

OLYMPUS Meeting - DESY

Thursday, 17 July, 2008

- 13:00 Overview - R. Milner
- 13:30 Realising OLYMPUS - D. Hasell
- 14:00 DORIS Ring - F. Brinker
- 14:30 Target Discussion - R. Milner
- 14:45 Coffee
- 15:15 MIT-Bates Perspective - R. Redwine
- 15:45 DESY Perspective - U. Schneekloth
- 16:15 Discussion
- 17:00 Meet with DESY Directors
- 19:00 Dinner
 - Sagebiels Fährhaus
 - <http://www.sagebielsfaehrhaus.de>
 - Blankeneser Hauptstrasse 107
 - short walk from Blankenese S-bahn
 - sufficient cars ???
 - meet in Building 1 Foyer 18:30

Friday, 18 July, 2008

- 09:00 Tracking Upgrade - D. Hasell
- 09:20 Luminosity Monitor - M. Kohl
- 09:40 Increasing Acceptance - A. Borrisov
- 09:50 other contributions - ???
- 10:15 Coffee
- 10:30 Proposal Status - R. Milner
- 10:45 Proposal Discussion
 - writing
 - responsibilities
 - contributions
- 11:45 AOB
- 13:30 Visit to DORIS

Realising OLYMPUS

Reminder of BLAST Detector

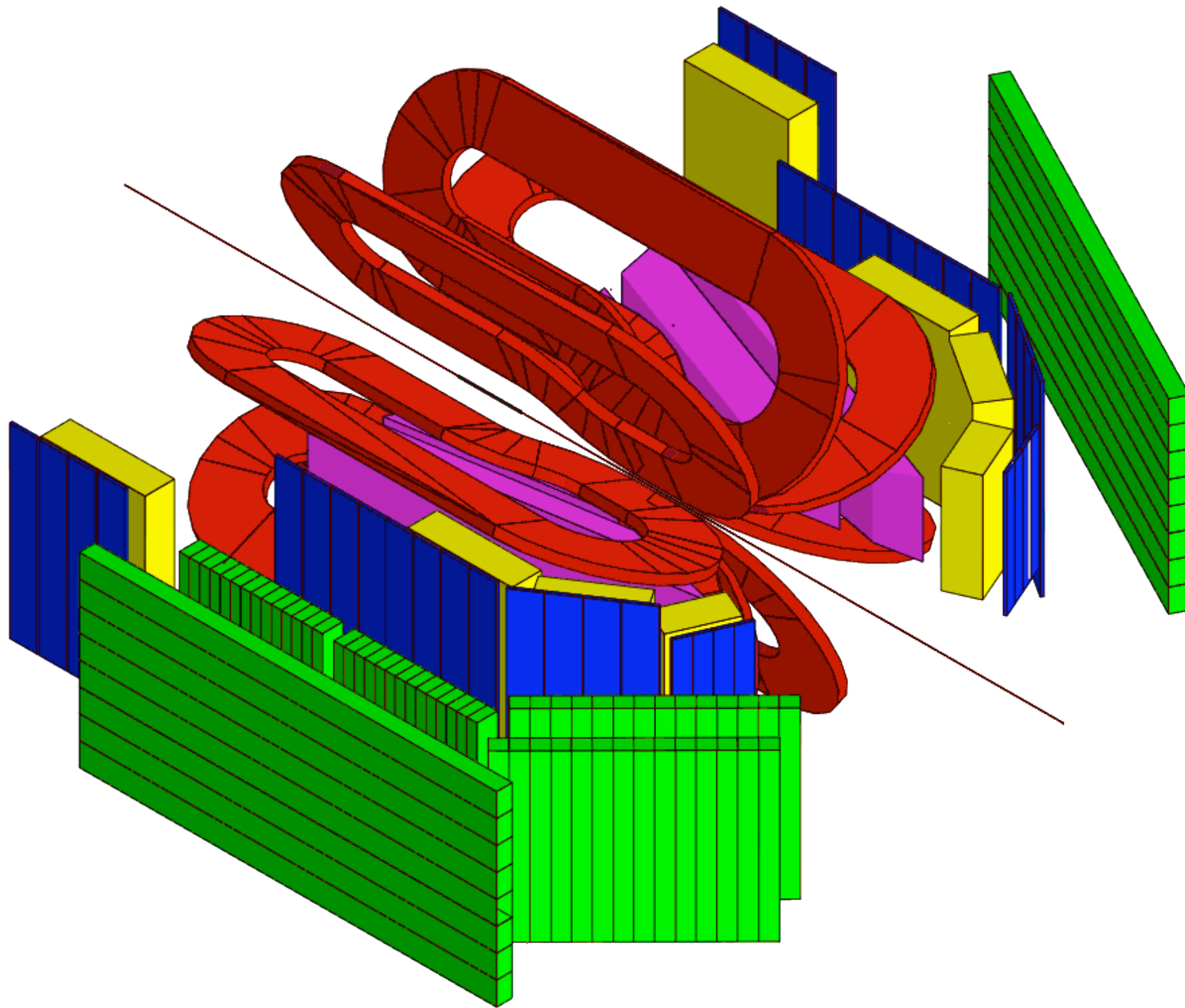
Planning to Put BLAST in DORIS Ring

Efforts Underway at MIT

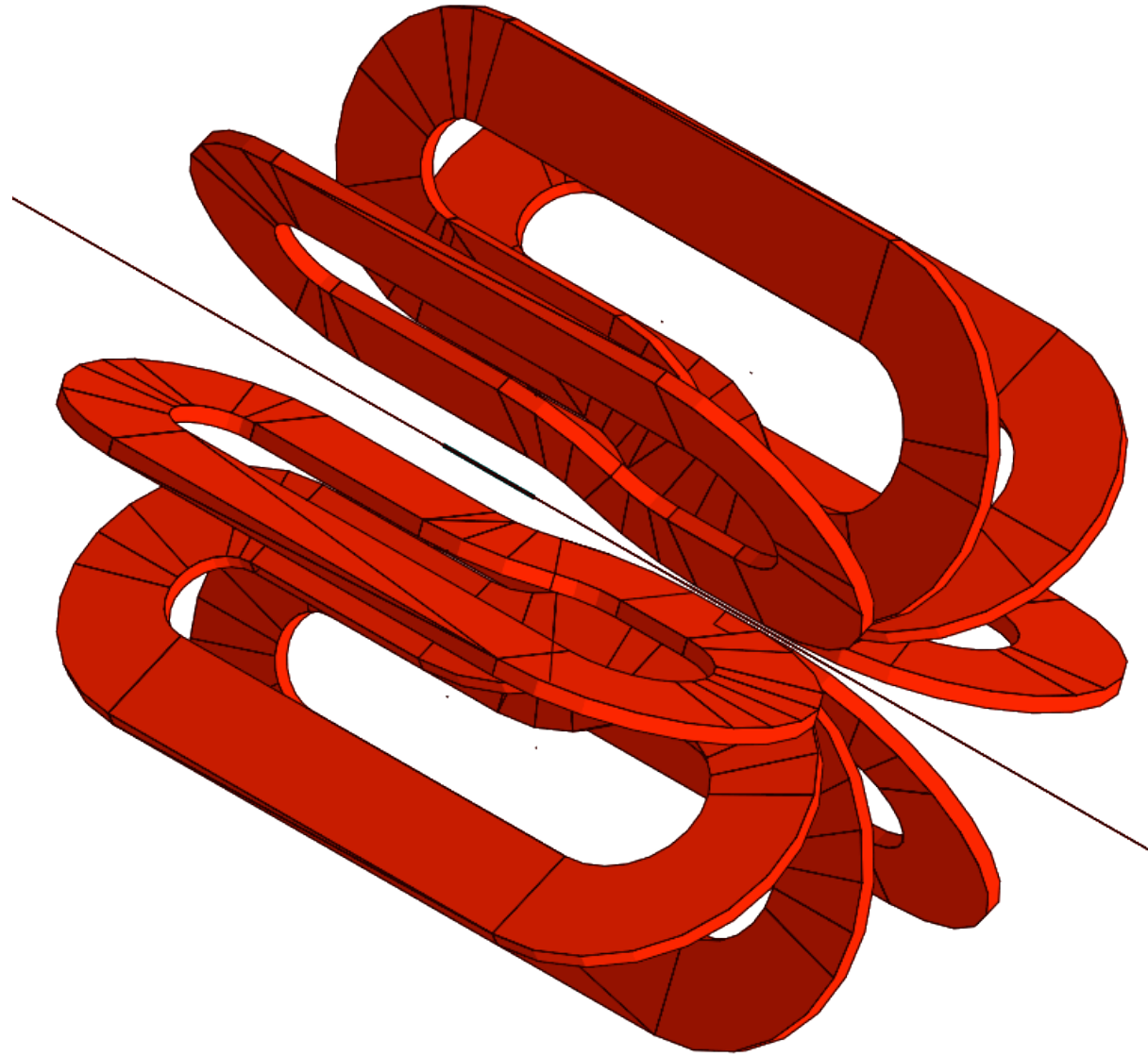
Possible Running Scenario

Organisation

BLAST Detector

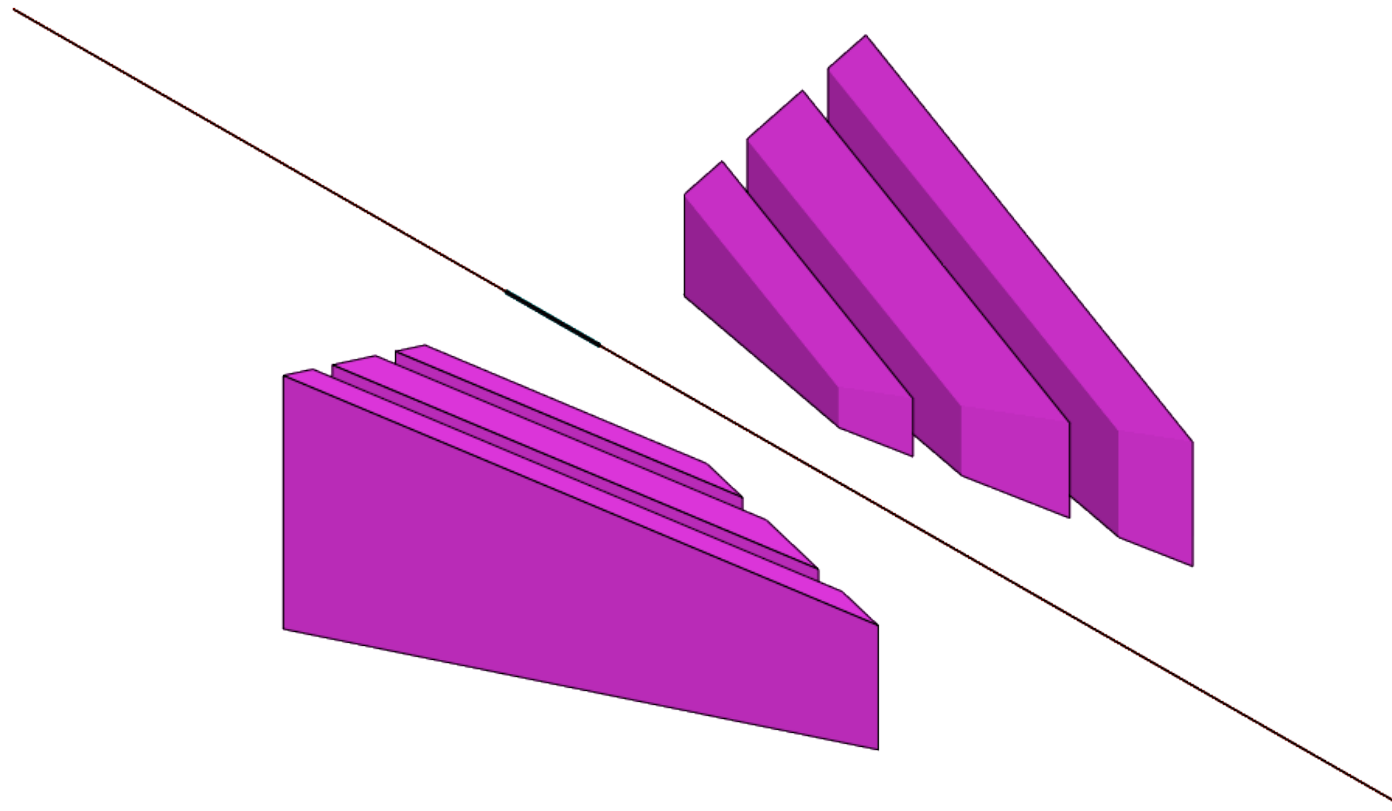


BLAST Detector



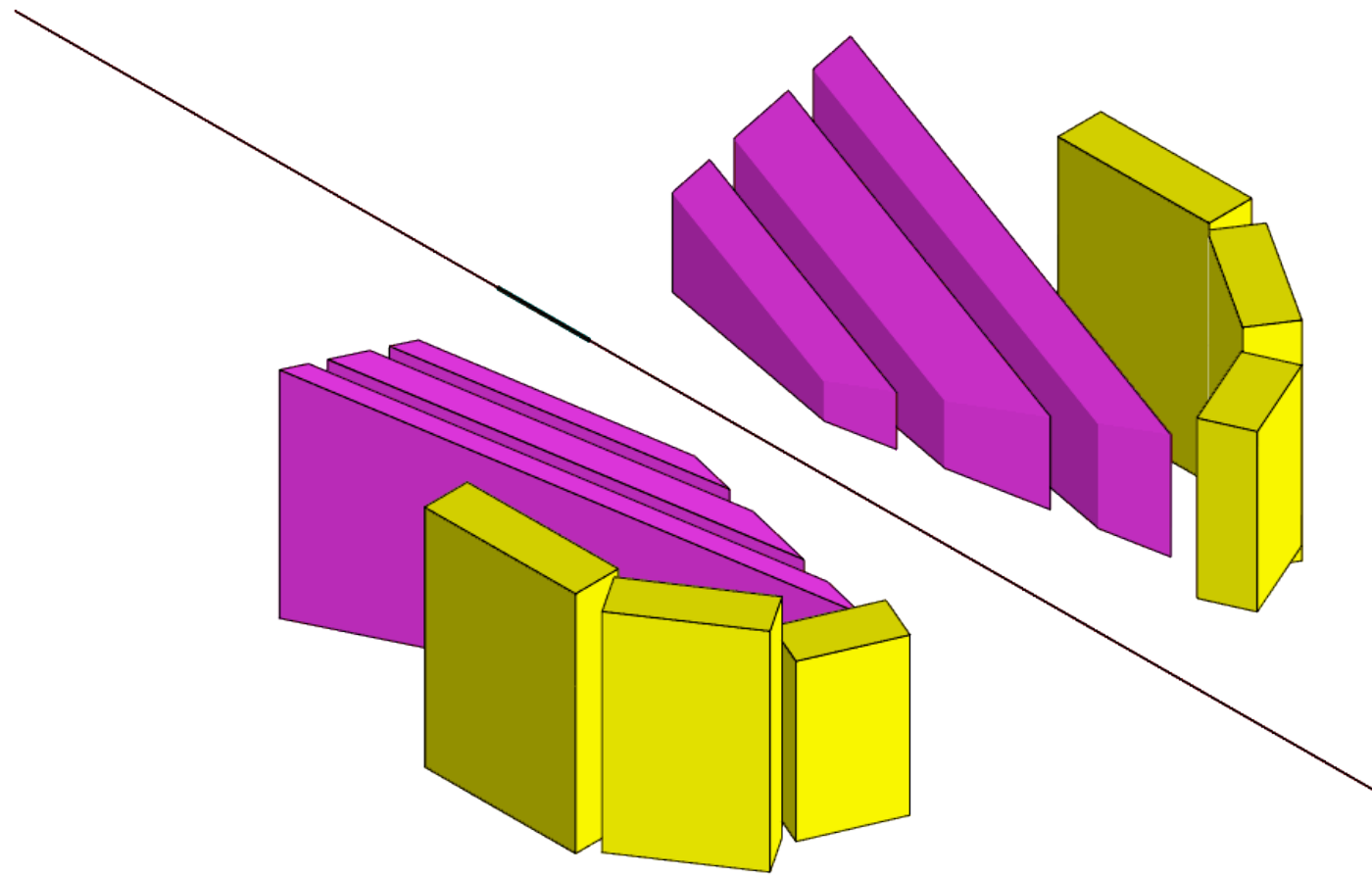
- 8 sector toroid magnet
 - minimise effect on beam and target polarisation
- 3.8 kG maximum field
- two horizontal sectors instrumented

BLAST Detector



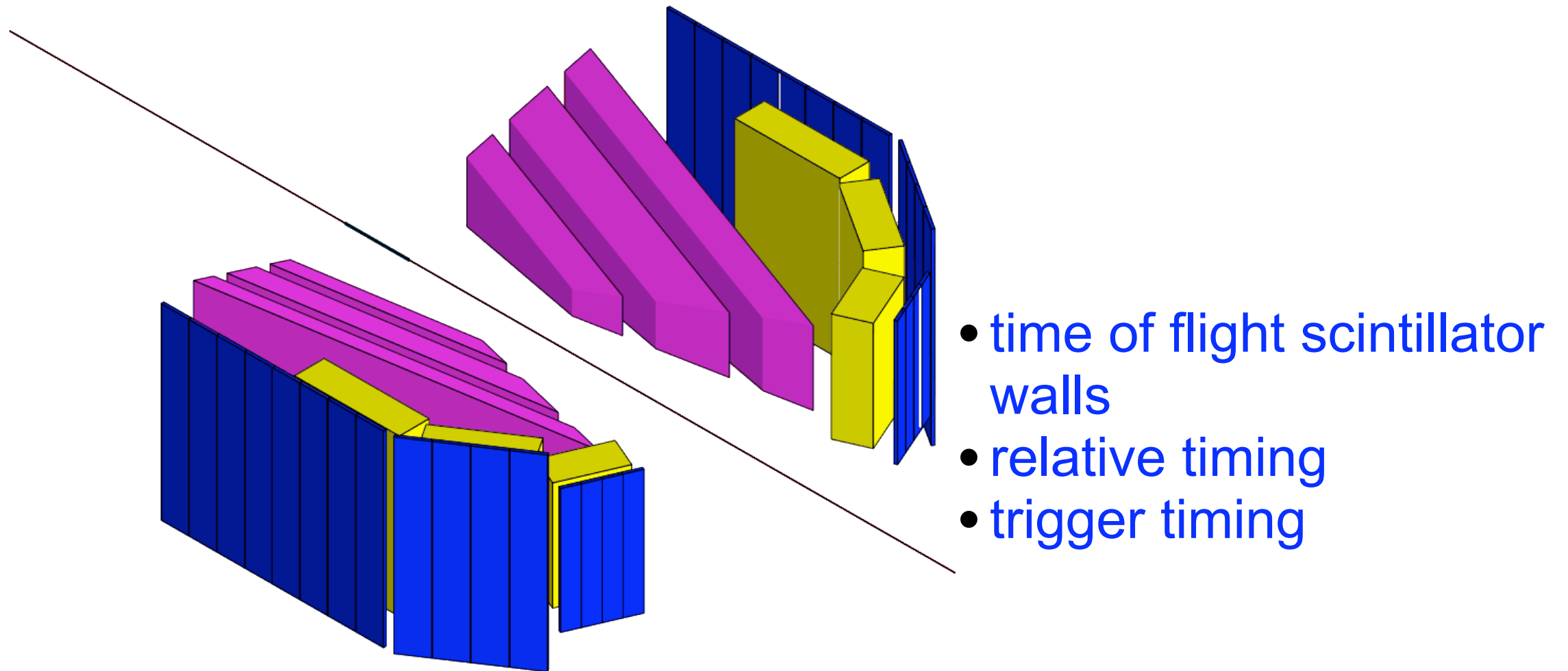
- 3 wire chambers / sector
 - single gas volume
- 2 superlayers / chamber
 - $\pm 10^\circ$ stereo
- 3 sense layers / superlayer
- total 18 layers of tracking
- momentum analysis
- scattering angles
- event vertex
- particle charge

BLAST Detector

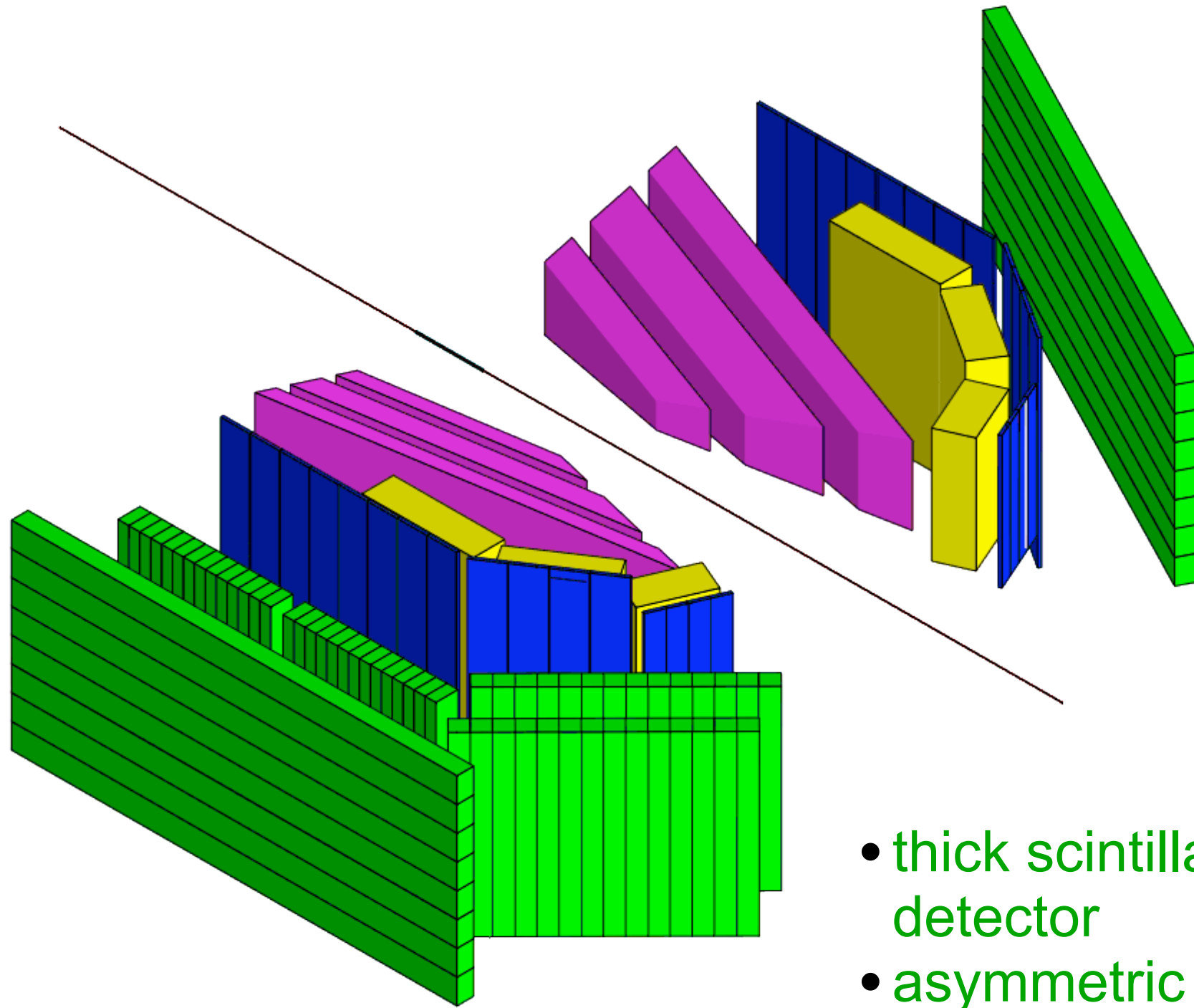


- Aerogel Cerenkov
- pion / electron separation

BLAST Detector



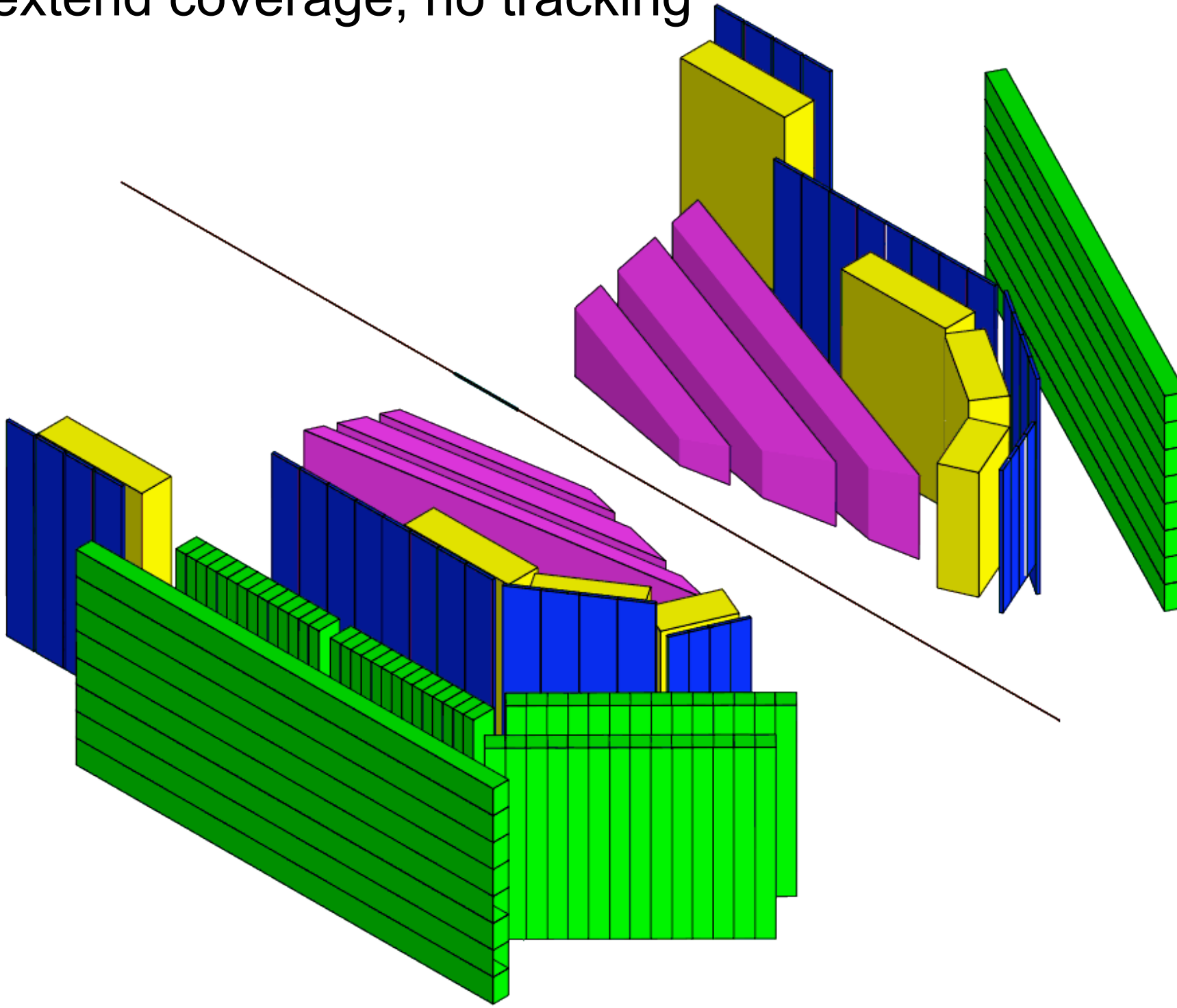
BLAST Detector



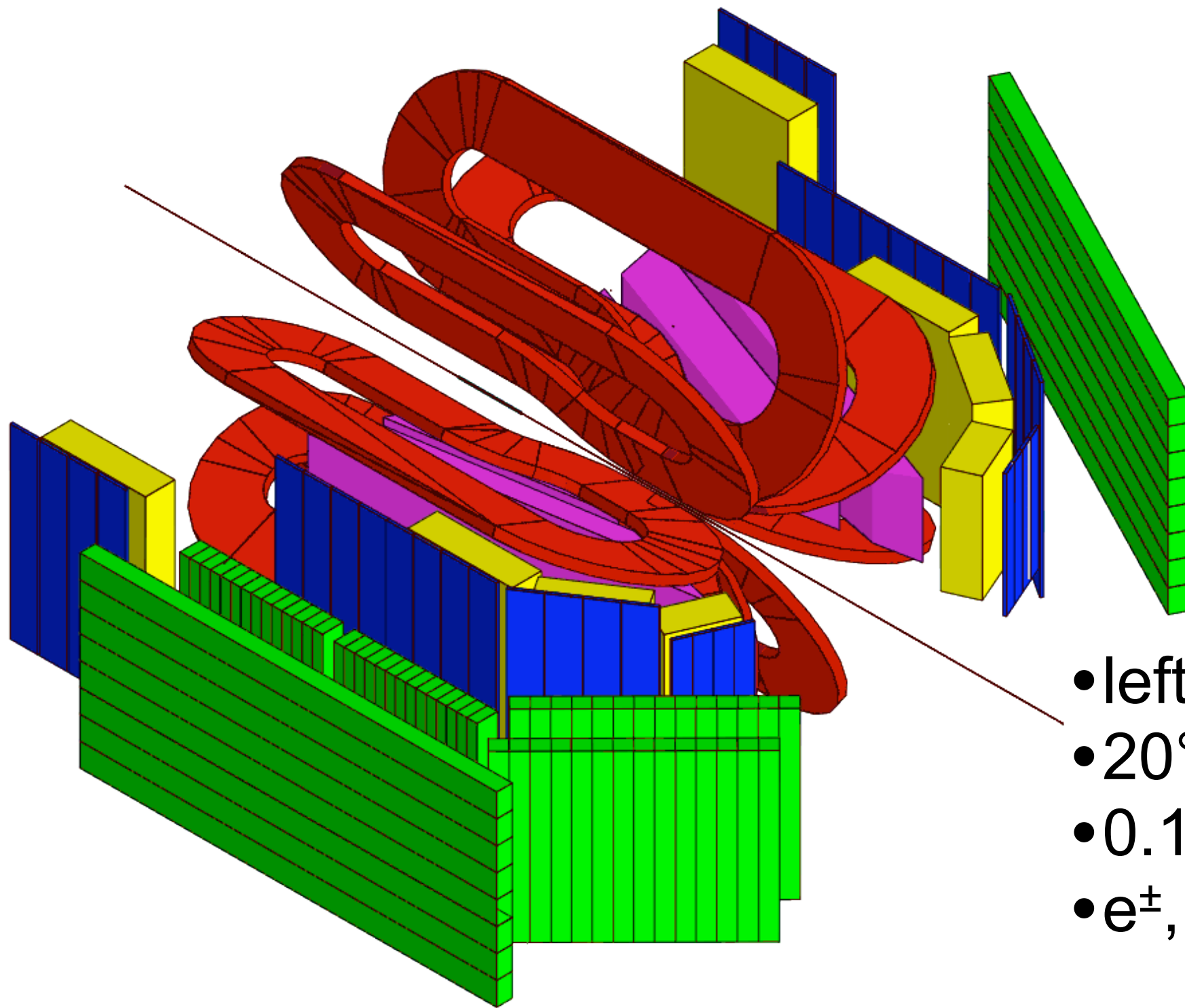
- thick scintillators for neutron detector
- asymmetric favouring right sector

BLAST Detector

- back angle detectors
- extend coverage, no tracking

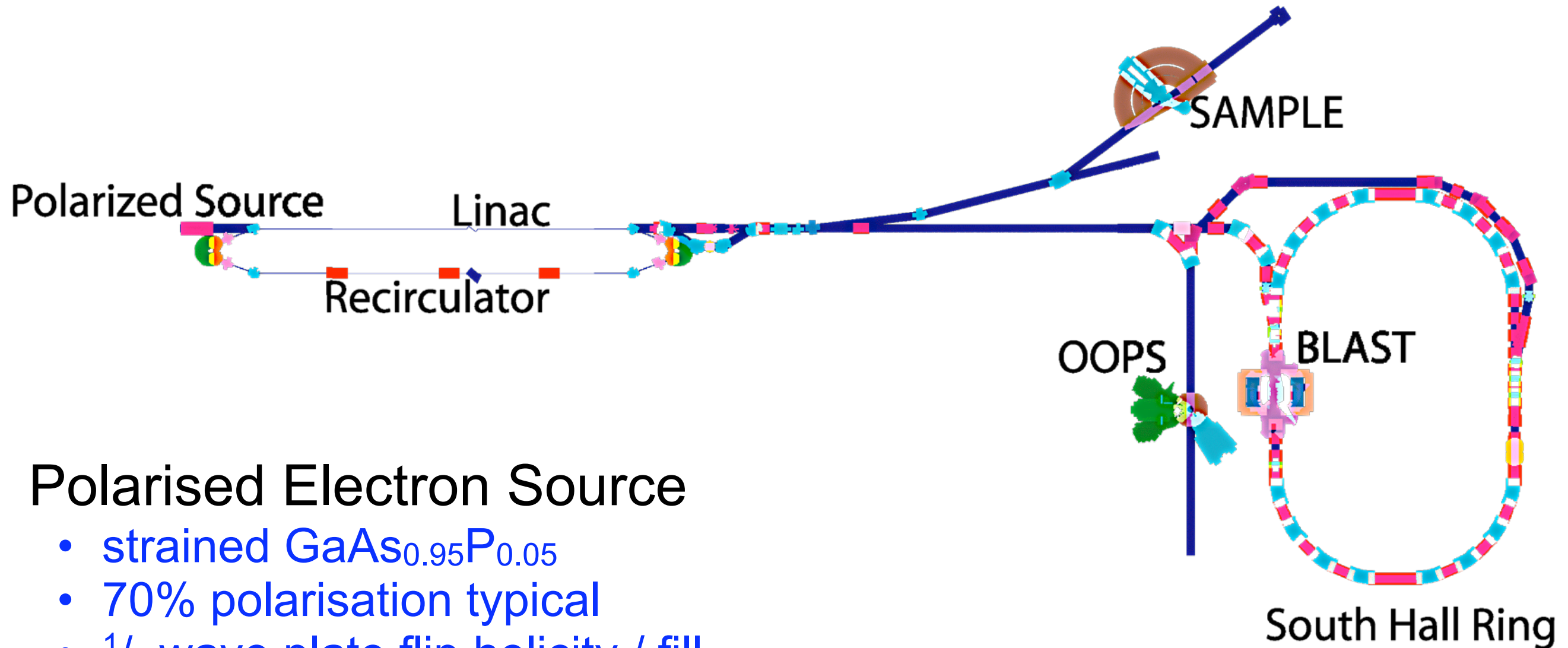


BLAST Detector



- left-right symmetric
- $20^\circ - 80^\circ \theta, \pm 15^\circ \varphi$
- $0.1 < Q^2 < 0.8 \text{ (GeV/c)}^2$
- $e^\pm, \pi^\pm, p, n, d$

MIT-Bates Linear Accelerator Center



Polarised Electron Source

- strained $\text{GaAs}_{0.95}\text{P}_{0.05}$
- 70% polarisation typical
- $1/2$ wave plate flip helicity / fill

500 MeV Linac + Recirculator

- polarised electrons up to 1 GeV

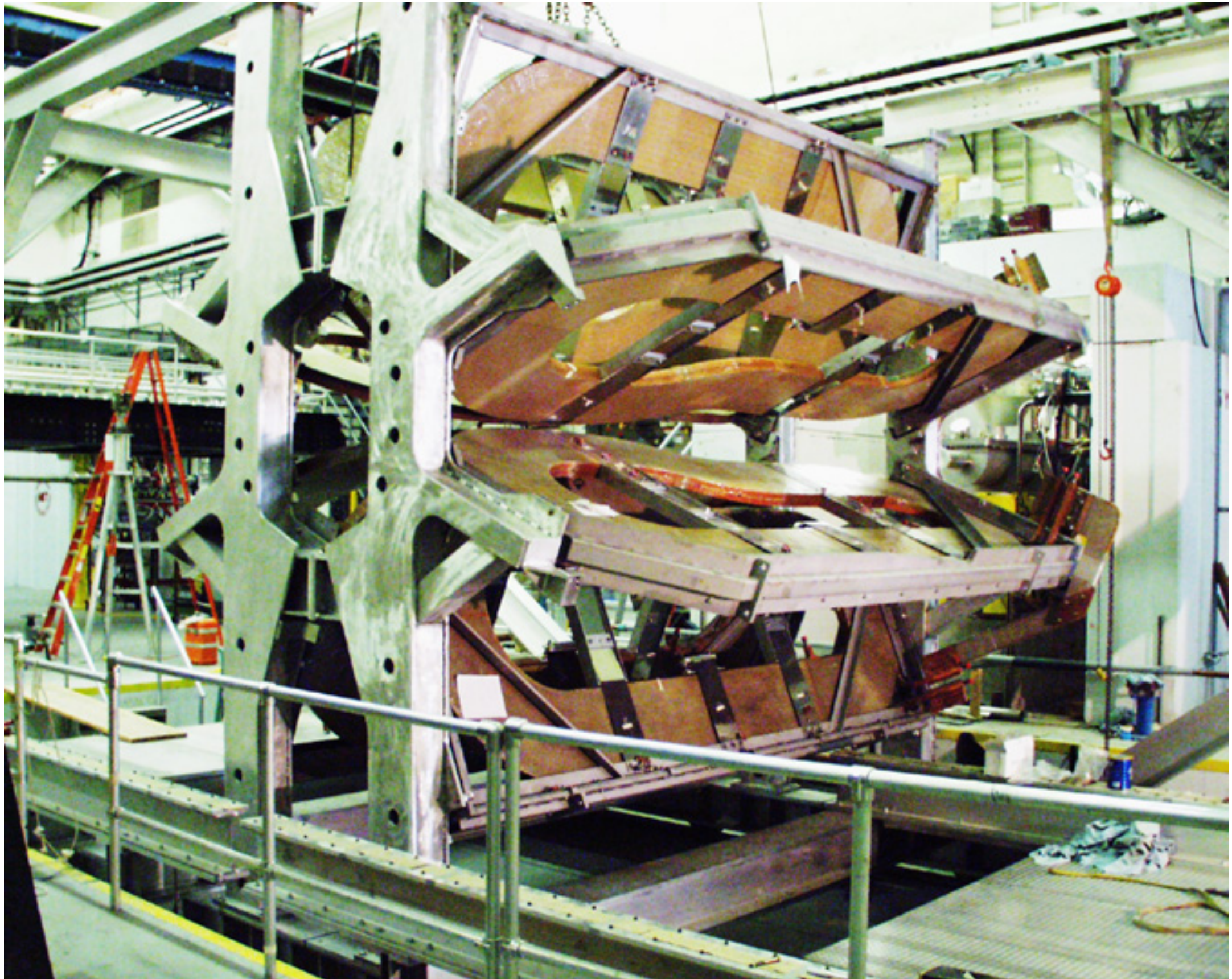
North and South Expt. Halls

- SAMPLE - north hall
- OOPS/BLAST - south hall

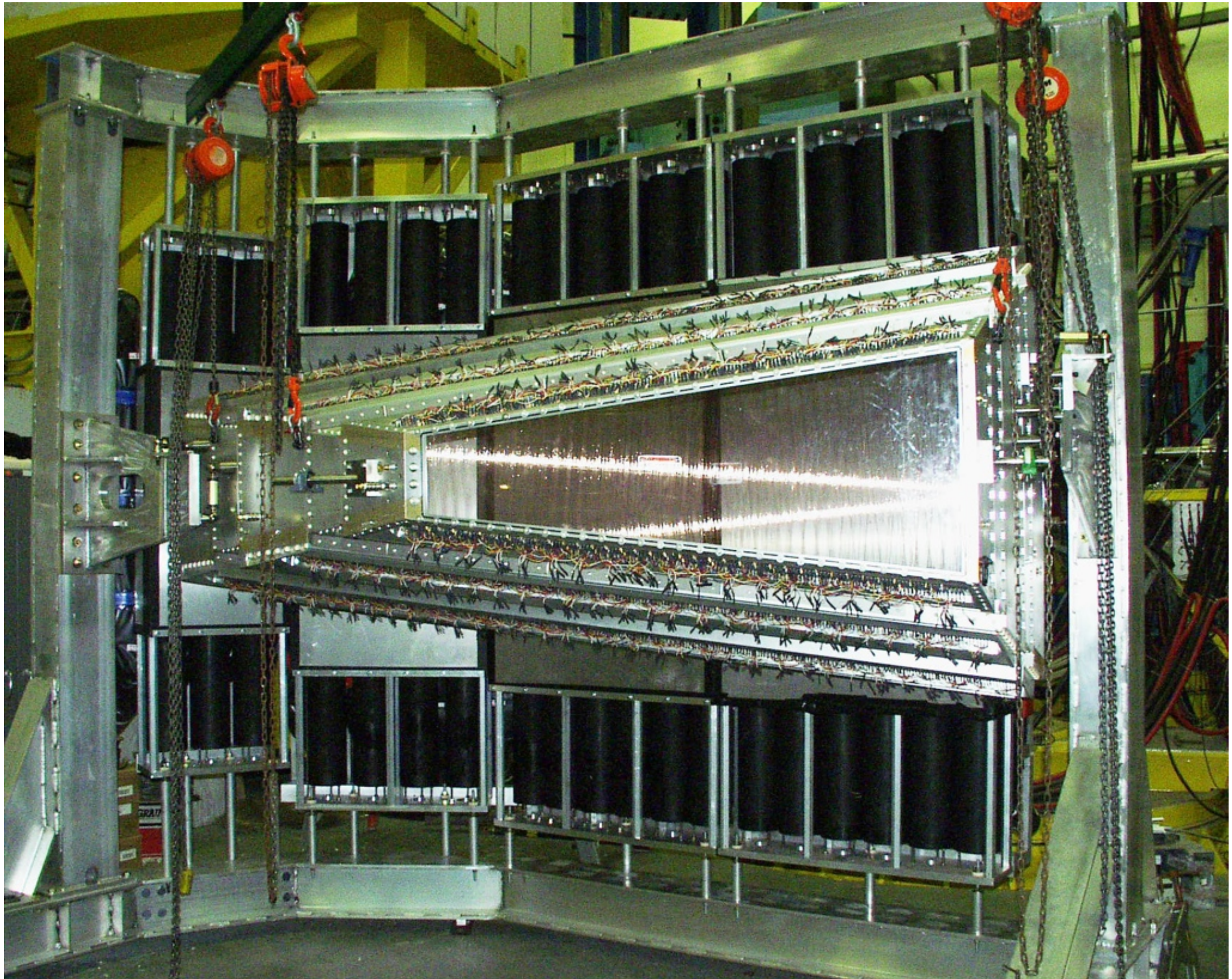
South Hall Ring

- stack to 225 mA typical
- 30 minute lifetime
- 65 % polarisation typical
- Siberian snake maintains longitudinal spin at target

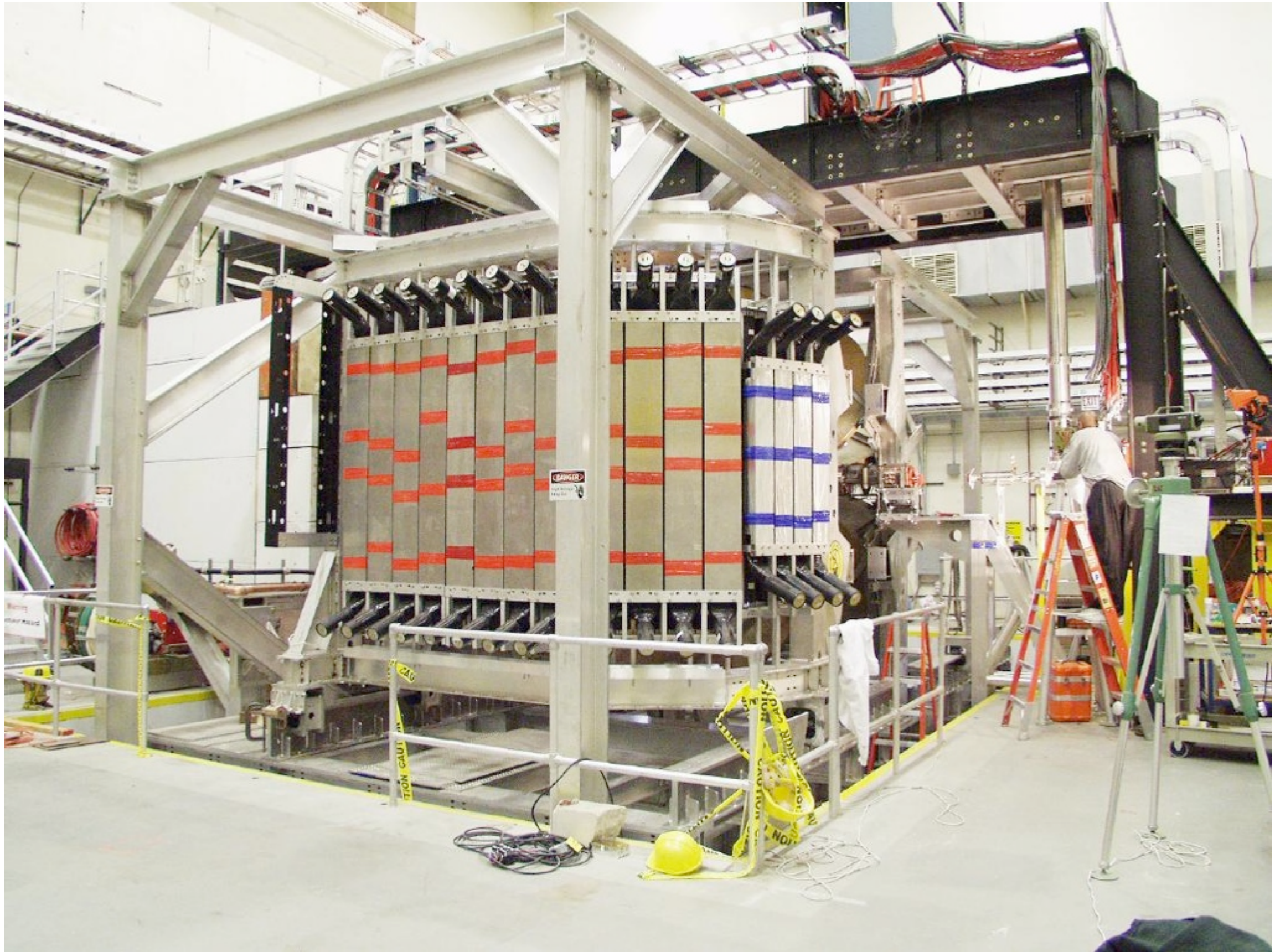
BLAST Toroid Magnet



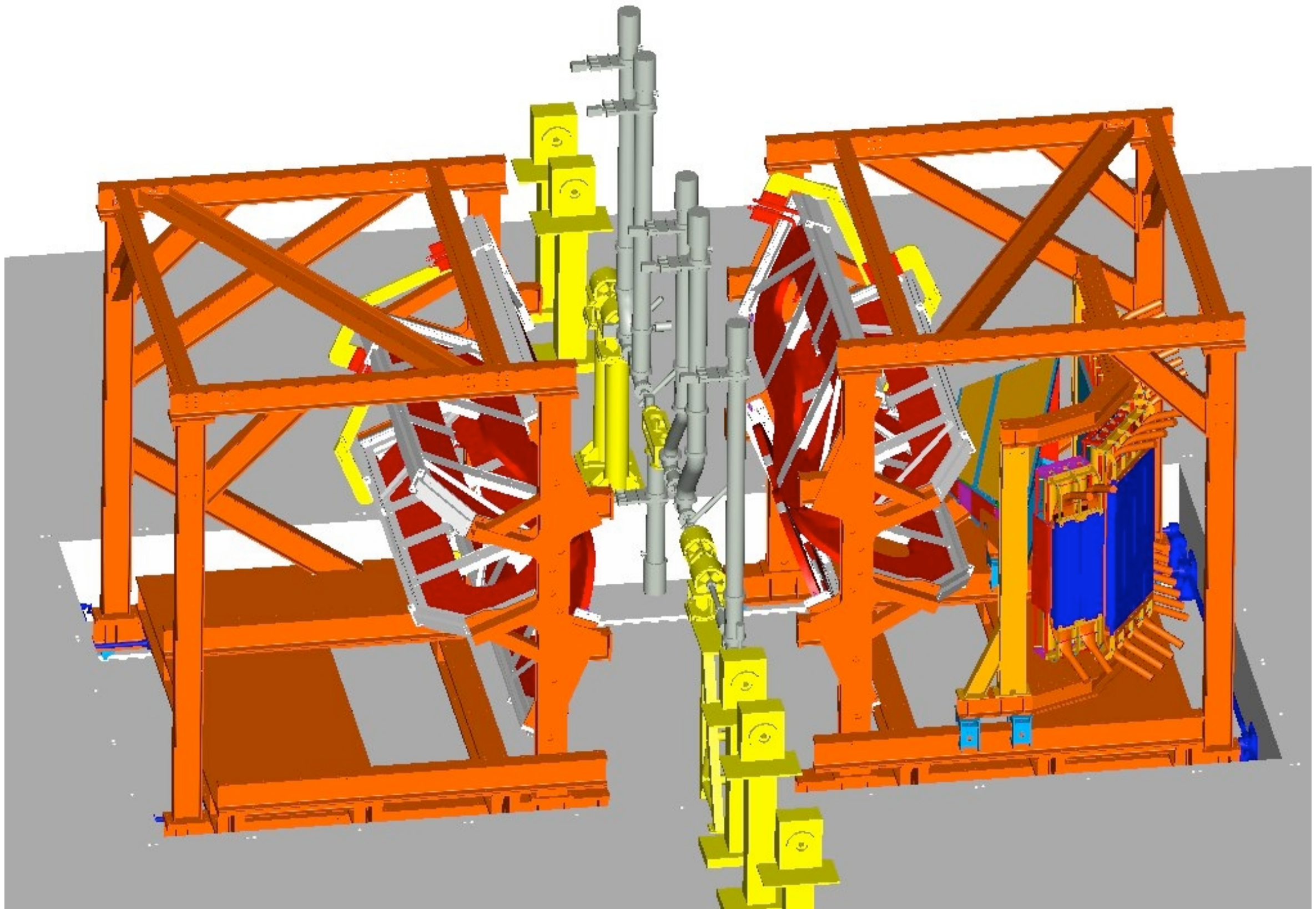
BLAST Wire Chambers



BLAST Time of Flight

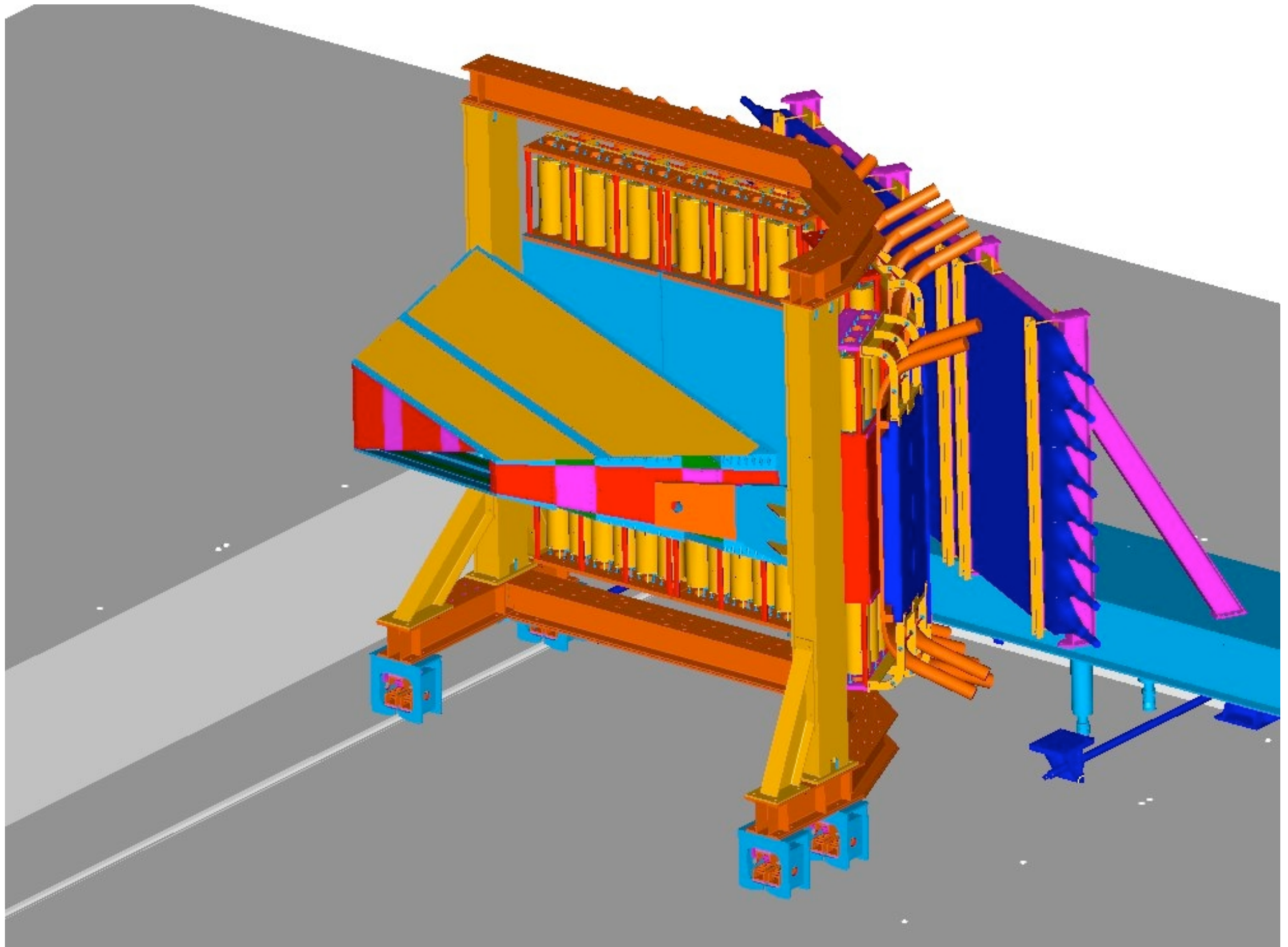


BLAST Detector Assembly

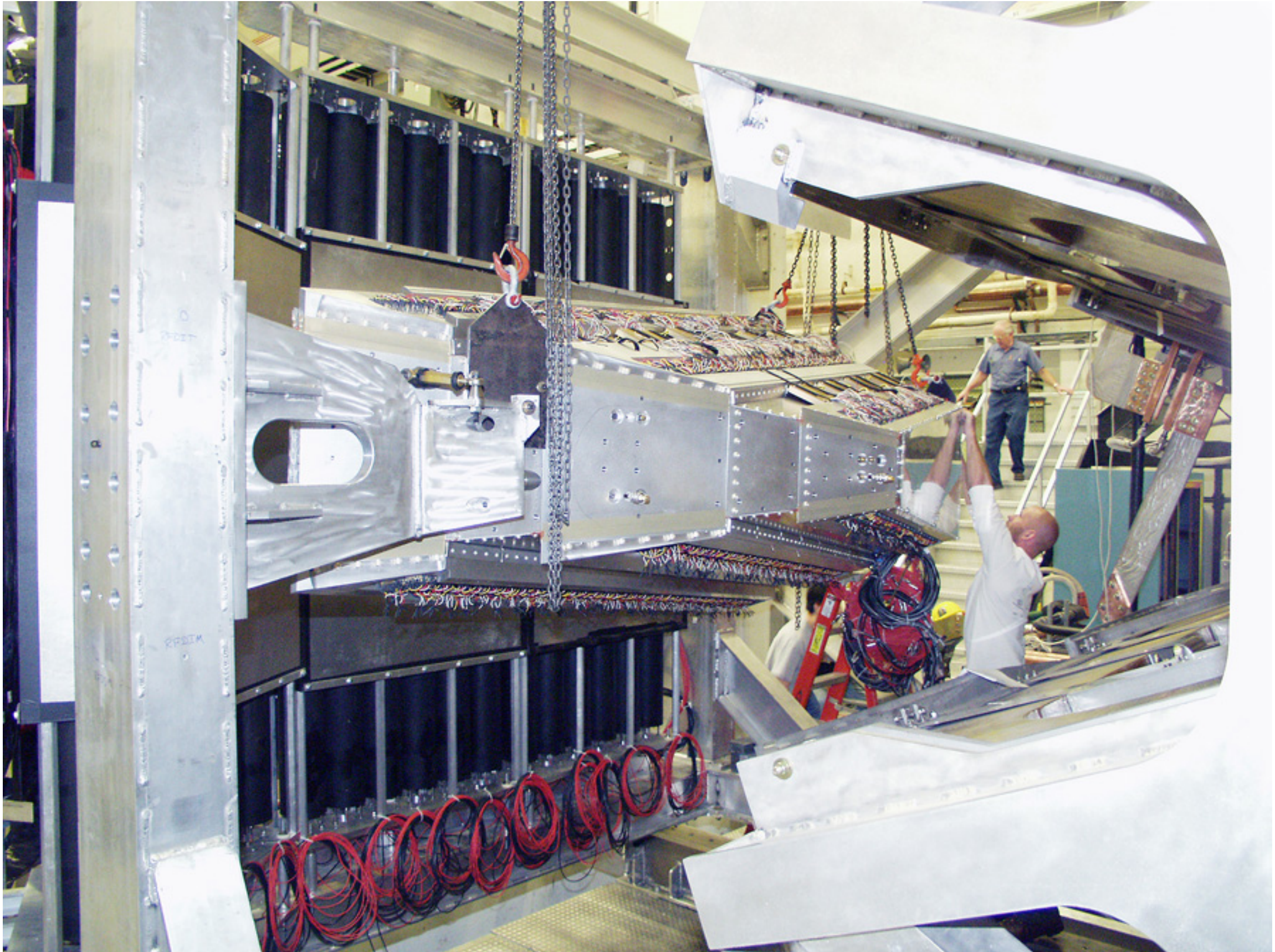




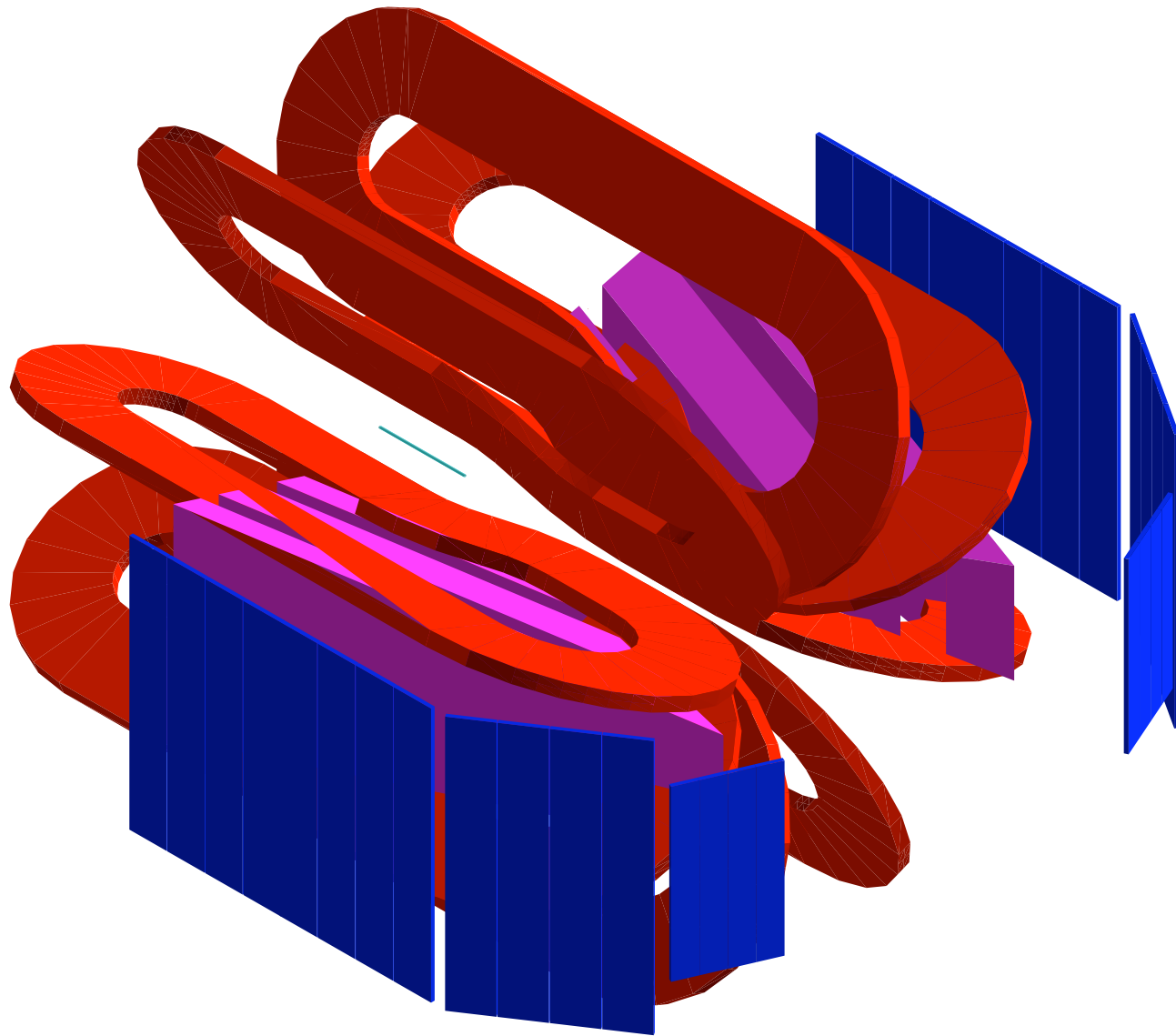
BLAST Sub-Detector Assembly



BLAST Wire Chambers



BLAST Detector for OLYMPUS



Reduced BLAST detector

- support frame
- toroidal magnet
 - DESY prefers their power supply
- wire chambers
- time of flight scintillators
- target chamber and gas system

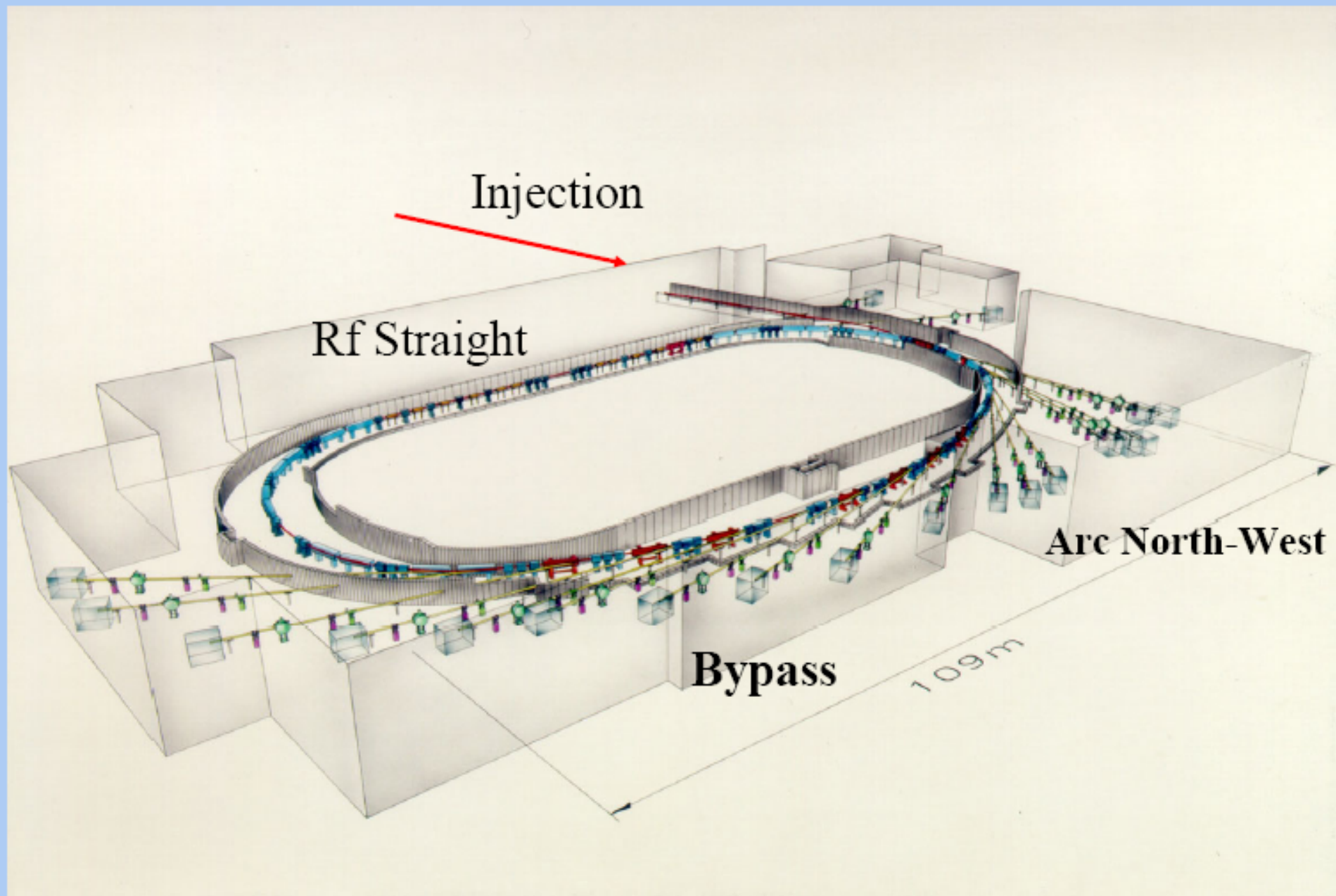
Possible upgrades

- improved tracking - Hasell
- luminosity monitors - Kohl
- PID ???
- instrument other sectors ???
- other ???

DORIS Electron/Positron Storage Ring



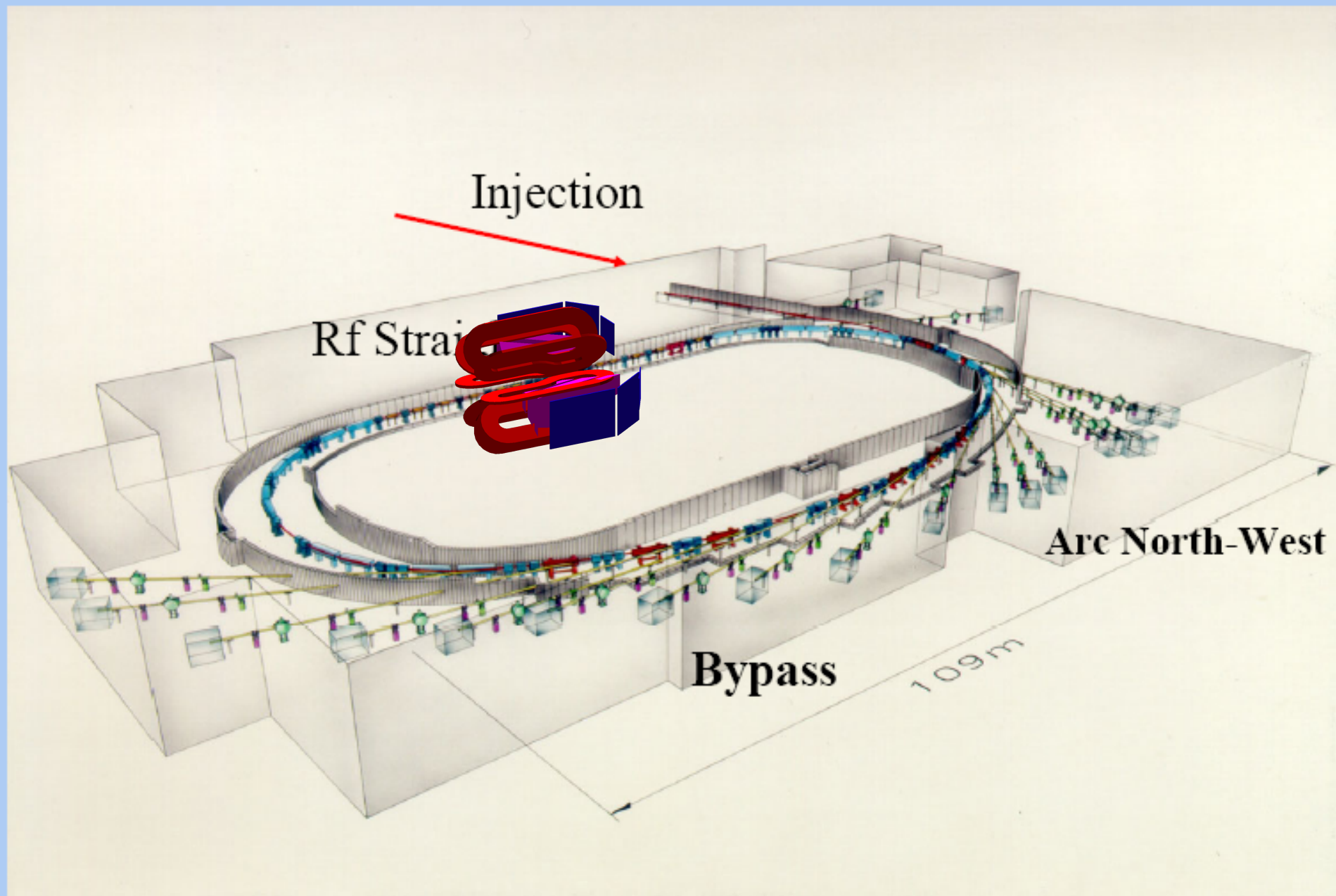
DORIS



DORIS Electron/Positron Storage Ring



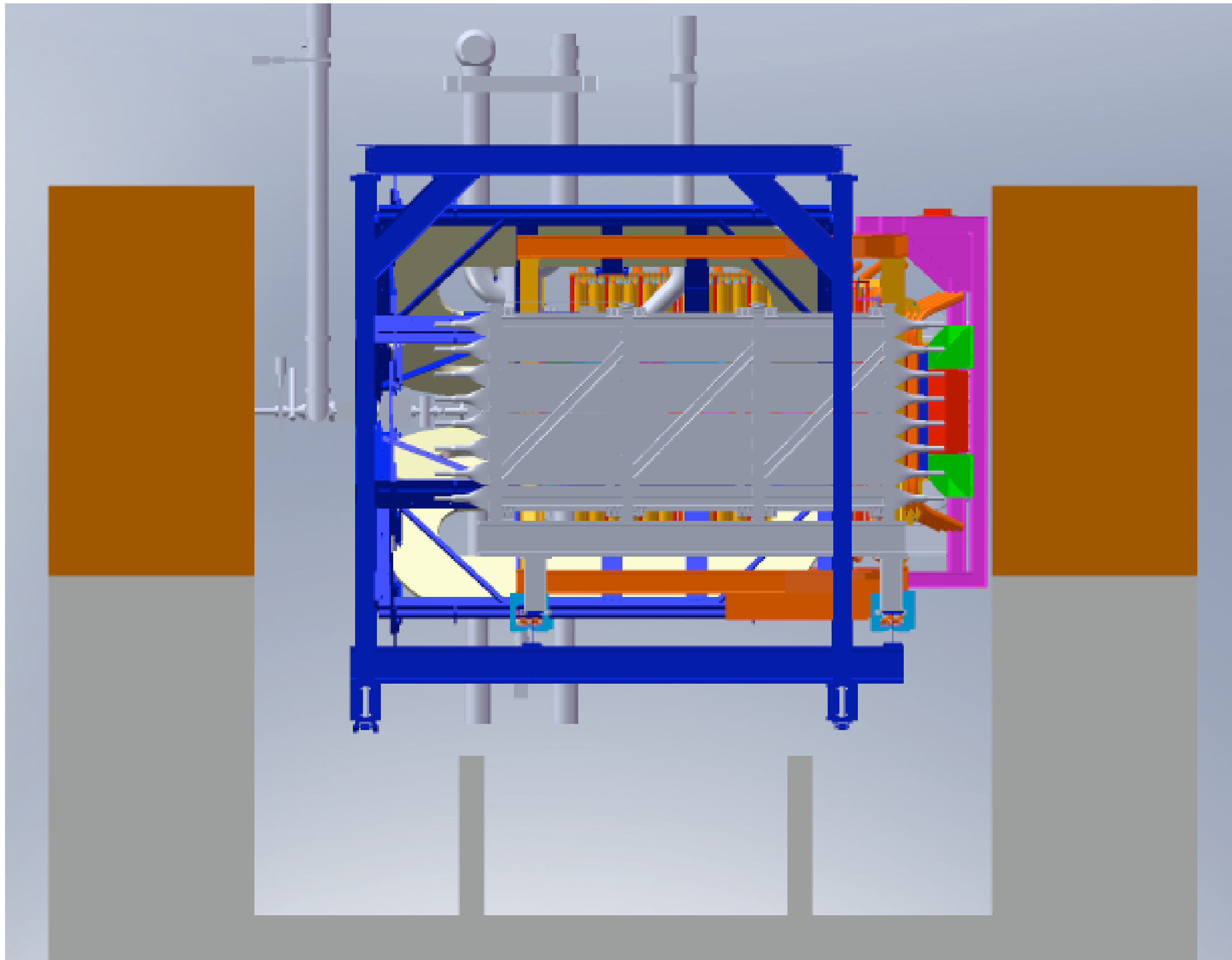
DORIS



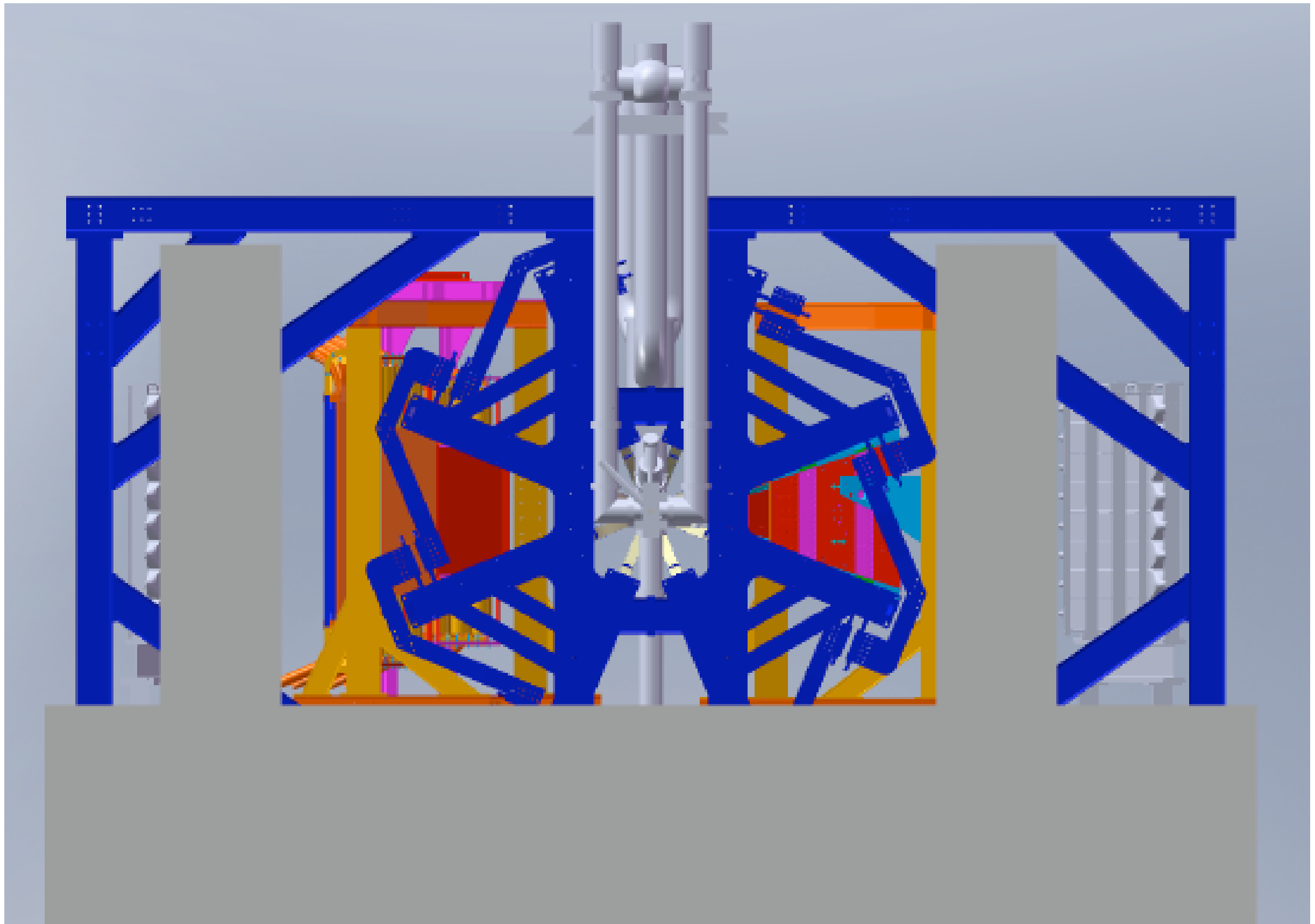
Inside DORIS Ring 2007



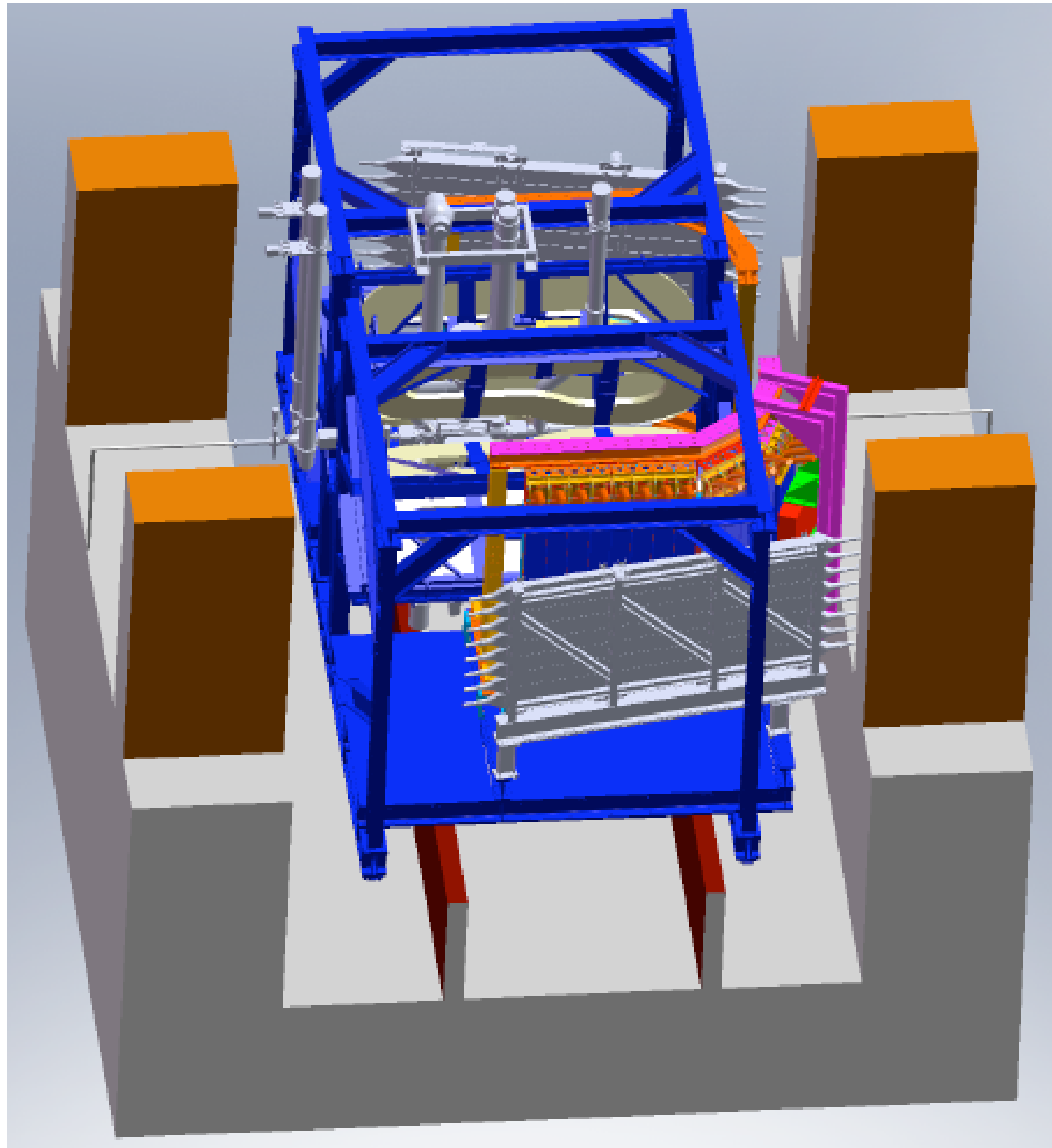
YZ View



XY View



BLAST in ARGUS Location



Shipped from MIT

Participation from Other Institute

BLAST Detector

- total weight ~ 40 t
- $5 \times 10 \text{ m}^2$ footprint
 - more to open main frame
- main frame splits in half
 - sub-detector opens inside main
- wire chambers
 - 1000 channels
 - 66 LV, 66 HV, 66 signal cables
 - volume 4000 l, flow 4 l/min
 - He:Iso-butane 83:17
 - could change to Ar:CO₂
- time of flight scintillator walls
 - 64 PMTs
 - 64 HV, 64 signal cables
- existing cables ~45 m
- laser flasher system

BLAST Toroid Magnet

- magnet cooling
 - 200 gallons/minute
 - 30° C temp. rise
- DESY prefers their power supply

Turbo pumps

Target Chamber / Cell

Unpolarised H gas system

Electronics, Trigger, DAQ

New detector components

Manpower

Pack and ship from MIT-Bates

- combination of air and sea freight
- handled by MIT-Bates physicists, engineers, and technicians
 - useful if DESY, German, ... physicists/engineers visit MIT-Bates

Assemble on floor of DORIS Hall

- MIT-Bates physicists and engineers to supervise
- need support of DESY physicists, engineers, and technicians
- perhaps other groups take responsibility for some components

Roll into location

- technical support from DESY

Commission/Calibrate in parallel with HASYLAB operation

- physicists and students from all groups

Run a few months per year

- physicists and students from all groups

Investigating Shipping BLAST

see R. Redwine's talk

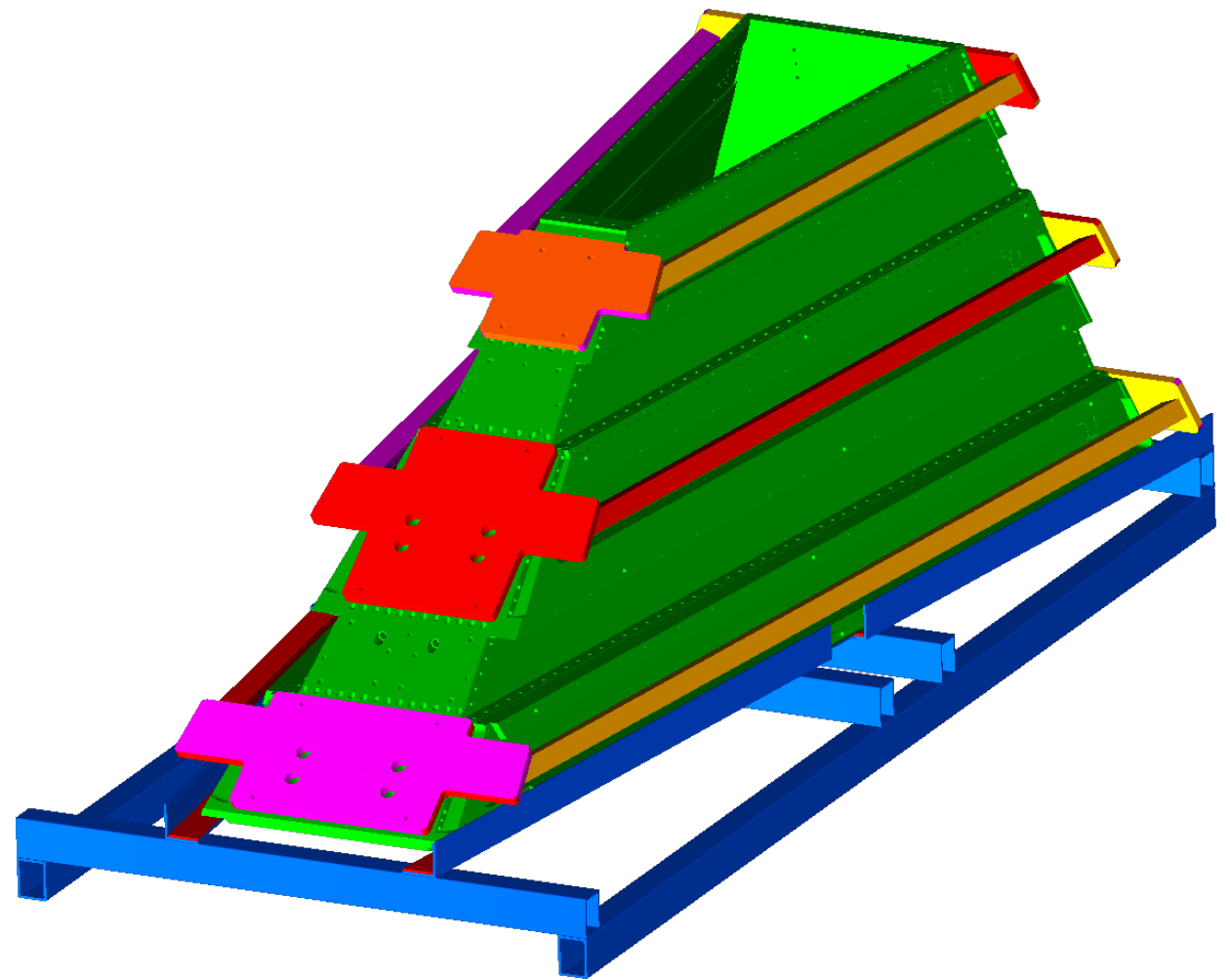
Most things fit in standard shipping container

Wire chambers need special handling - air freight

- finite element analysis
- design and build shock absorbing and damping system
- hopefully preserve most wires

Test before shipping

- wire chambers
- PMT's



Target Chamber and Target Cell



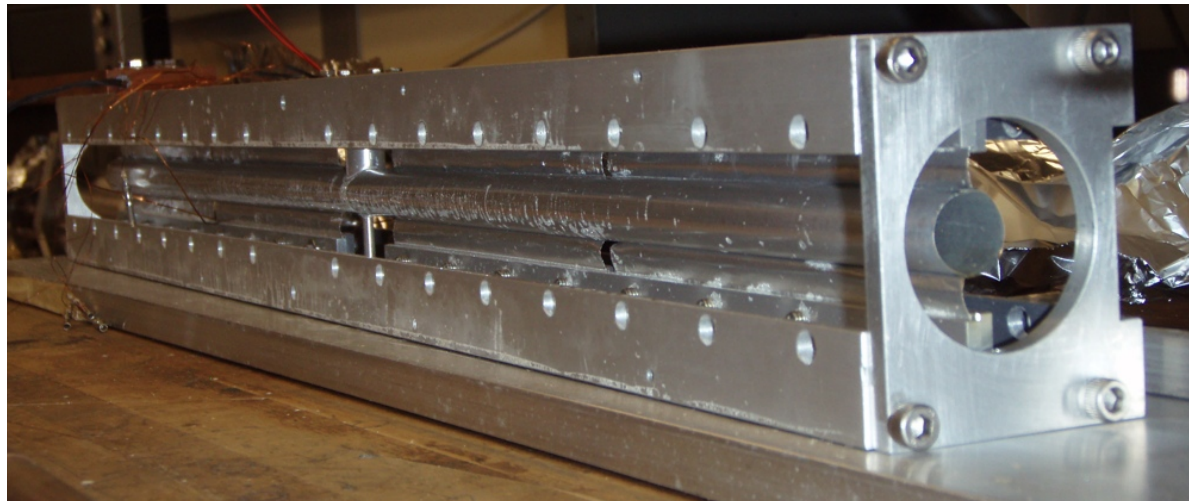
see R. Milner's talk

Blast target chamber

- Helmholtz coils
- pumping ports, cold head, gas fittings

Other chambers

- optimise angular coverage
- design for longer cell



Target cell

- BLAST cell 60 cm long and cylindrical
- other geometries possible
- allow instrumenting other sectors

Possible Time Line



Summer 2009

- reconfigure DORIS beamline
 - move RF
 - modify beamline/elements
- install simple target chamber, cell, and gas system
- install simple scintillator detectors to monitor rates

2009 - 2010

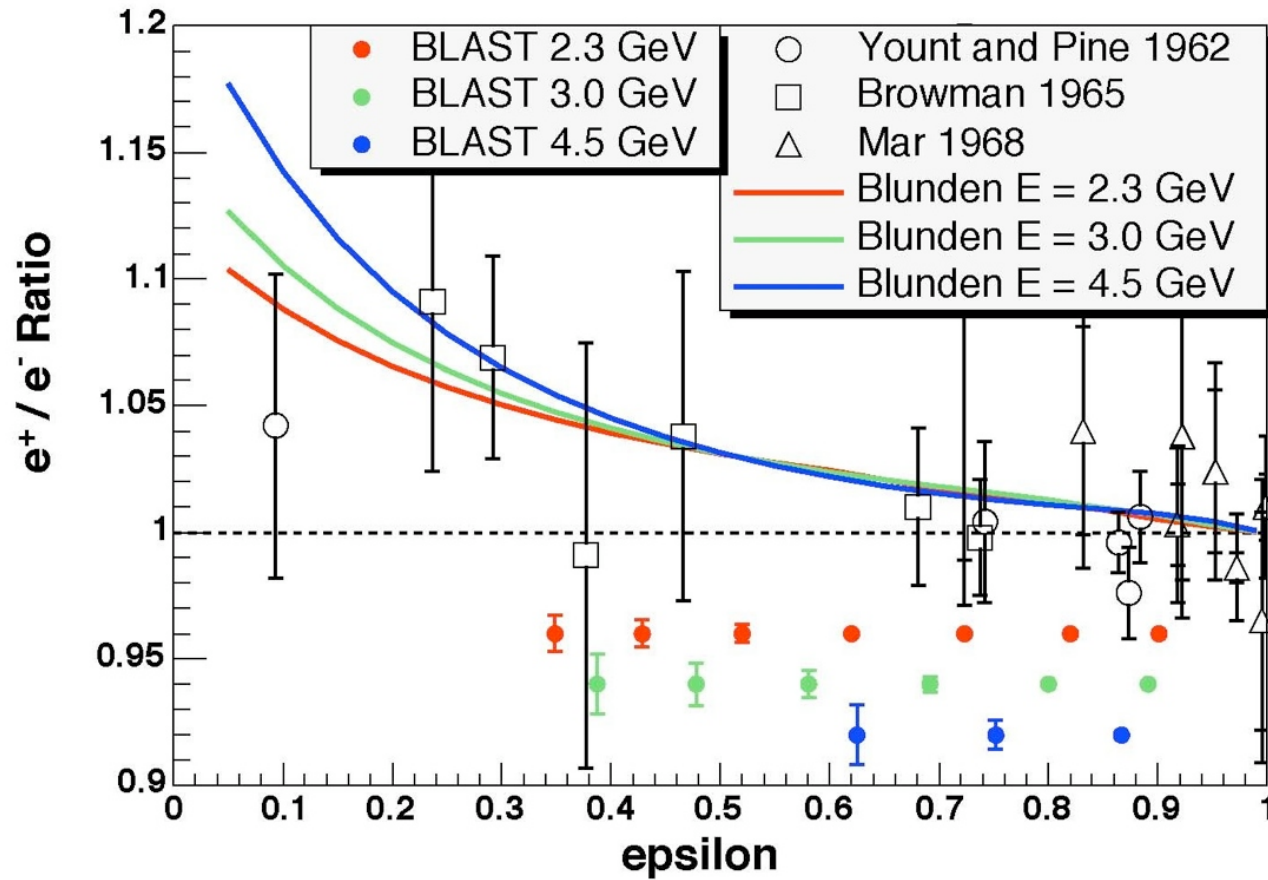
- run parasitically with HASYLAB
- low target density
- get estimate of rates and background
- begin shipping and assembly of BLAST in DORIS Hall

Summer 2010

- install BLAST in DORIS Ring

Run 1-2 months per year

Optimise Running - Reduce Time



BLAST Detector Acceptance

- best coverage at 2.3 GeV

Small Difference in Effect

⇒ Run at 2.3 GeV

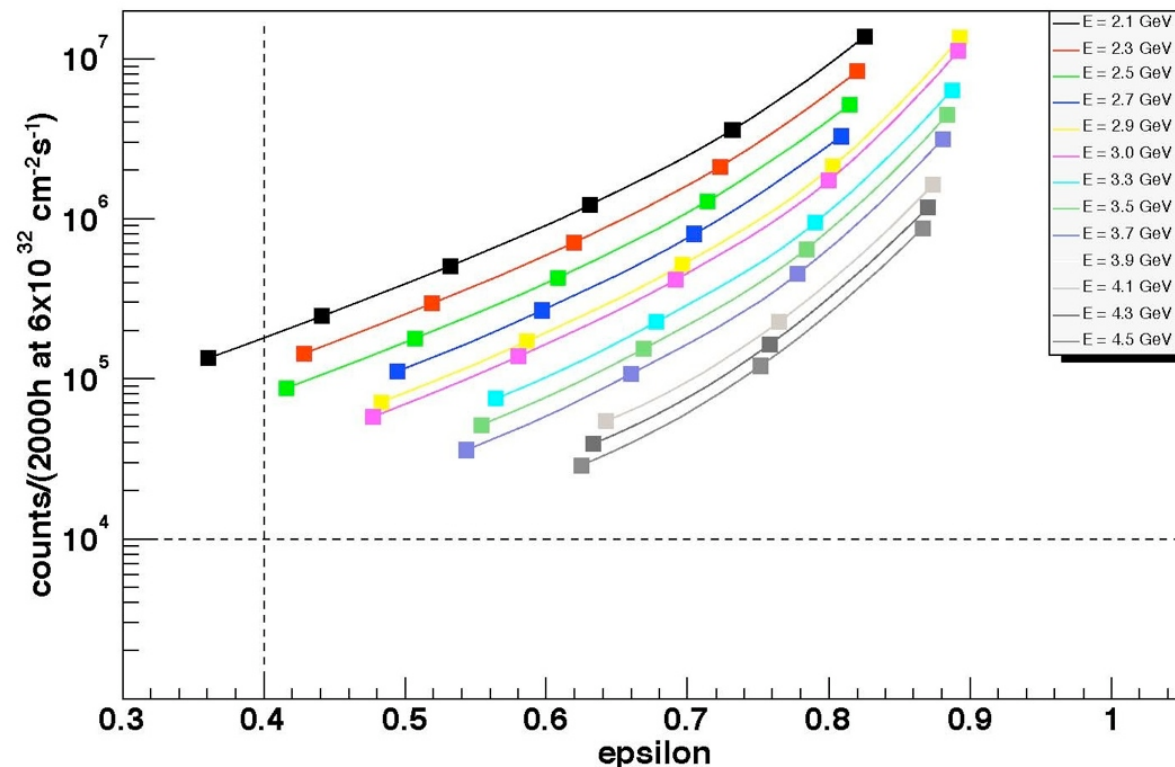
- higher energies later

Target density

- chosen for 1 hour beam lifetime
- 2.3 GeV rates $> 10^5$ / 2000 hr
- in top-up mode and dedicated running can increase density

Room to Optimise Running

Counts vs. epsilon



Proposal

Draft available from web

- <http://web.mit.edu/2-photon/DOCUMENTS/Draft-Proposal.pdf>

Needs more work

- update everything
- Monte Carlo simulations
- optimise running
- detector upgrades
- contributions from other groups
- budget
- commitments and responsibilities

Discuss Friday

A PROPOSAL TO DEFINITELY
DETERMINE THE CONTRIBUTION OF
MULTIPLE PHOTON EXCHANGE IN
ELASTIC LEPTON-NUCLEON
SCATTERING

THE OLYMPUS COLLABORATION

June 23, 2008

Mailing List

“Mailman” mailing list created at MIT

olympus@mit.edu

Mailing list accessible from the web:

<http://mailman.mit.edu/mailman/listinfo/olympus>

- only members can send messages
 - join at web page (must be approved)
- messages to mailing list are sent to all members
 - replies sent to poster not mailing list
 - use reply-all to have reply sent to all members too
- messages are archived and can be read and reread
 - no need to store messages on your own mail server
 - archives are public, anyone can read them
 - attachments are “scrubbed” - attachment is stored in archive and linked in message

Web Page

Web Page created at MIT

<http://web.mit.edu/2-photon/>

Limited content at the moment

- [documentation](#)
- [figures and drawings](#)
- [presentations](#)
- [contacts](#)

Will implement CMS at some point

Send suggestions, comments, content to hasell@mit.edu