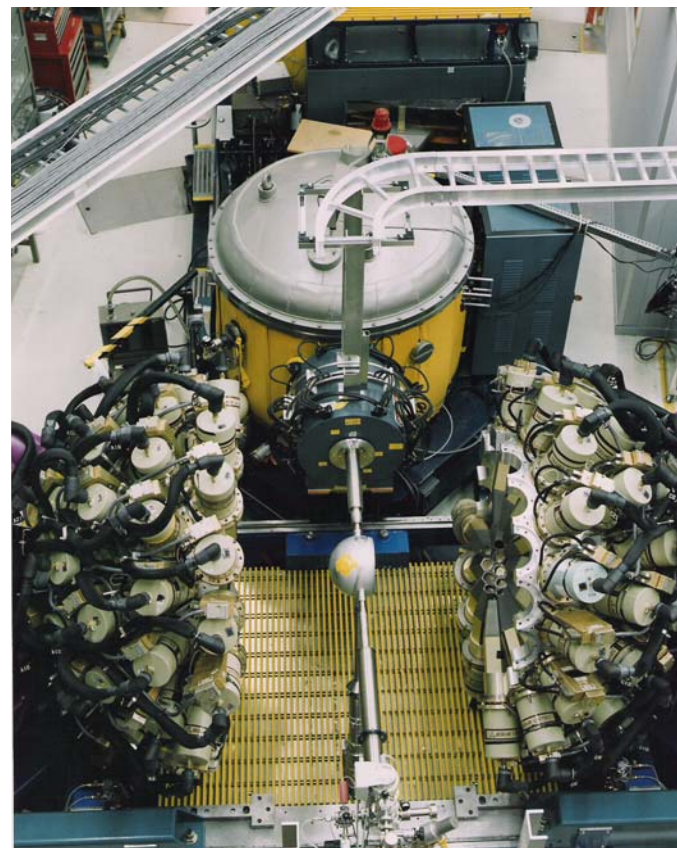




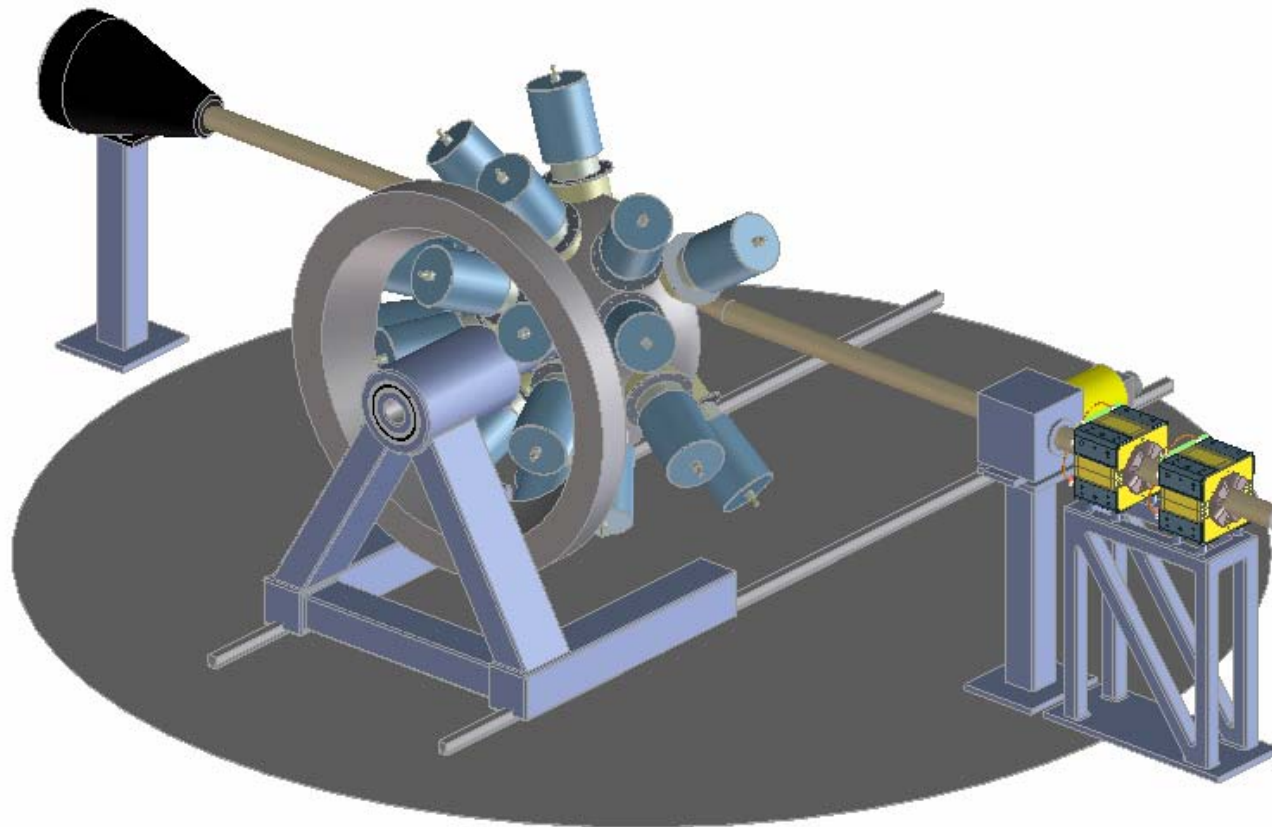
GammaSphere



Moveable - *Gammasphere at ANL*

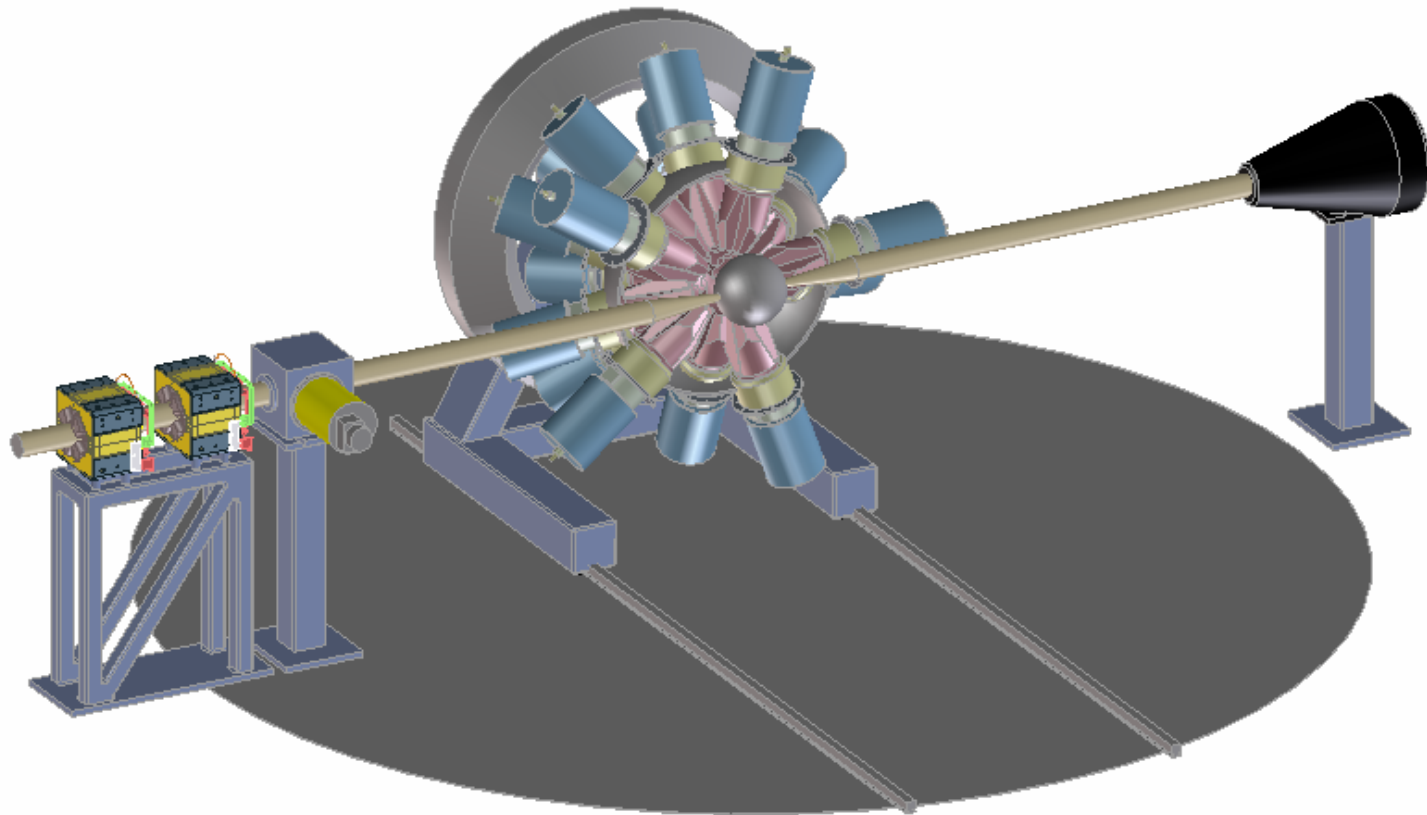


Gretina Configuration - *Option 1*



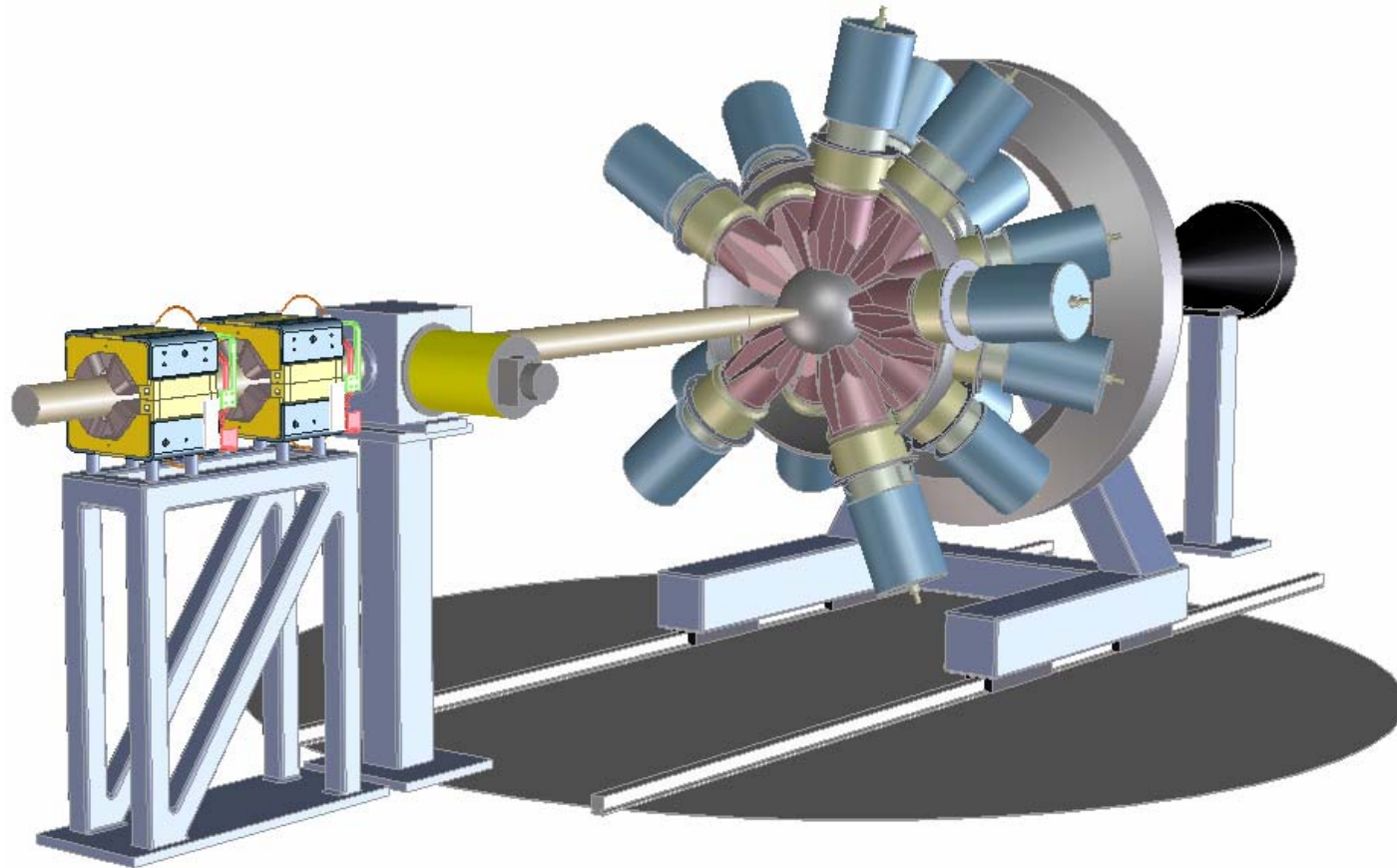
Hemisphere transverse to beam

Gretina Configuration - *Option 1*



Hemisphere transverse to beam

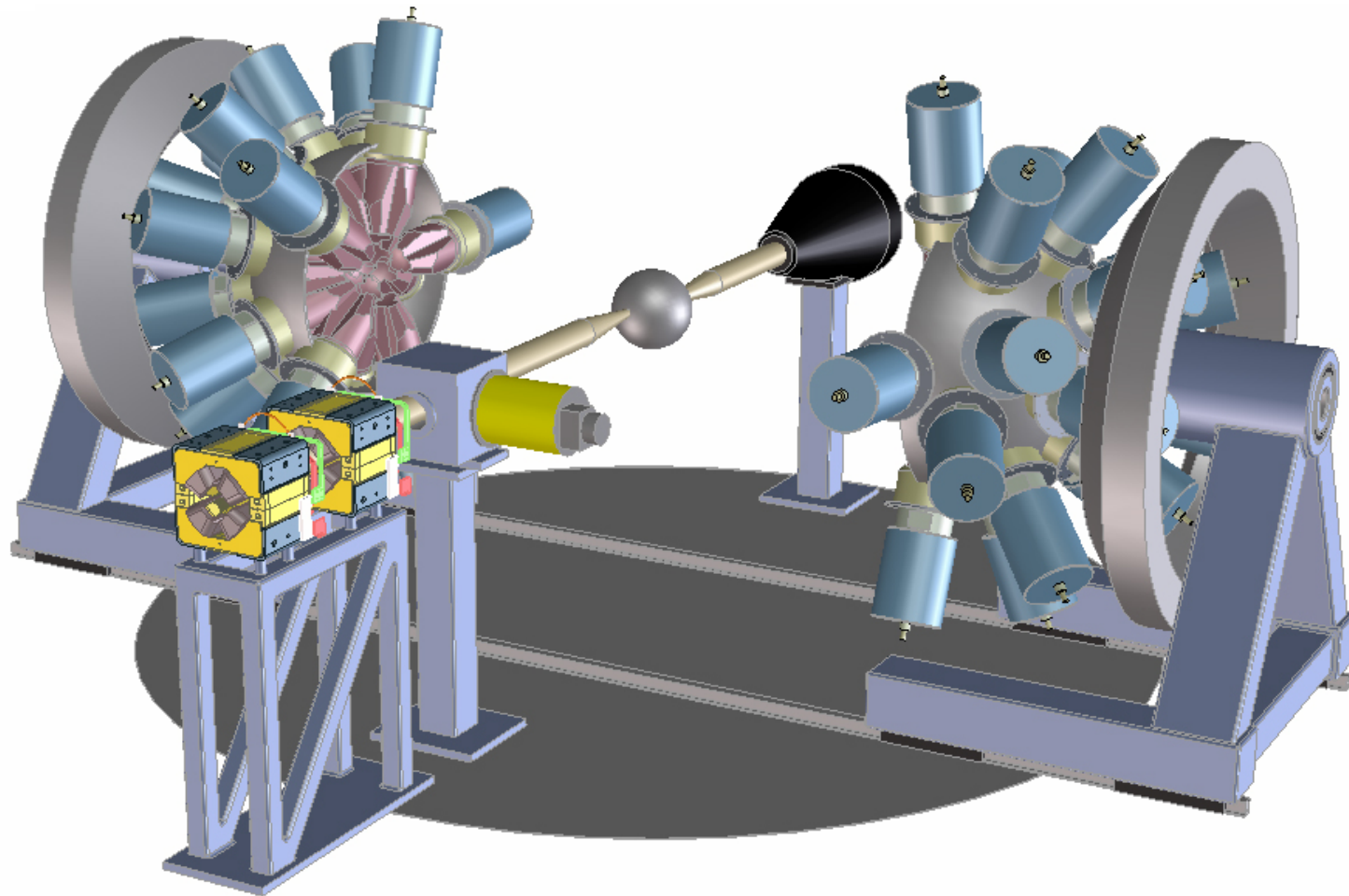
Gretina Configuration - *Option 2*



Hemisphere on beam axis



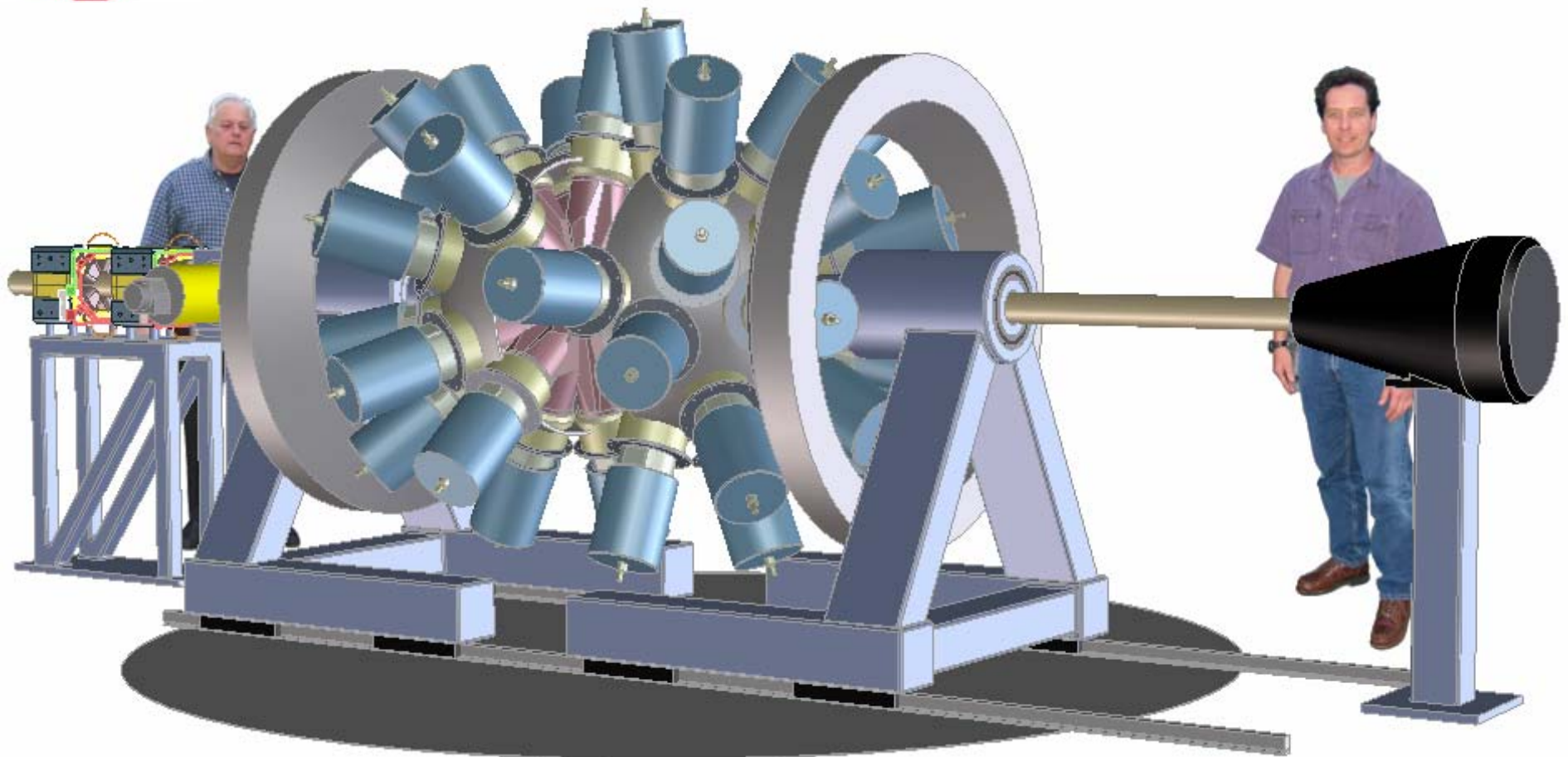
Future Greta Upgrade - *Option 1*



Hemispheres transverse to beam



Future Greta Upgrade - *Option 2*



Hemispheres on beam axis

Baseline Issues



- Gretina or Greta
 - accommodate 10/20/30/40 detectors
 - expandable to Greta
- CDR baseline
 - 1 hemisphere, 30 possible detector locations
 - 1 support structure
 - translate/rotate

Baseline Issues



- 1 hemisphere or 2 quarters
- On beam - MSU??
- Orthogonal to beam - ANL
- Support points
 - 4 possible pentagon attach points/hemi
 - 2 possible pentagon attach point/quarter
 - open side of hemisphere

Baseline Issues



- Auxiliary detectors
 - ANL – FMA
 - MSU – spectrometer??
 - others??

Baseline Issues



- Structure configuration
 - one configuration
 - multiple configurations
 - first installation where??
 - moving costs include configuration mods

Detector Issues



- Tolerances
 - manufacture: $+0.000/-0.005''$
 - position $0.005''$
 - pointing: $0.005''$
 - azimuthal: $0.005''$
 - deformation: $0.005''$
- Measurement must be better than $0.001''$
 - use CMM to inspect/normalize

Detector Issues



- Vendor to measure crystal canister vertices relative to flange using CMM after mounting and prior to installation of cryostat cap.
- LBL will inspect cap, normalize with respect to mounting flange, using CMM

Detector Issues



- Detector flange/hemi interface options
 - 2 pins/2 holes
 - 2 pins/1 hole and 1 slot
 - 3 spherical features/3 v-grooves
 - nothing - use installation device to position/clock, fasteners to secure, friction to hold

Detector Issues



- Detector installation –
 - horizontal loading/unloading??
 - detector weight: 80 lbs.
 - installation tooling??
 - translate??
 - rotate??

Target Issues



- Multiple versions??
- Target chamber support
 - beam tubes??
 - strut at pentagon??
- Access
 - translate hemisphere/quarters??
 - additional port for cables/gas-lines/target ladder
 - upstream/side port

LN Issues



- Number of detector dewar supply/return lines: 10/20/30??
- Detector dewar supply/return manifold mounted on rotating structure??
- Detector dewar supply/return manifold encapsulated for ice prevention??