Two Photon Proposal Meeting

DESY, 31 March, 2008

Agenda

- 10:00 Overview of experiment - R. Milner (MIT)
- 10:45 Realization of the experiment - D. Hasell (MIT)
- 11:15 The ORIS Ring - F. Brinker (DESY)
- 11:45 Measurements with a polarized target - F. Maas (Mainz)

- 12:15 Lunch

- 13:30 Experiment upgrades and discussion on responsibilities - M. Kohl (Hampton)
- 14:15 Proposal preparation - D. Hasell (MIT)
- 14:45 Dates for future meetings - D. Hasell (MIT)

- 15:00 Visit to DORIS Hall and former ARGUS location

BLAST@DORIS

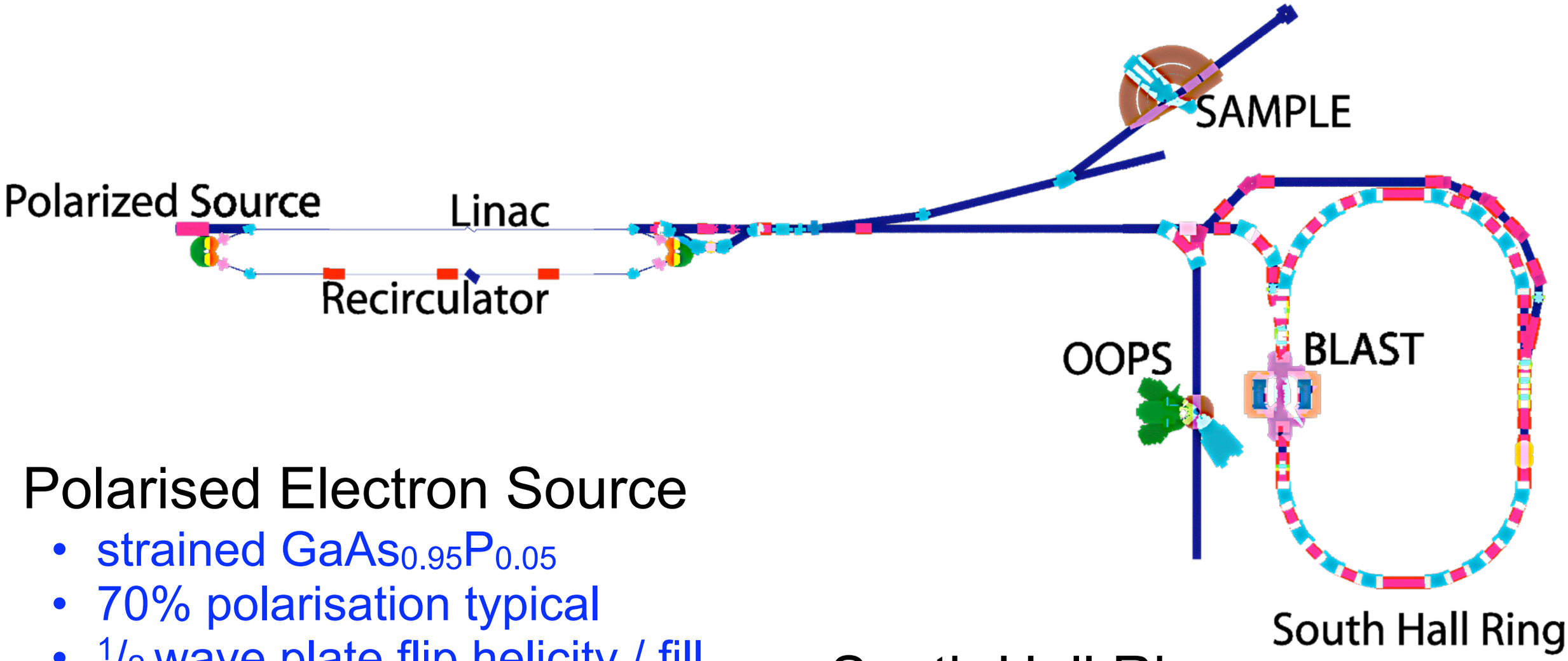
Outline

BLAST at MIT-Bates

BLAST in DORIS

Infrastructure

MIT-Bates Linear Accelerator Center



Polarised Electron Source

- strained $GaAs_{0.95}P_{0.05}$
- 70% polarisation typical
- $^1/_2$ wave plate flip helicity / fill

500 MeV Linac + Recirculator

- polarised electrons up to 1 GeV

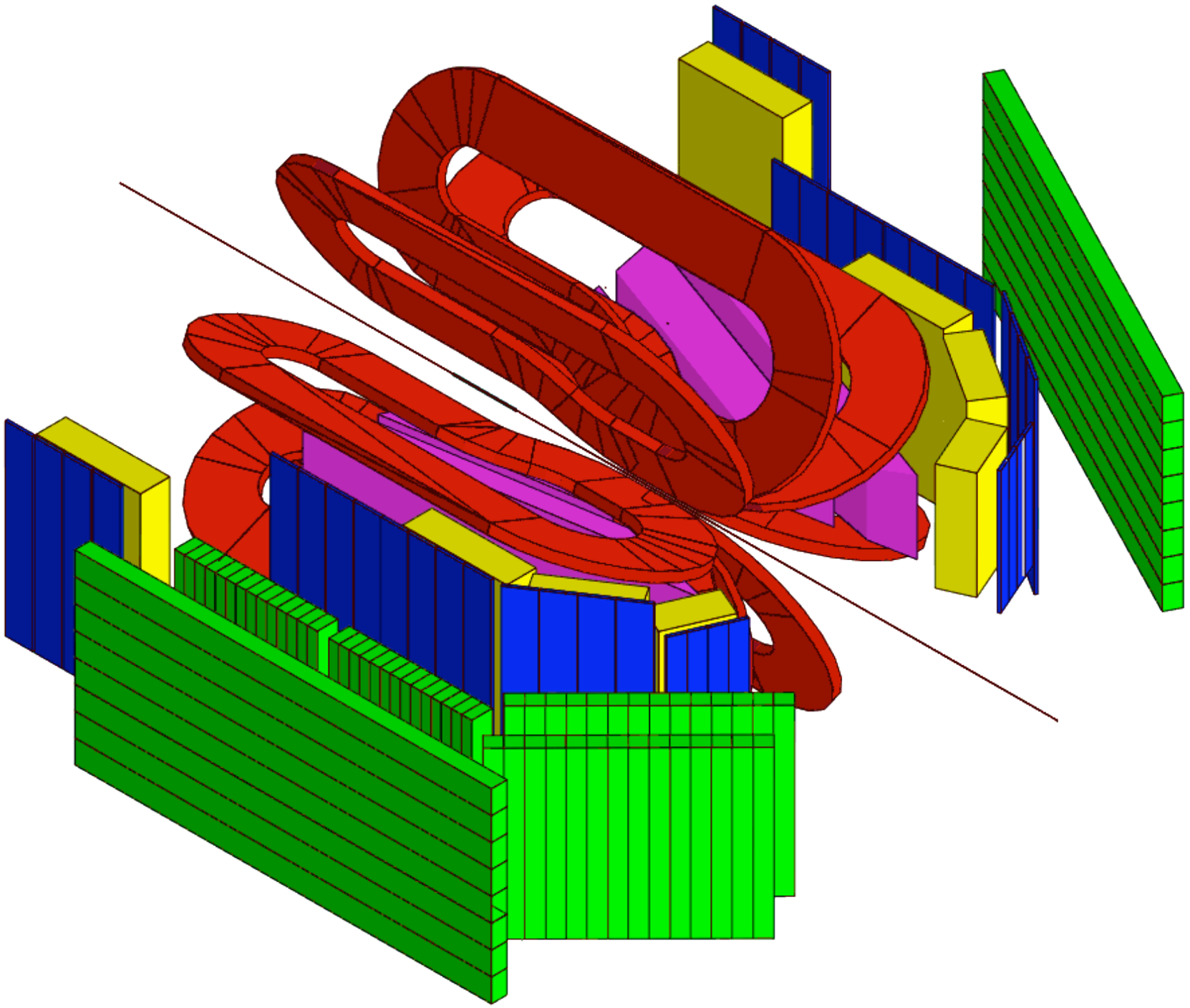
North and South Expt. Halls

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

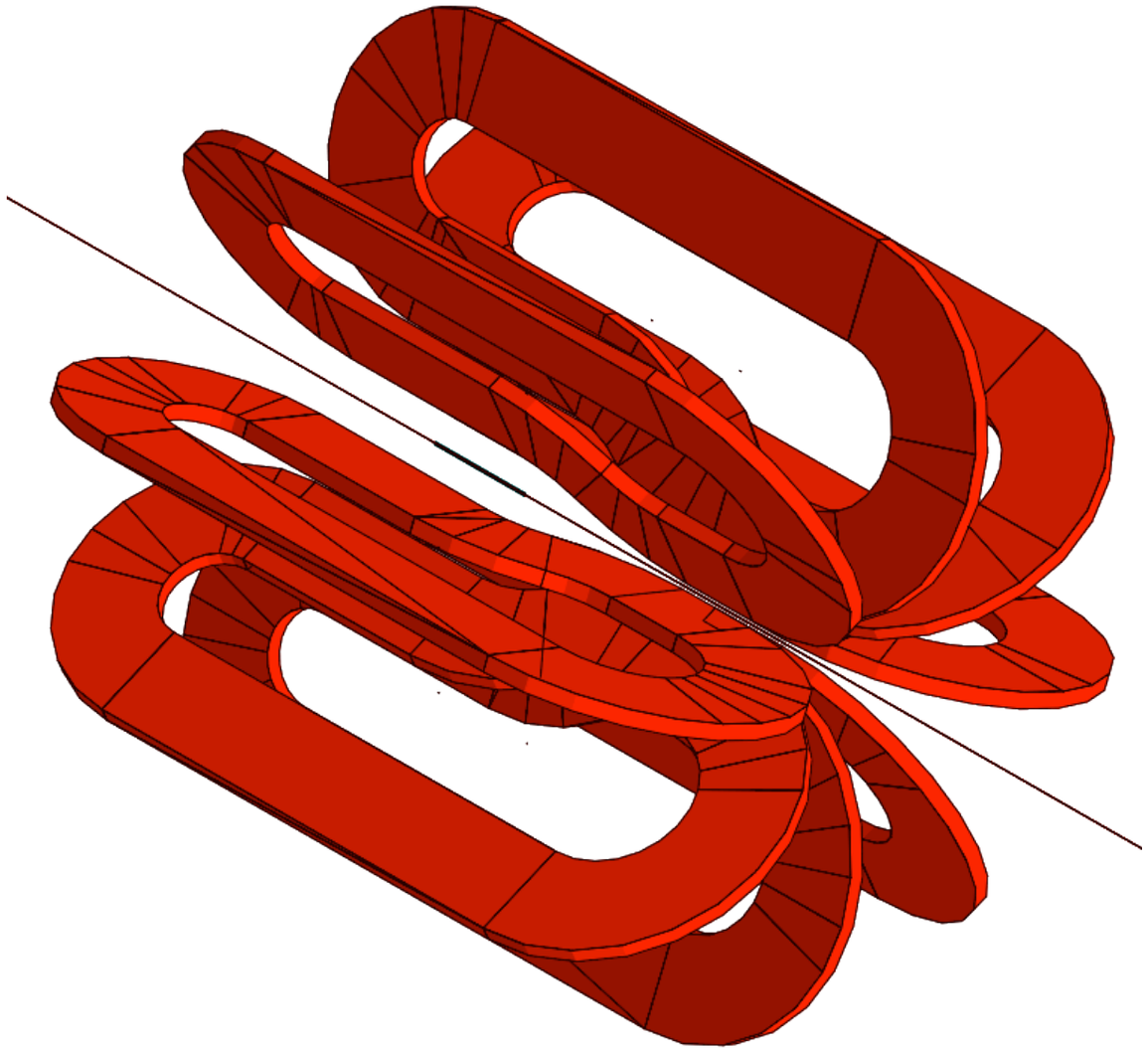
South Hall Ring

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

BLAST Detector

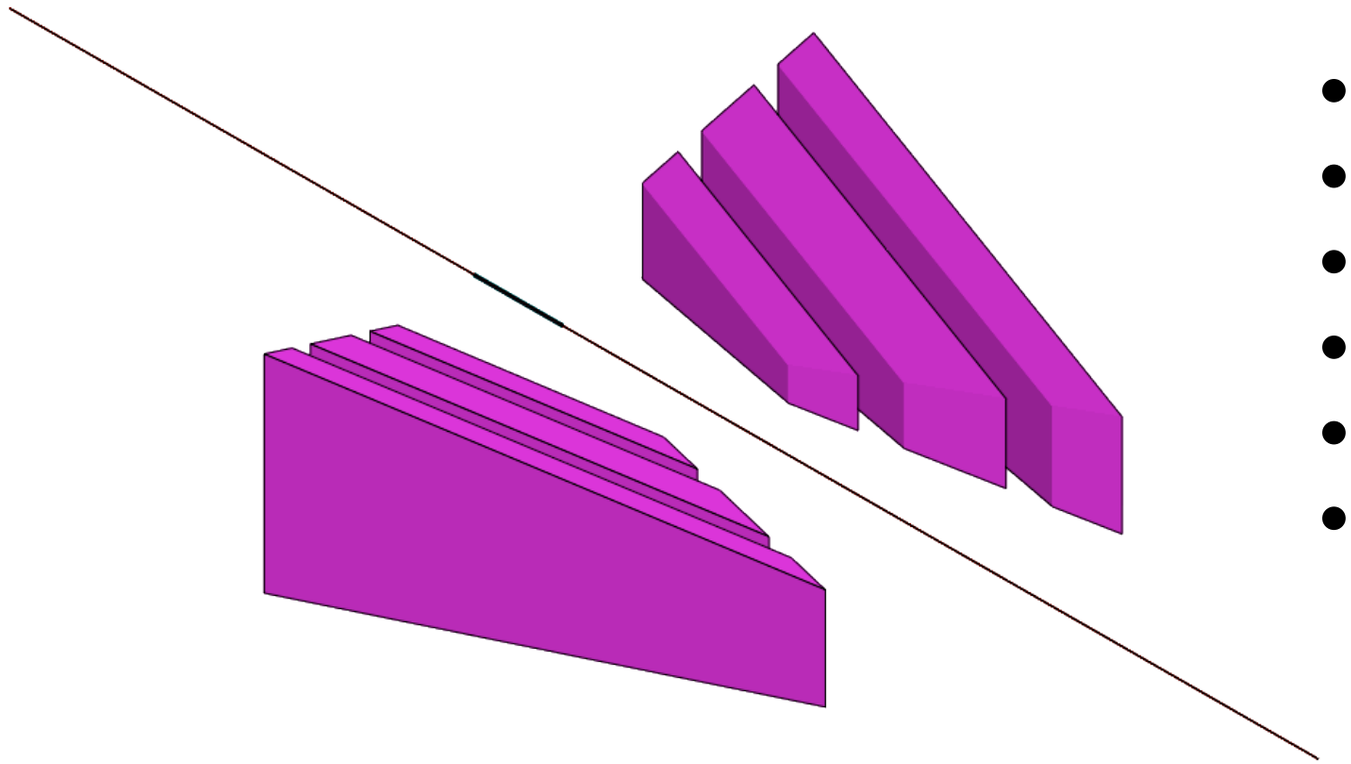


BLAST Detector



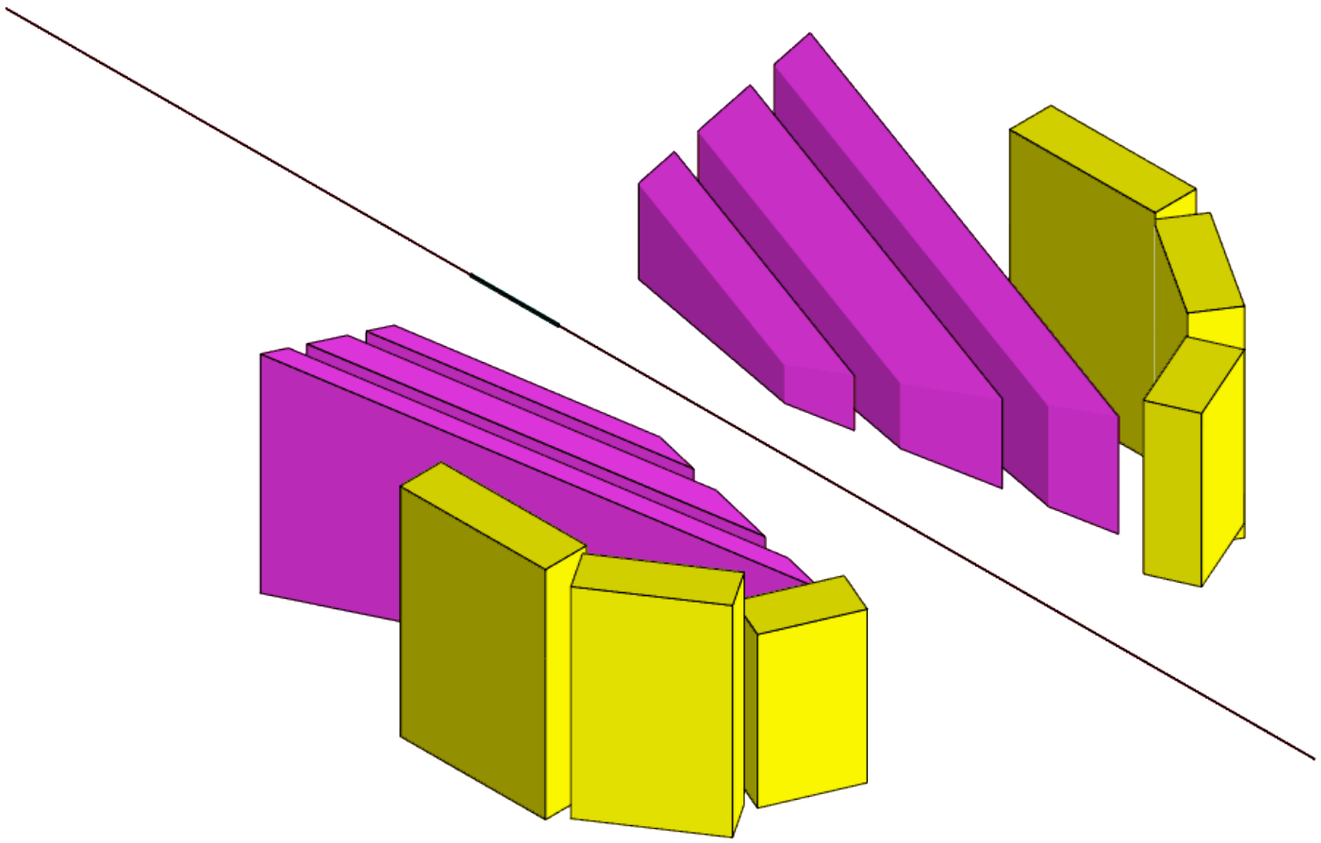
- 8 sector toroid magnet
  - minimise effect on beam and target polarisation
- 3.8 kG maximum field
- two horizontal sectors instrumented

BLAST Detector



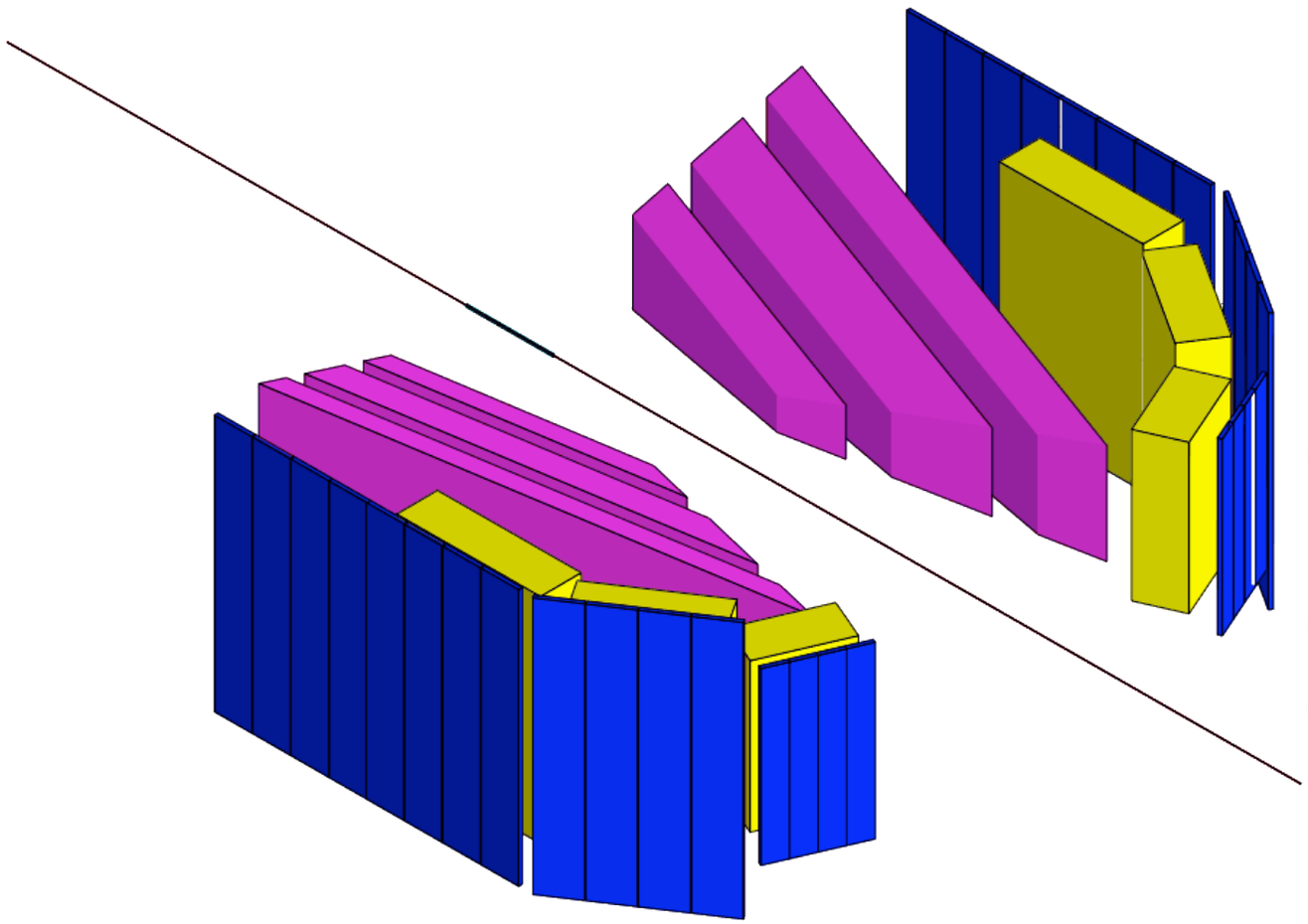
- 3 wire chambers / sector
  - single gas volume
- 2 superlayers / chamber
  - +/- 10° stereo
- 3 sense layers / superlayer
- total 18 layers of tracking
- momentum analysis
- scattering angles
- event vertex
- particle charge

BLAST Detector



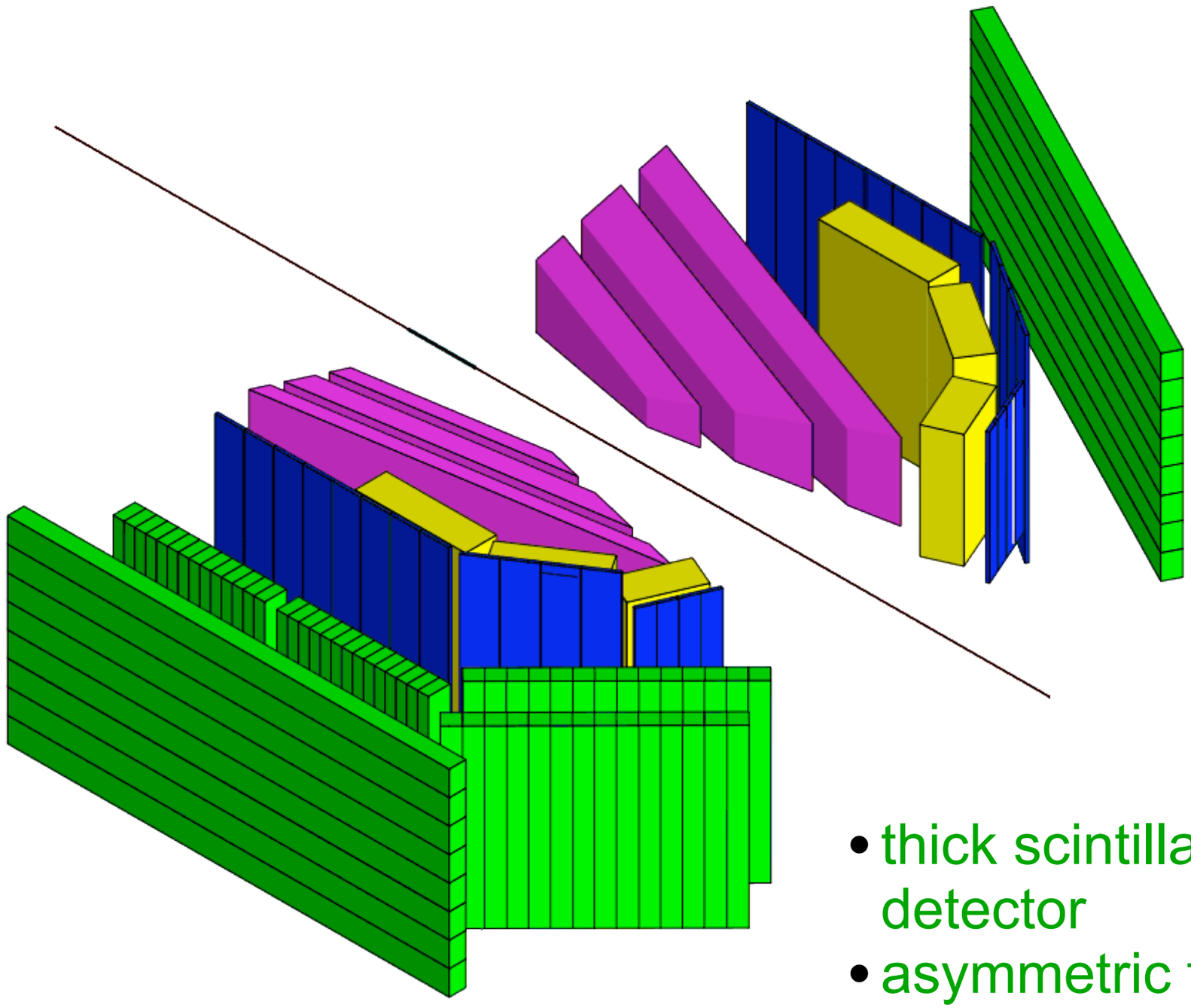
- Aerogel Cerenkov
- pion / electron separation

BLAST Detector



- time of flight scintillator walls
- relative timing
- trigger timing

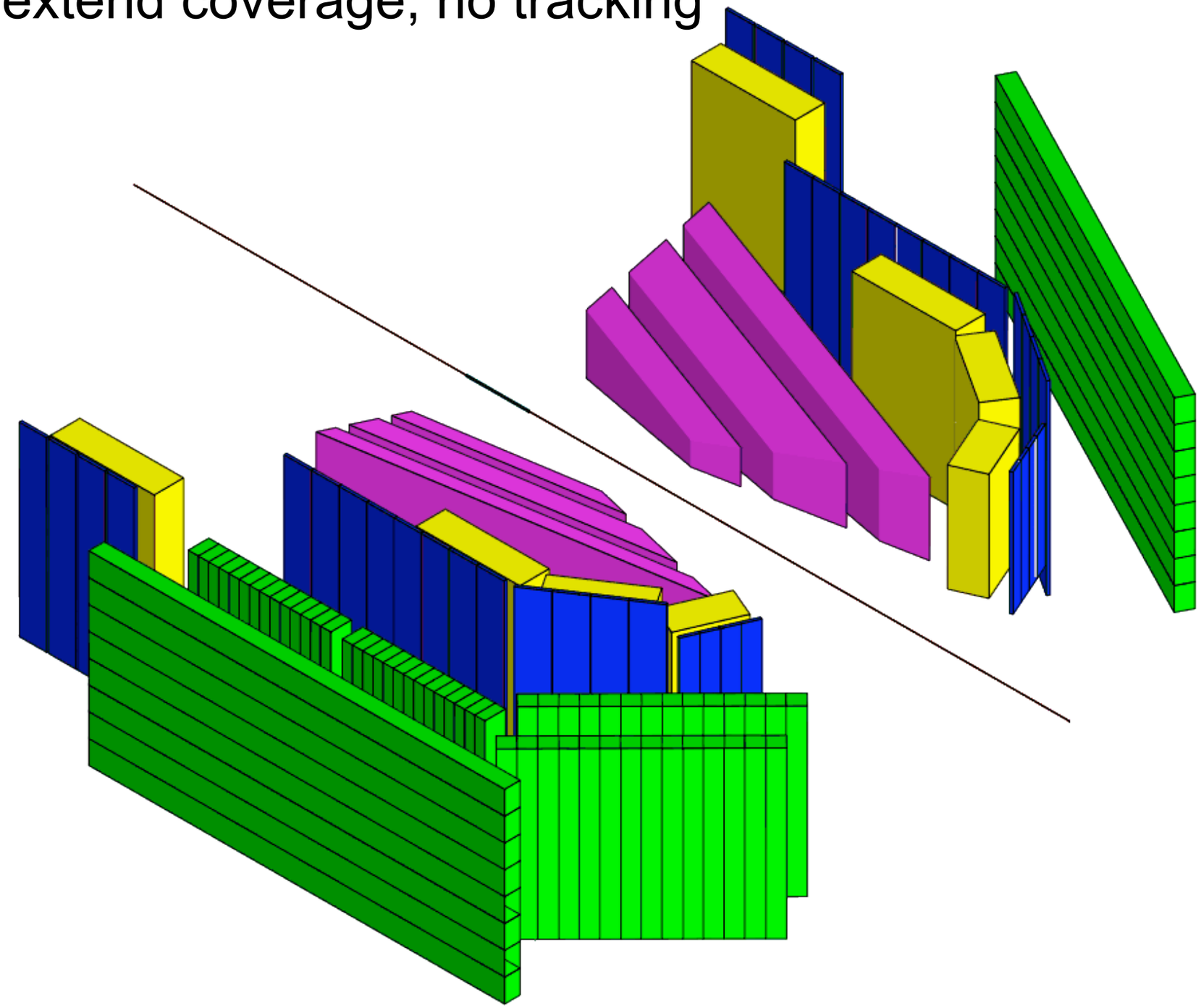
BLAST Detector



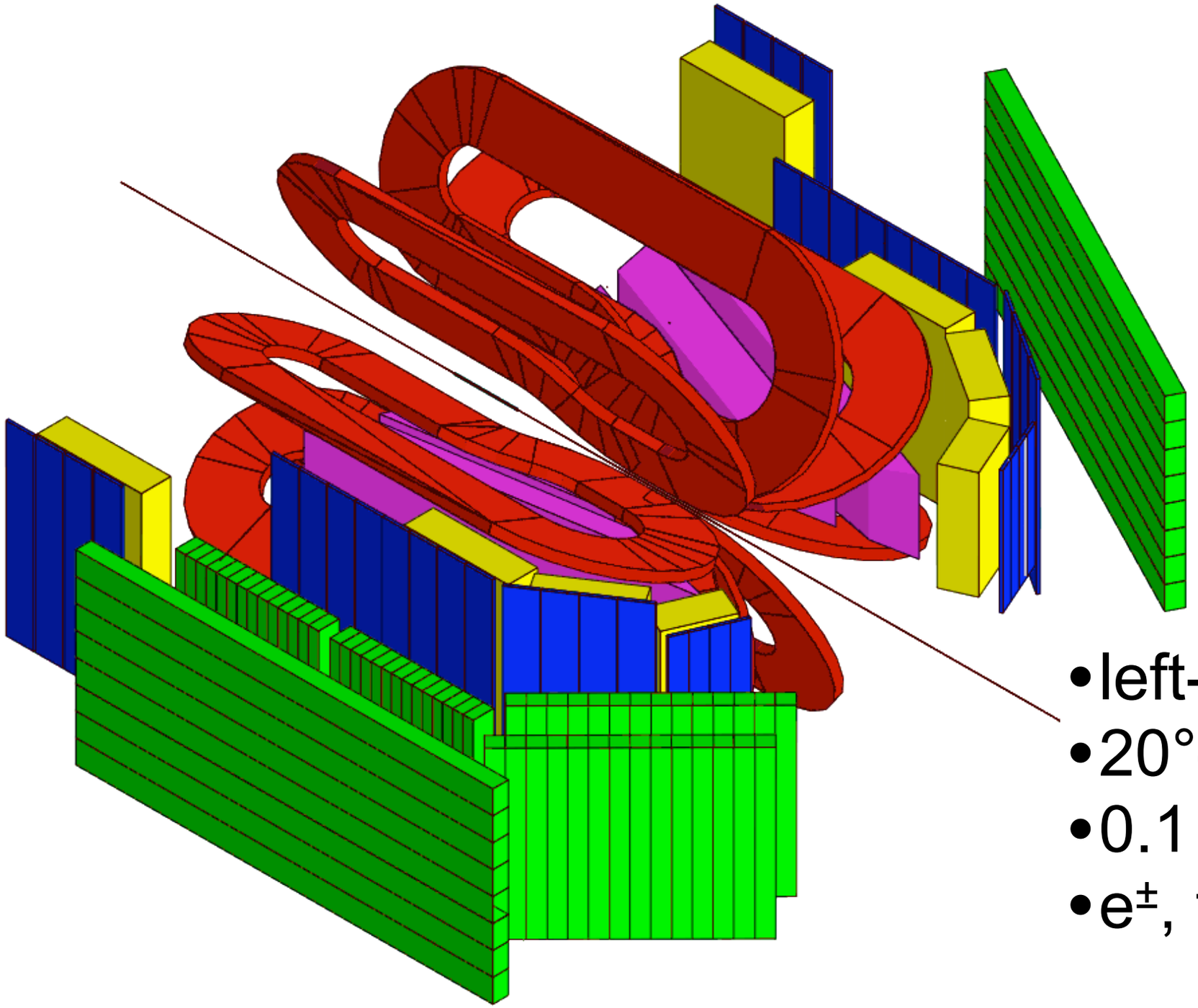
- thick scintillators for neutron detector
- asymmetric favouring right sector

BLAST Detector

- back angle detectors
- extend coverage, no tracking



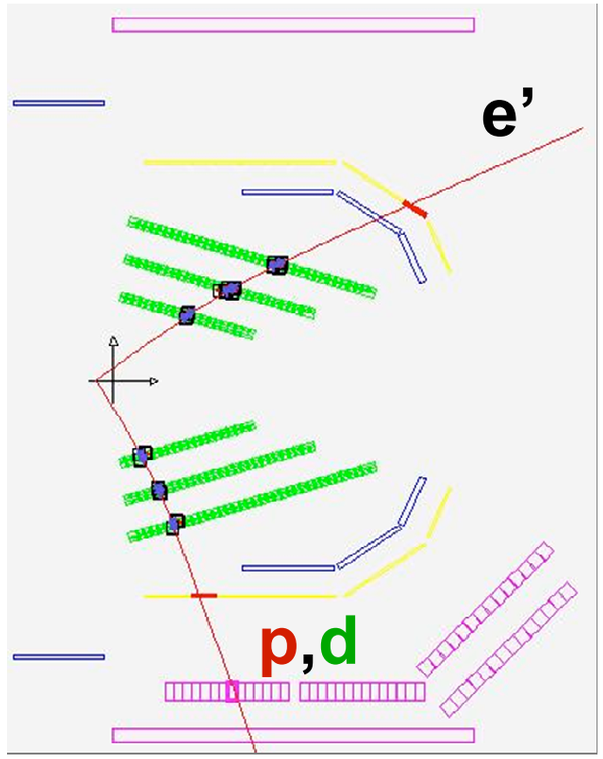
BLAST Detector

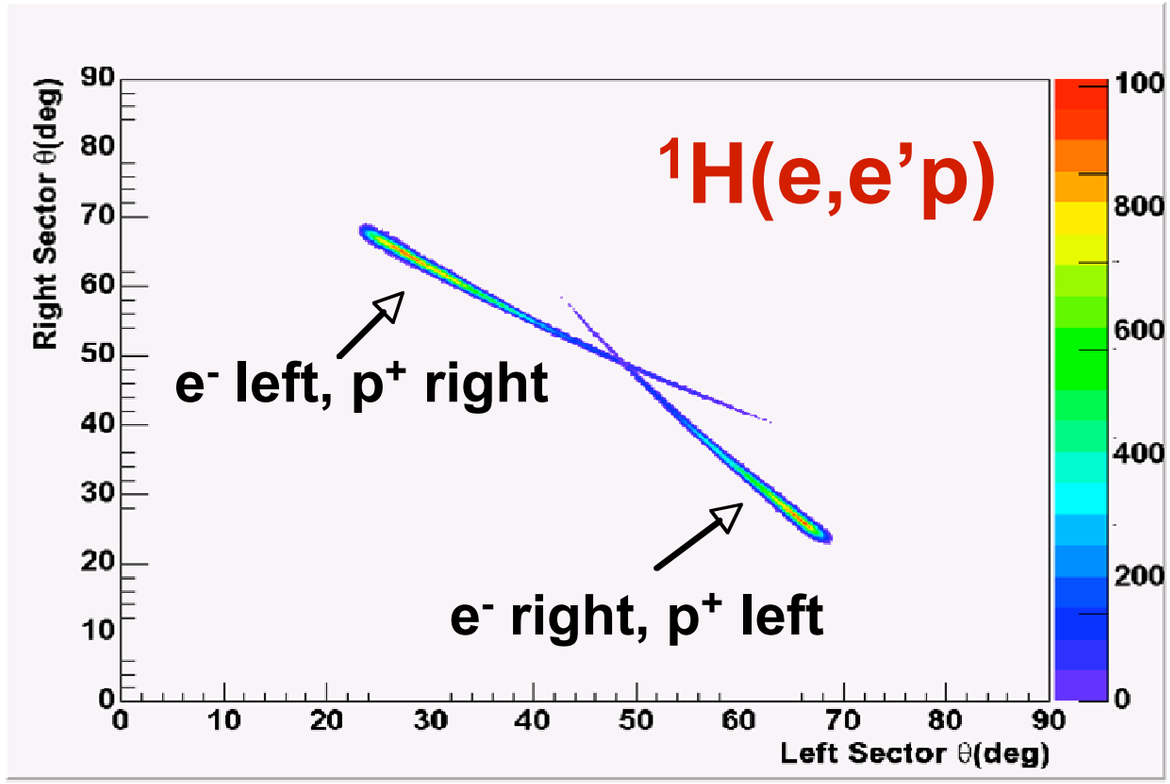


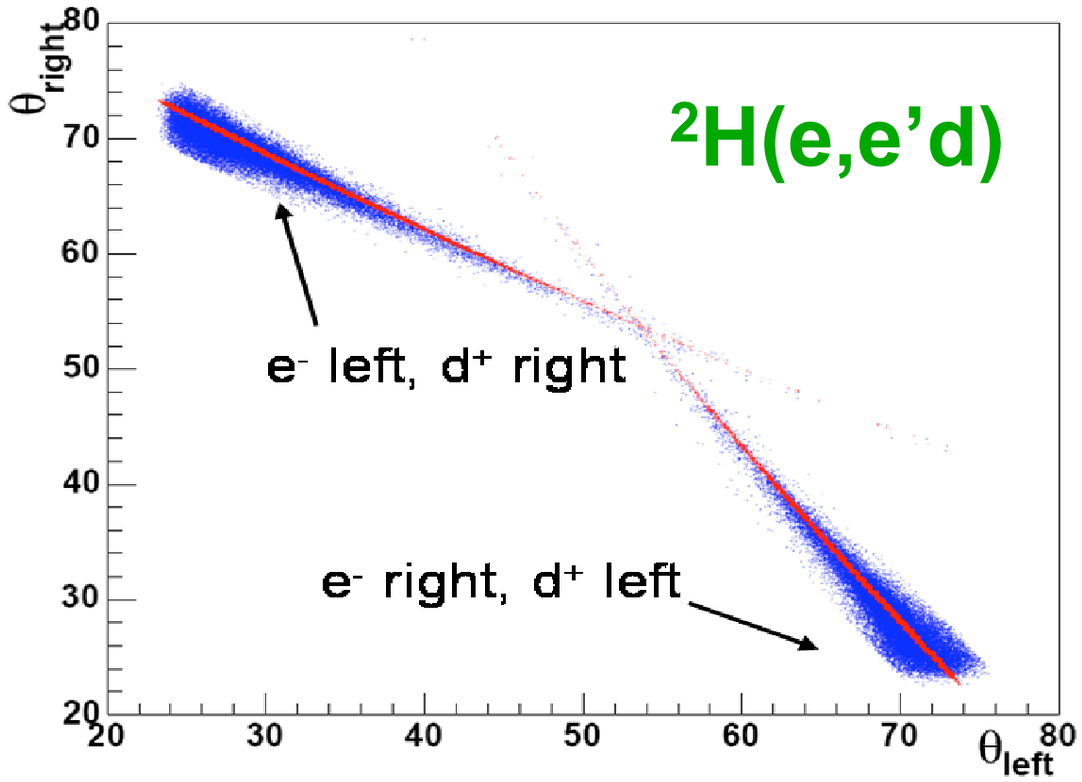
- left-right symmetric
- 20°- 80° θ, ±15° φ
- $0.1 < Q^2 < 0.8$ $(GeV/c)^2$
- $e^{\pm}$, $\pi^{\pm}$, p, n, d

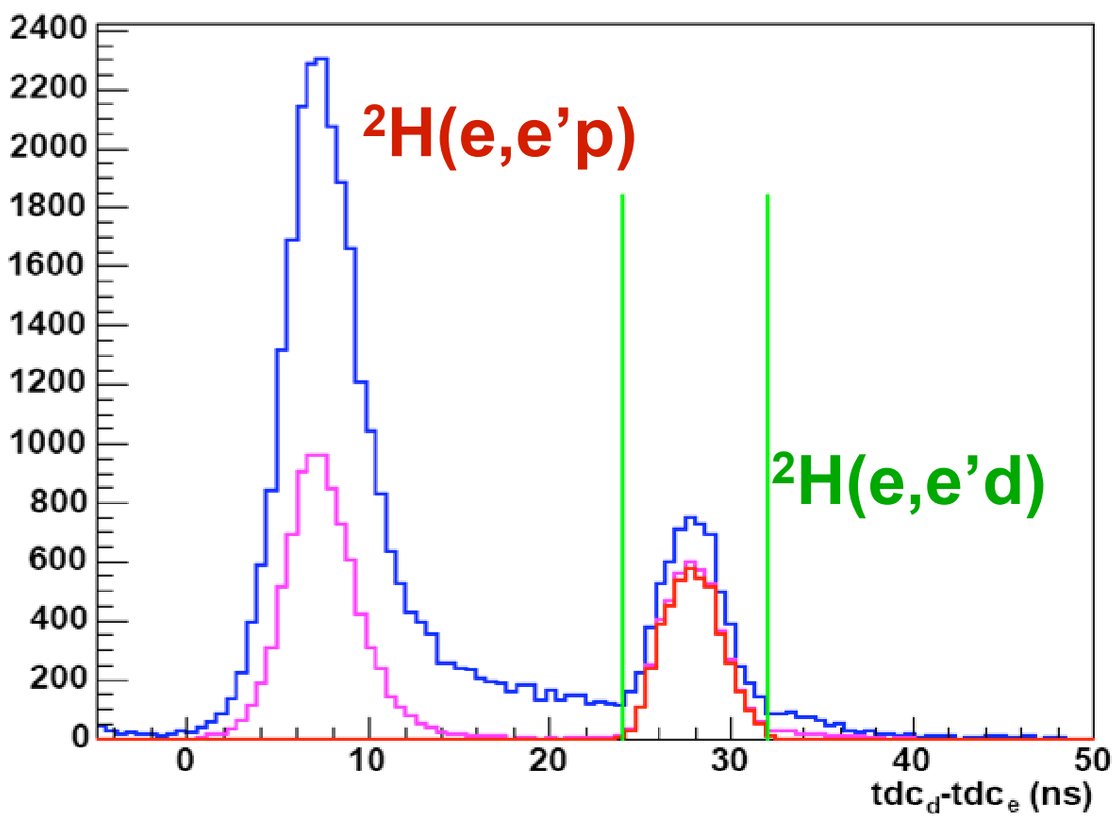
Event Selection

Charge+/-
Coplanarity
Kinematics
Timing

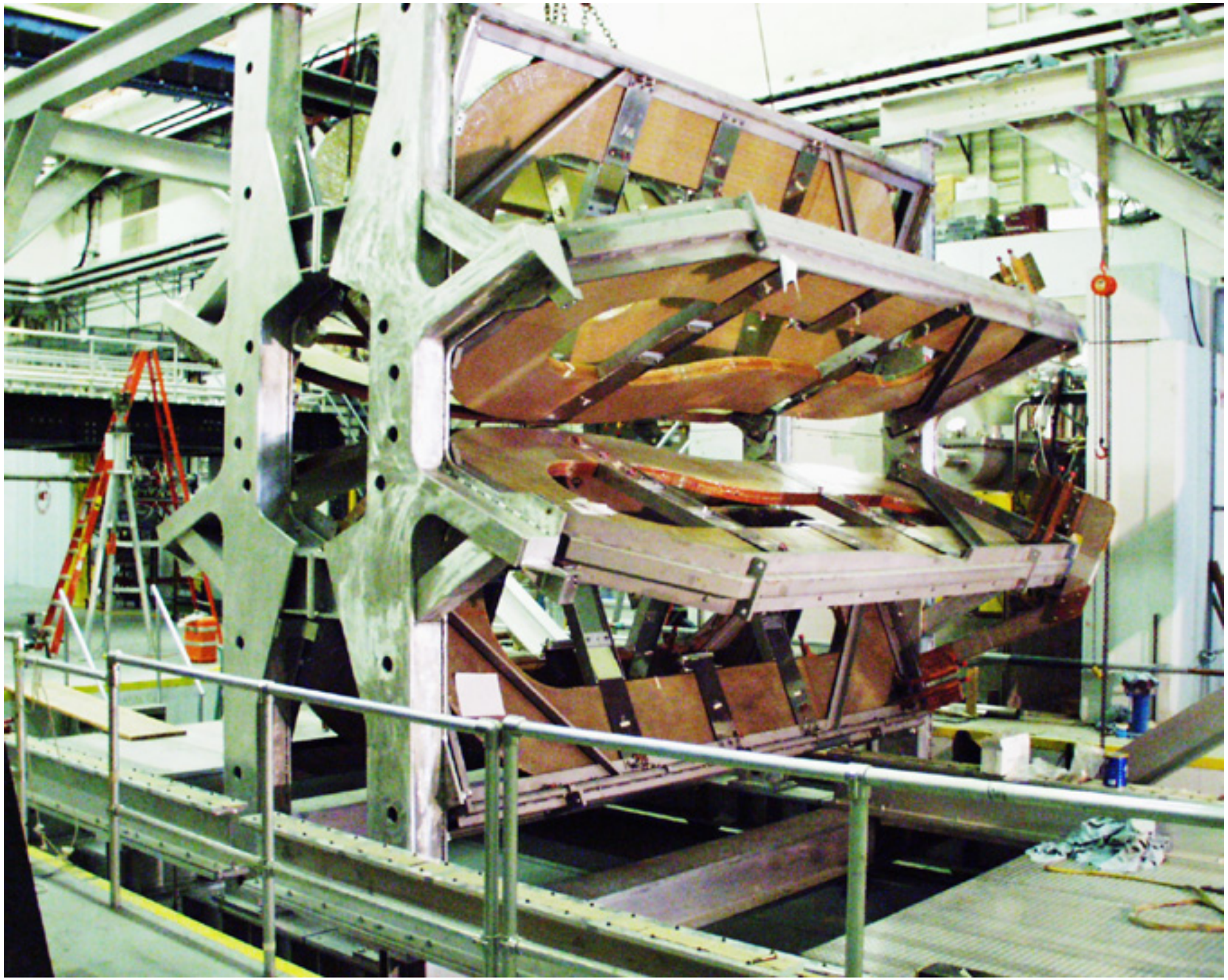




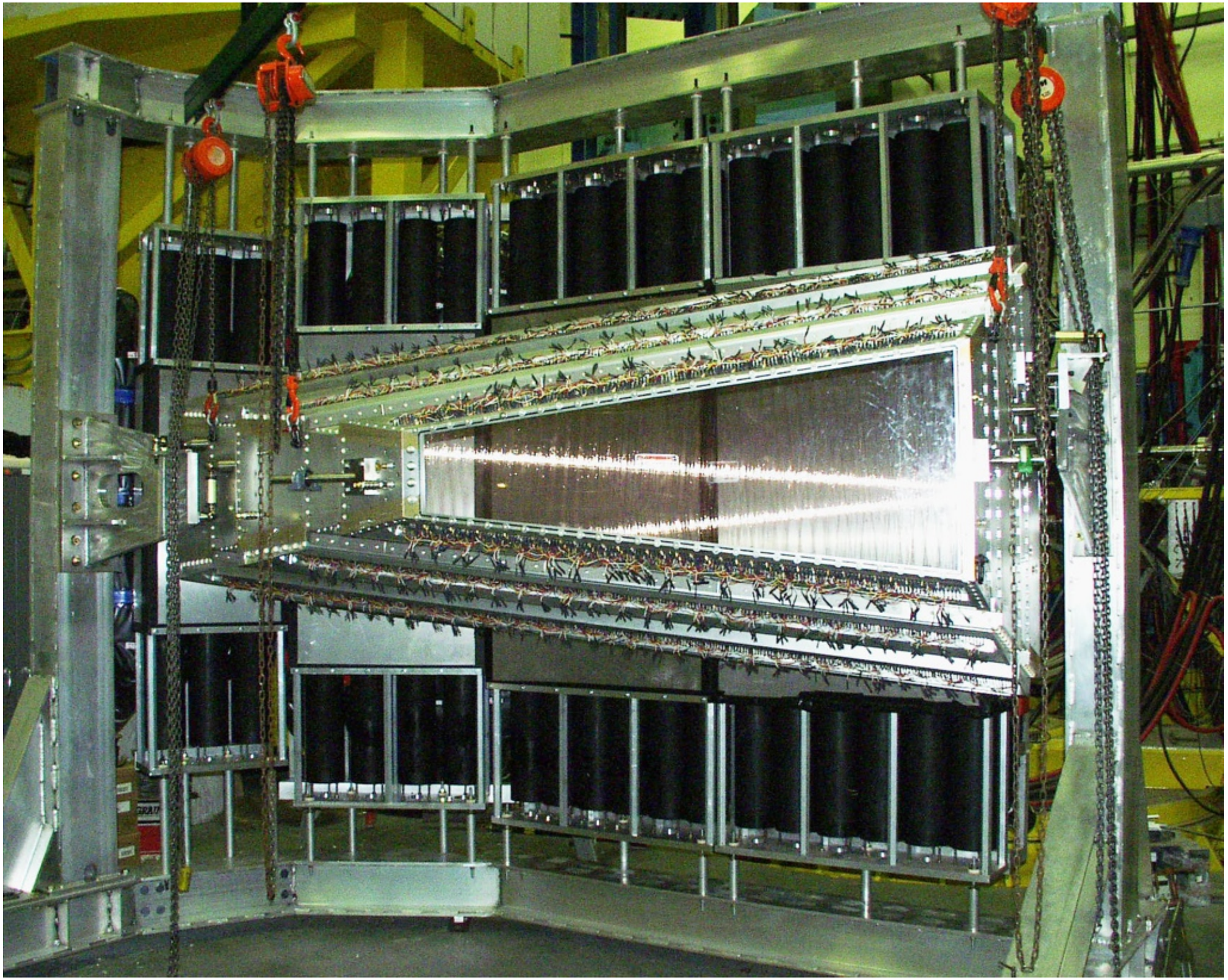




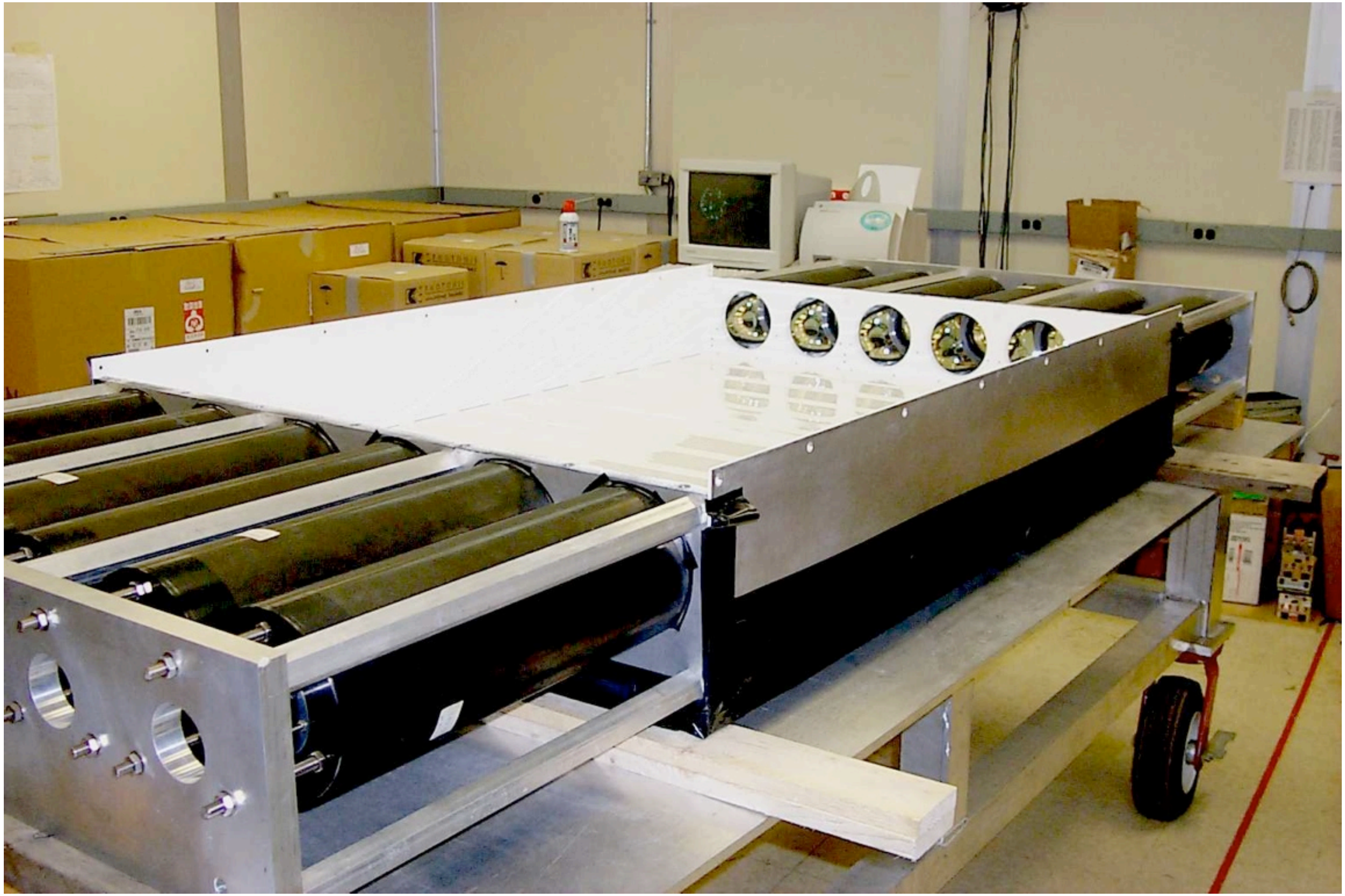
BLAST Toroid Magnet



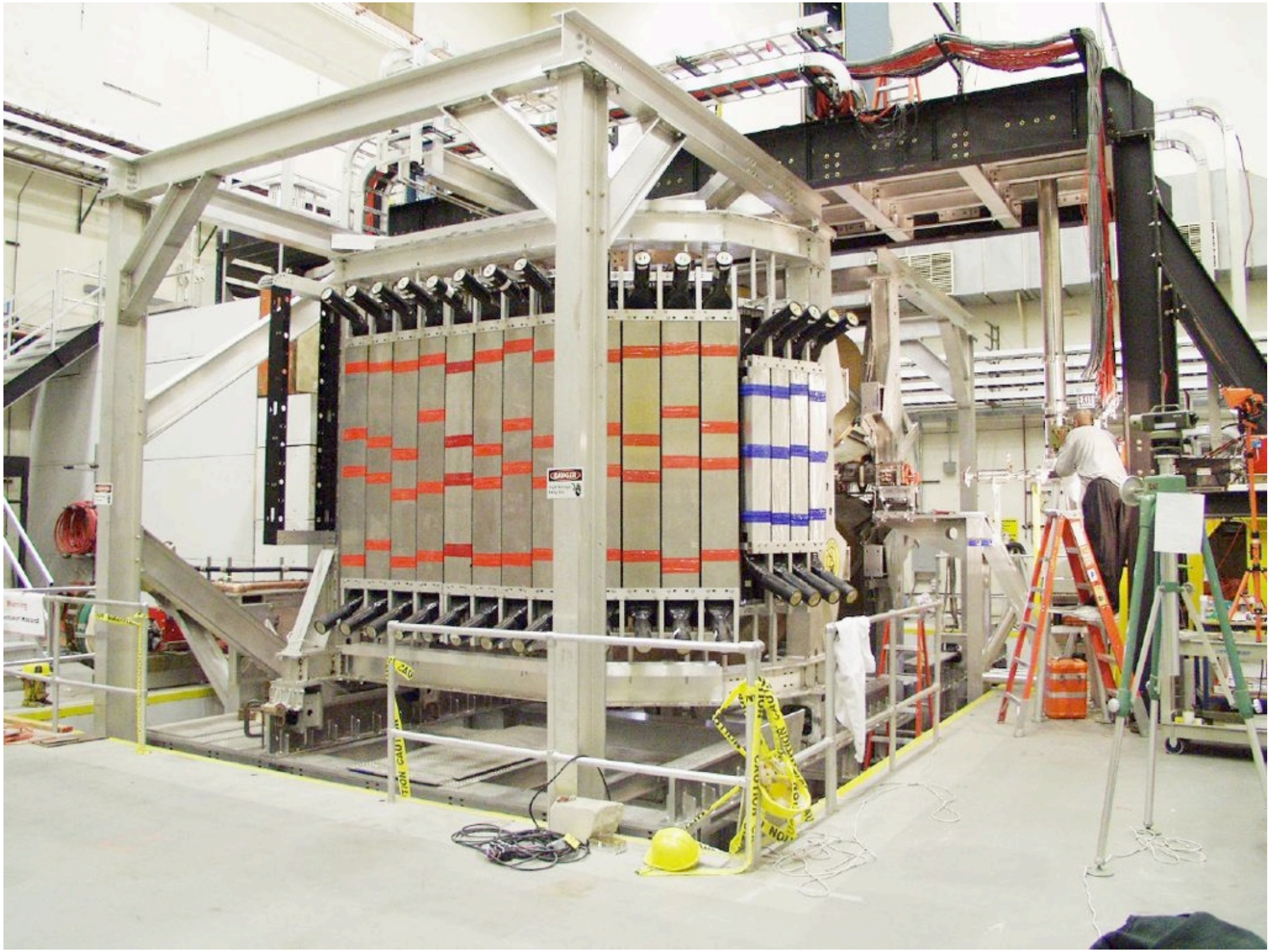
BLAST Wire Chambers



BLAST Cerenkov Detector



BLAST Time of Flight

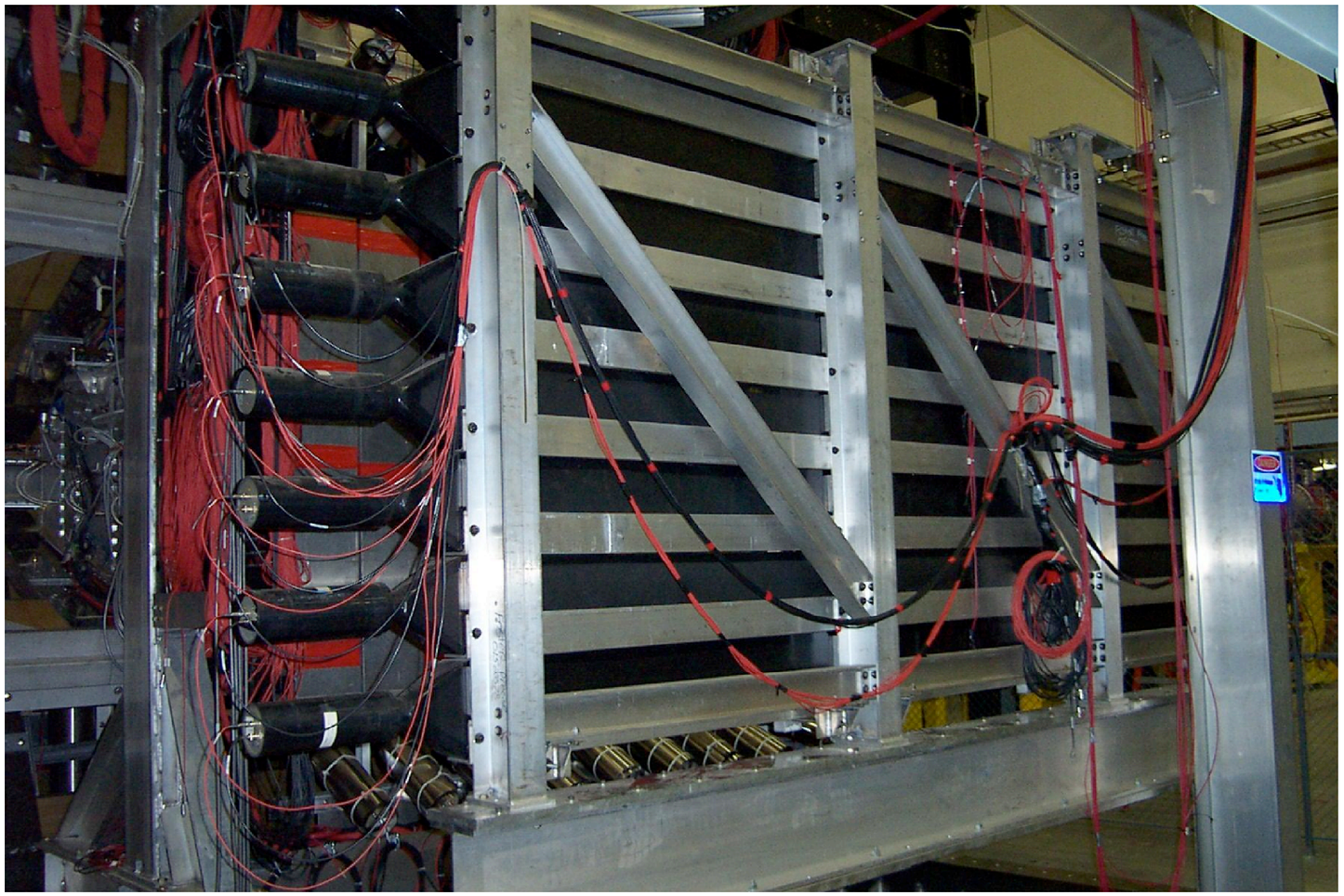


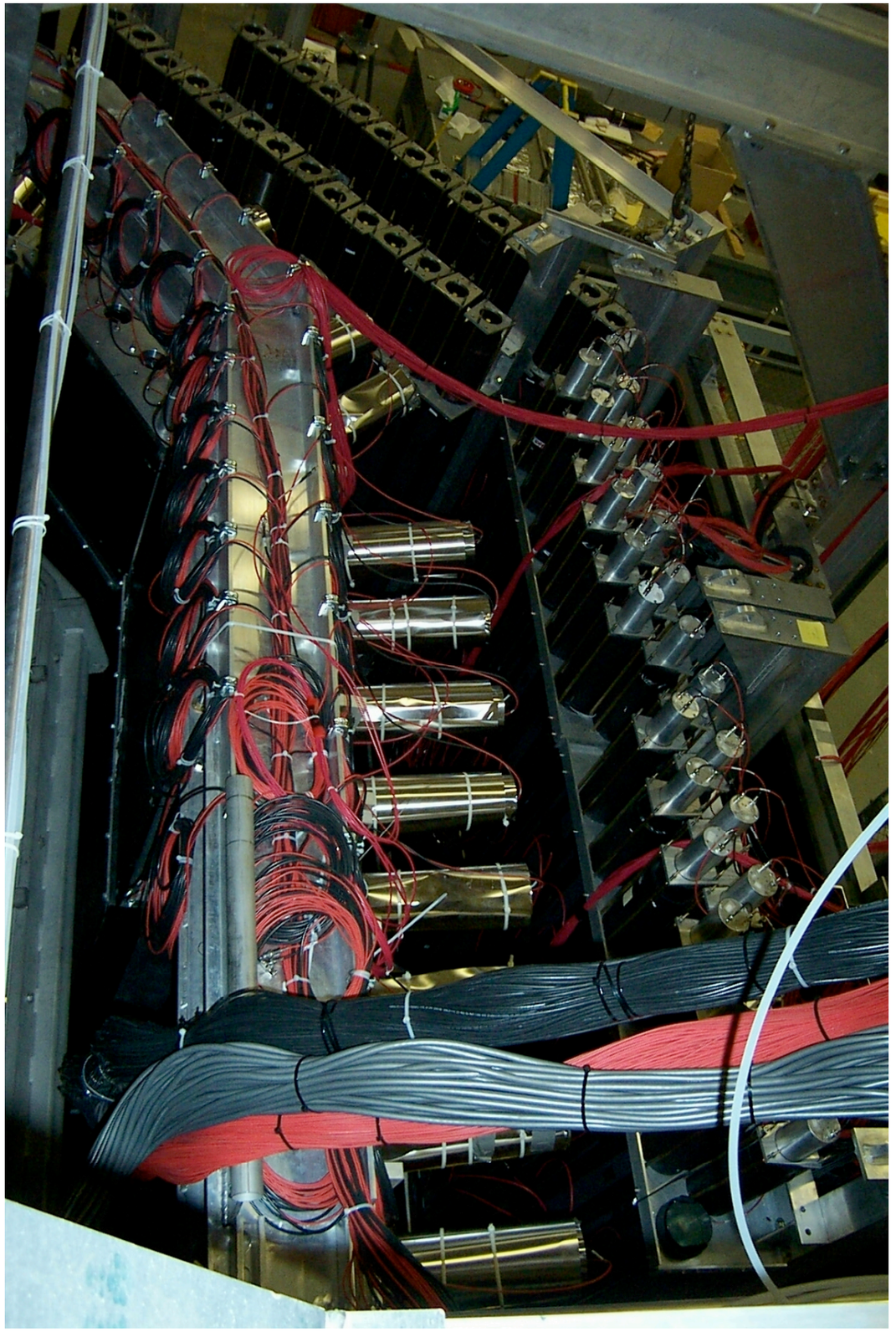
BLAST Detector Components

Neutron Detectors

MIT

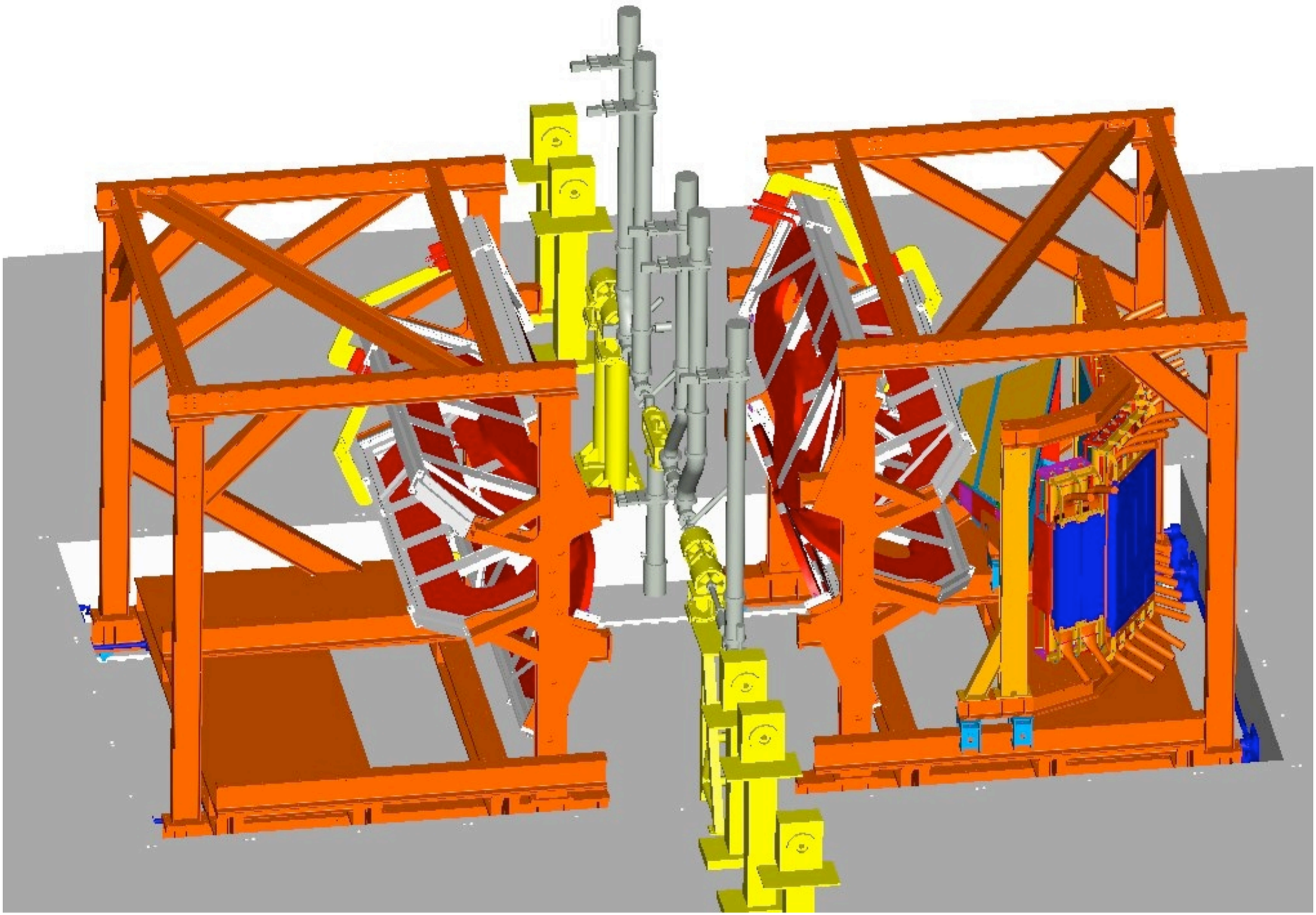
Ohio University



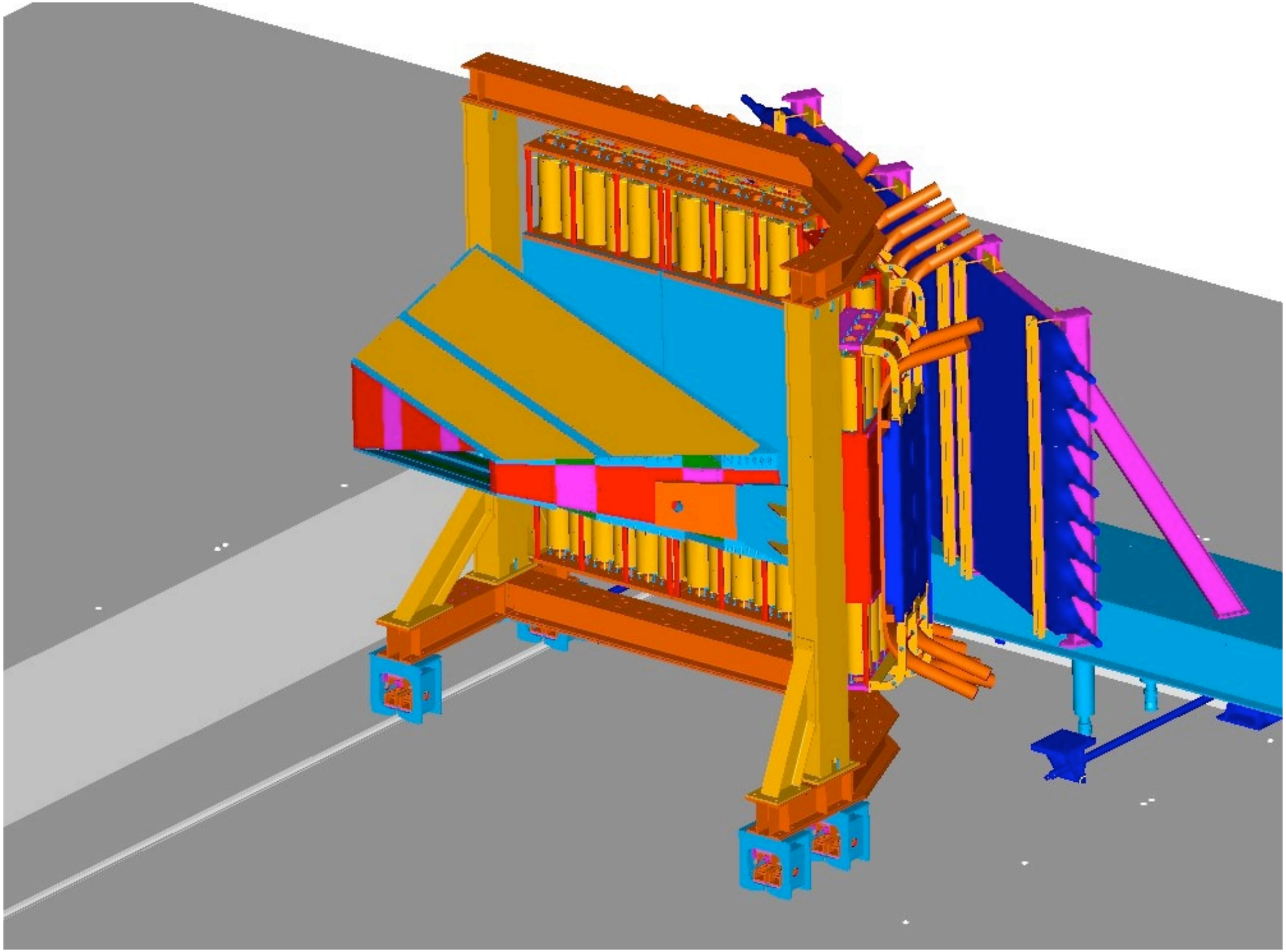


BLAST Collaboration

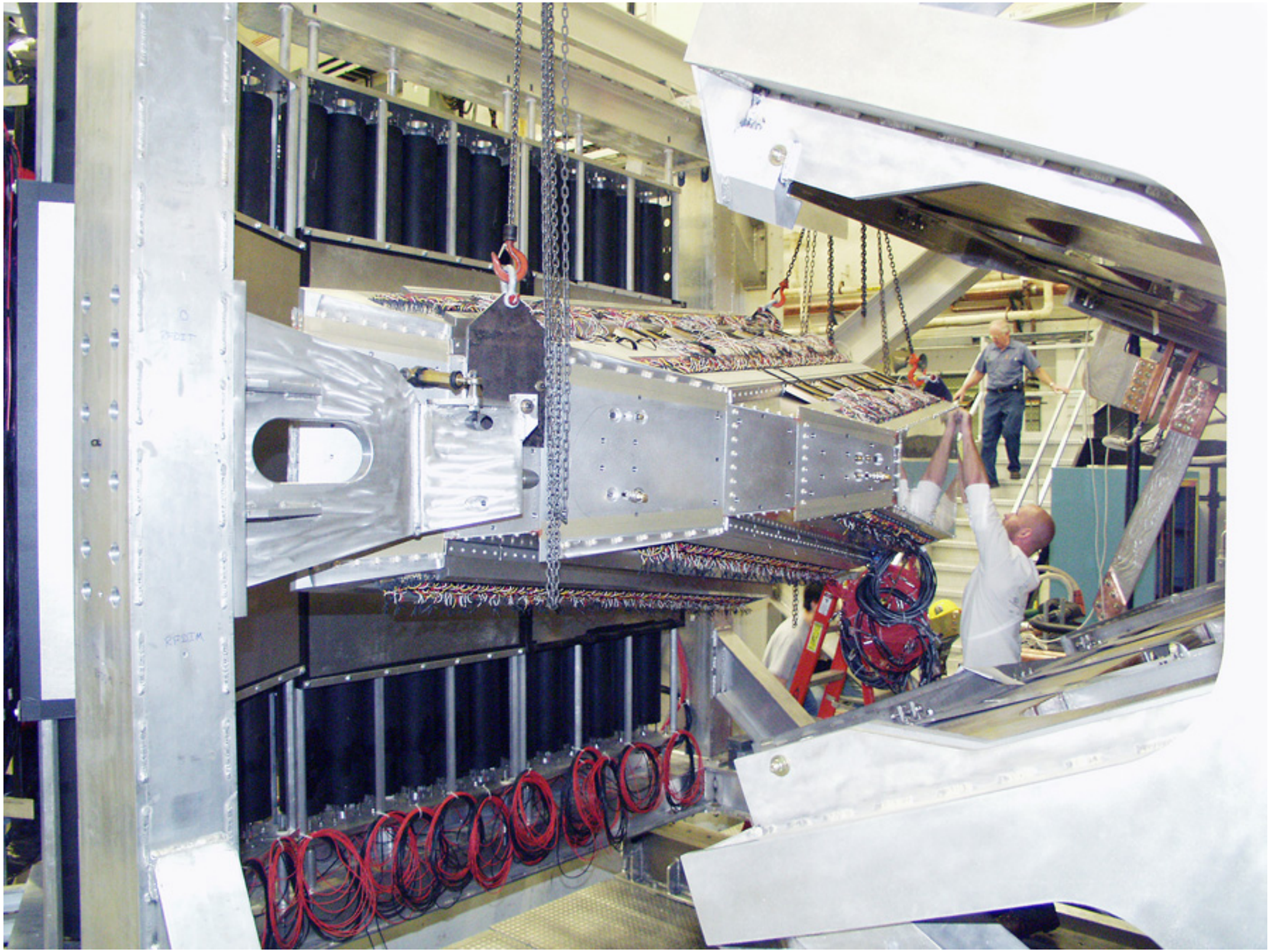
BLAST Detector Assembly



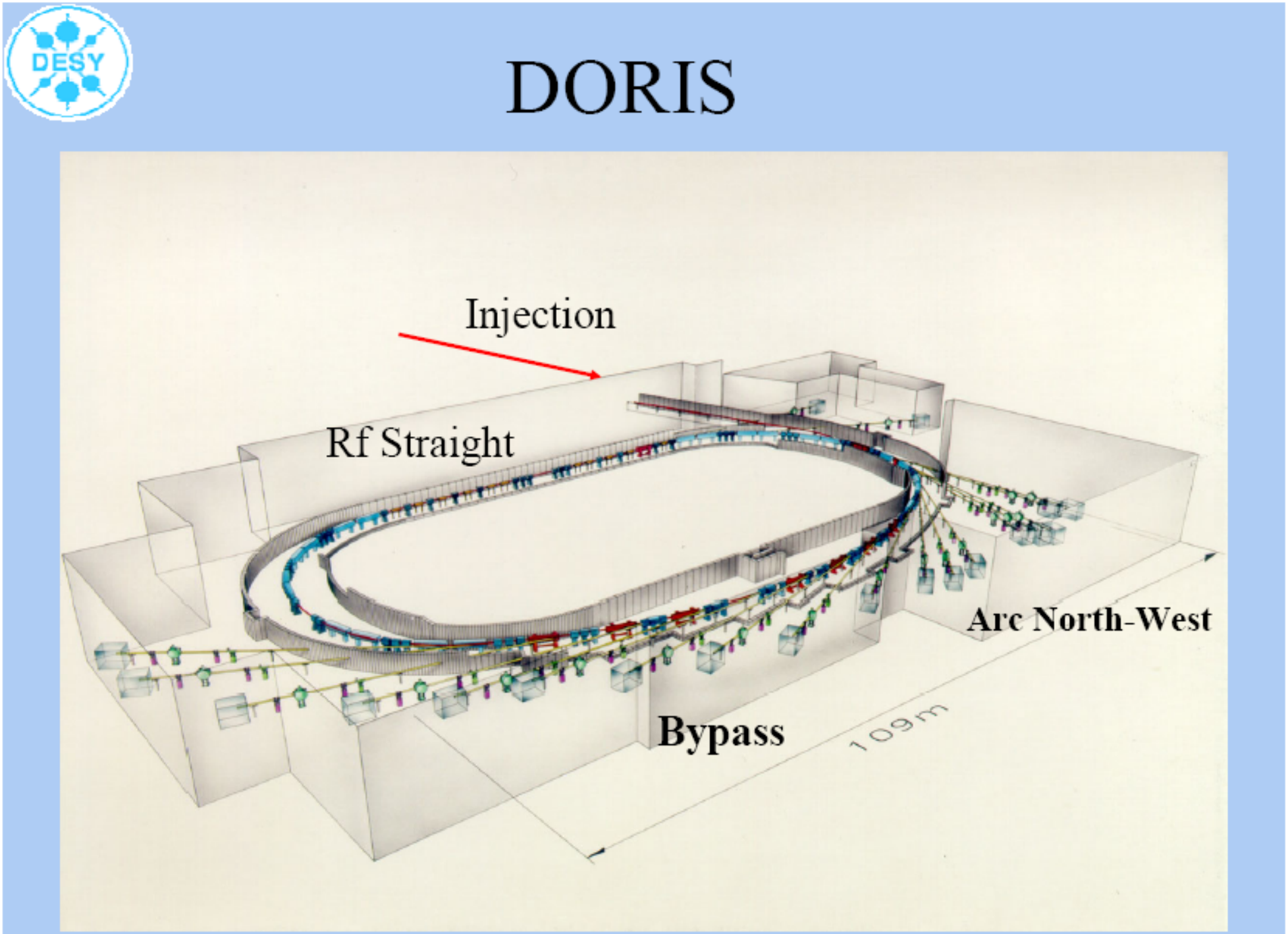
BLAST Sub-Detector Assembly



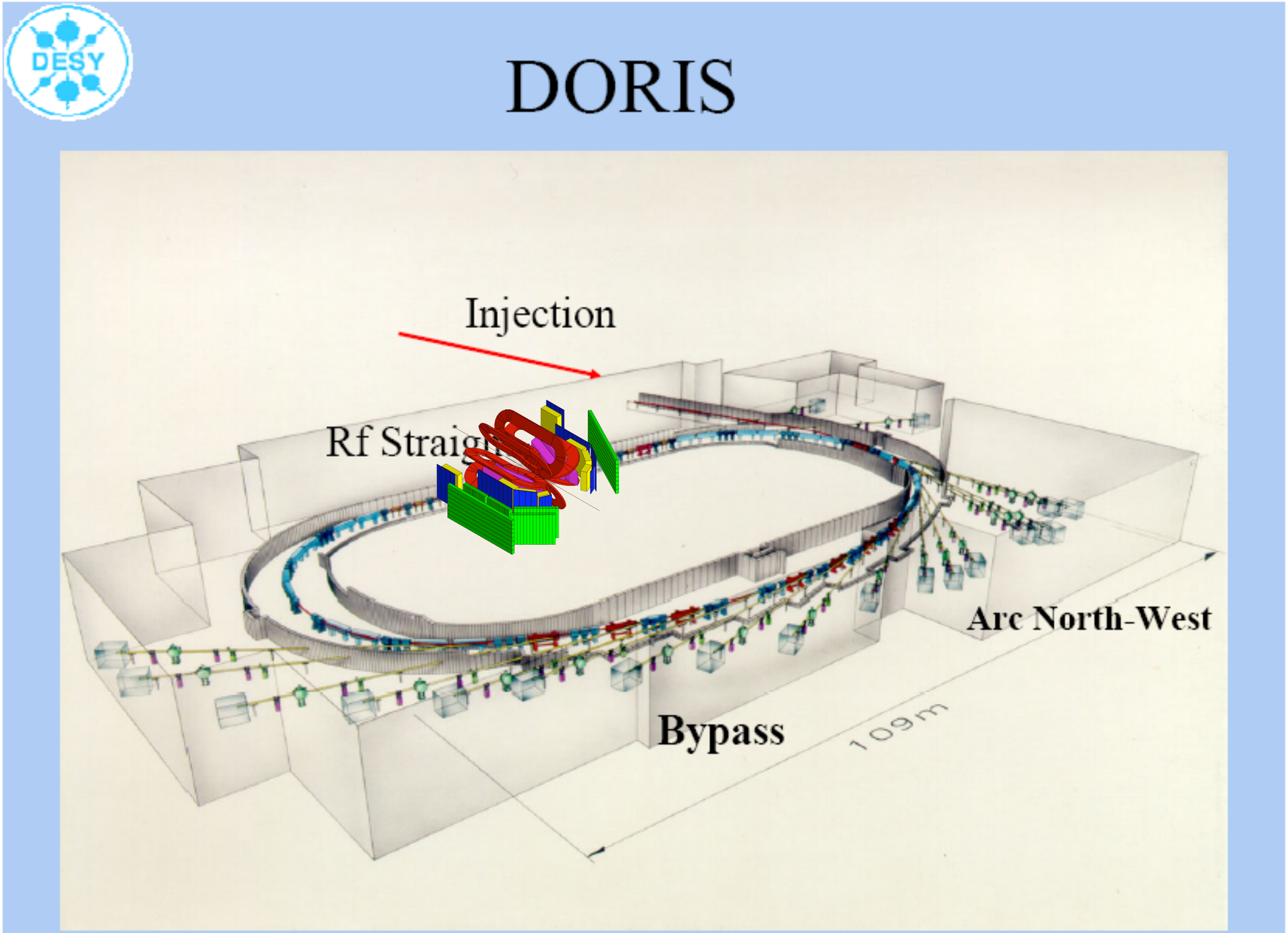
BLAST Wire Chambers



DORIS Electron/Positron Storage Ring



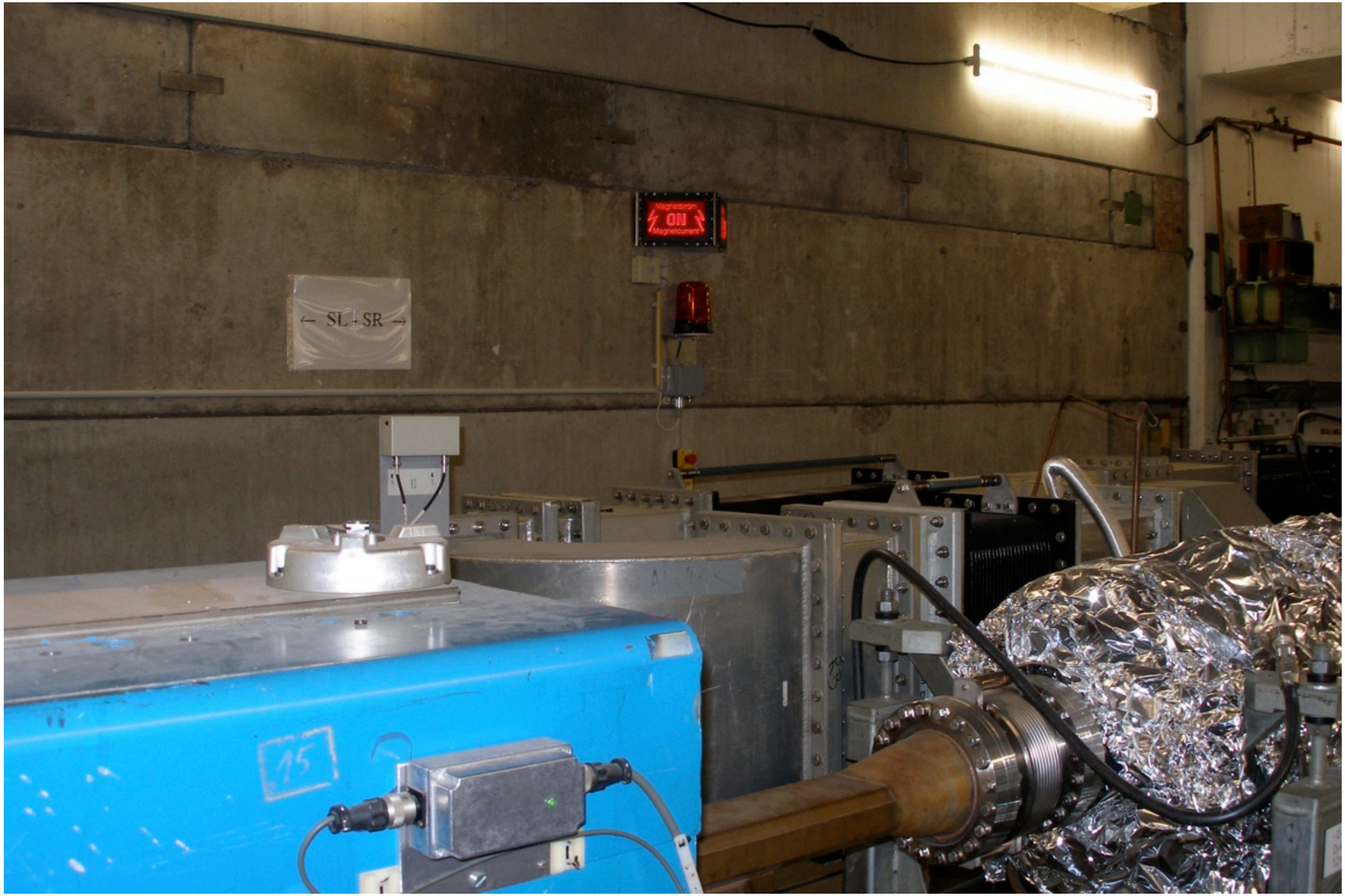
DORIS Electron/Positron Storage Ring



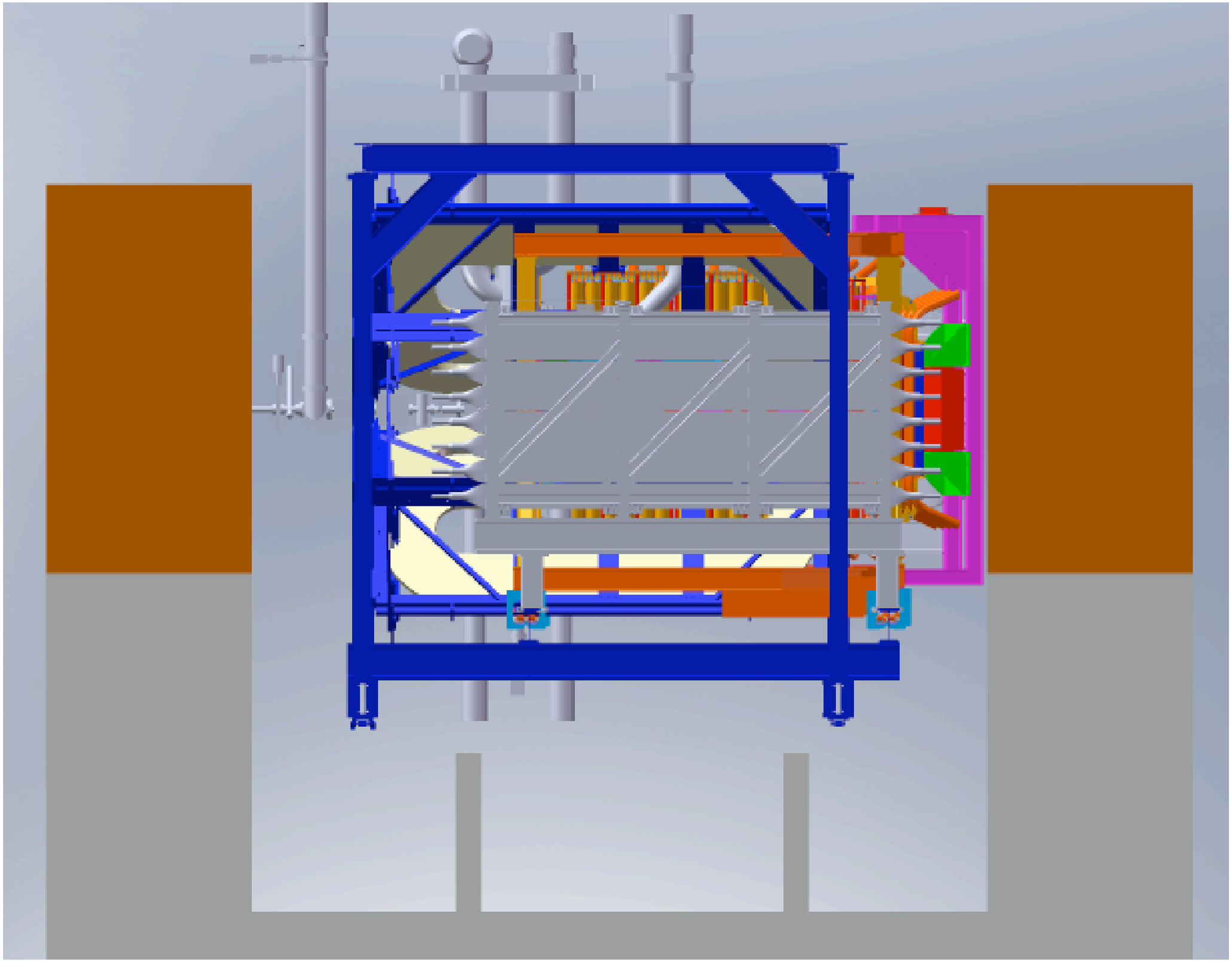
Inside DORIS Ring 2007

Former ARGUS Location

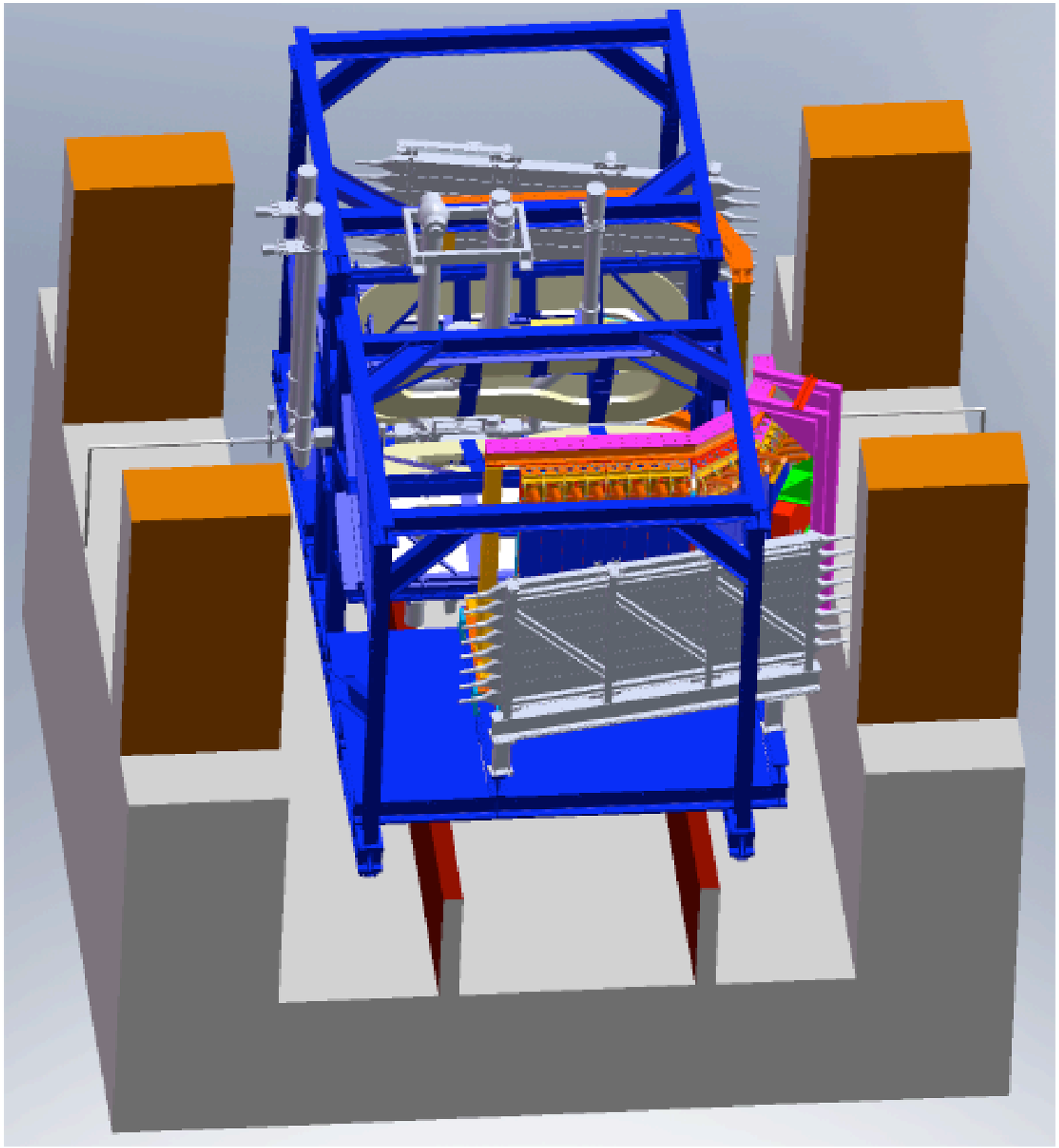
Former ARGUS Location



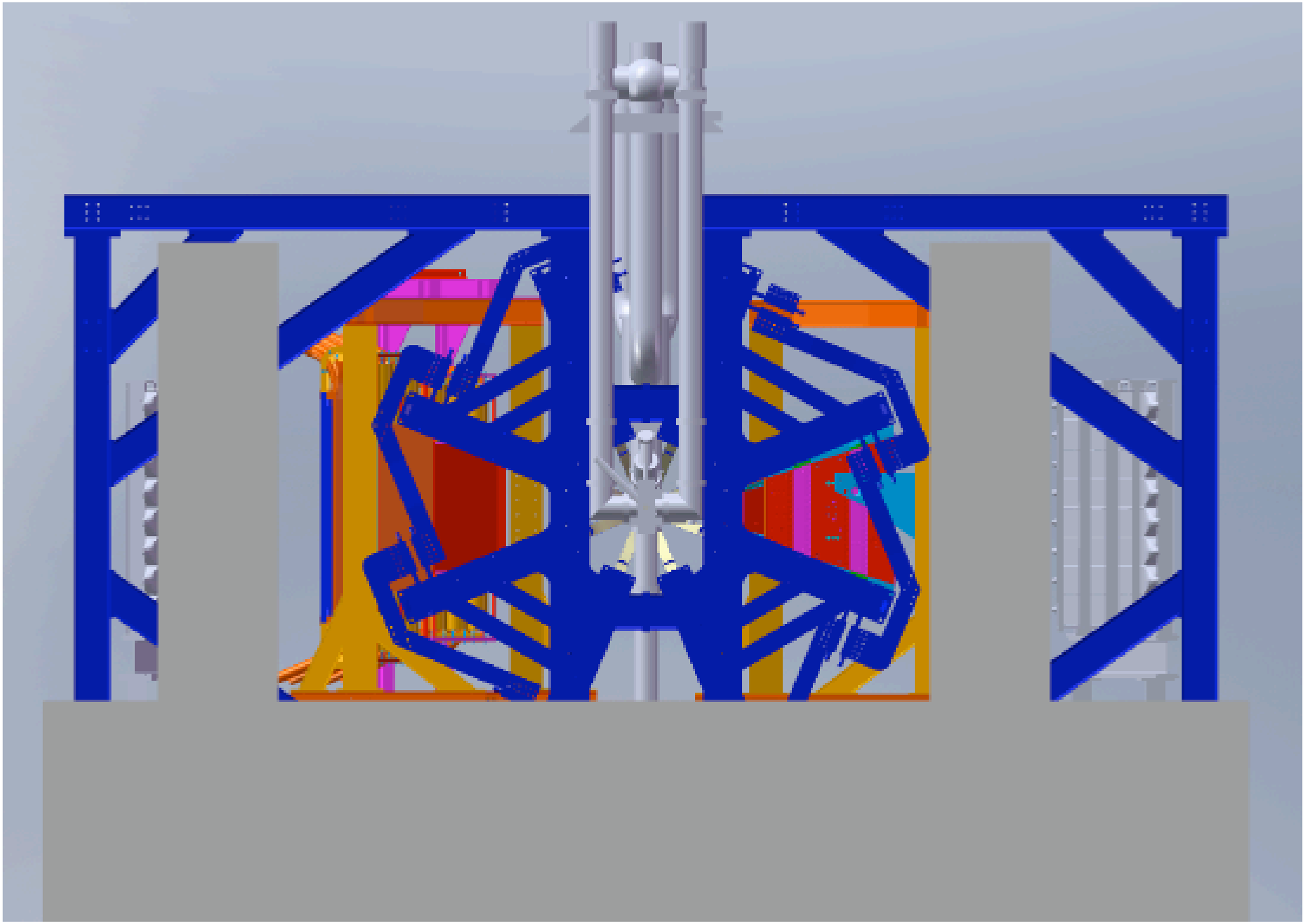
YZ View



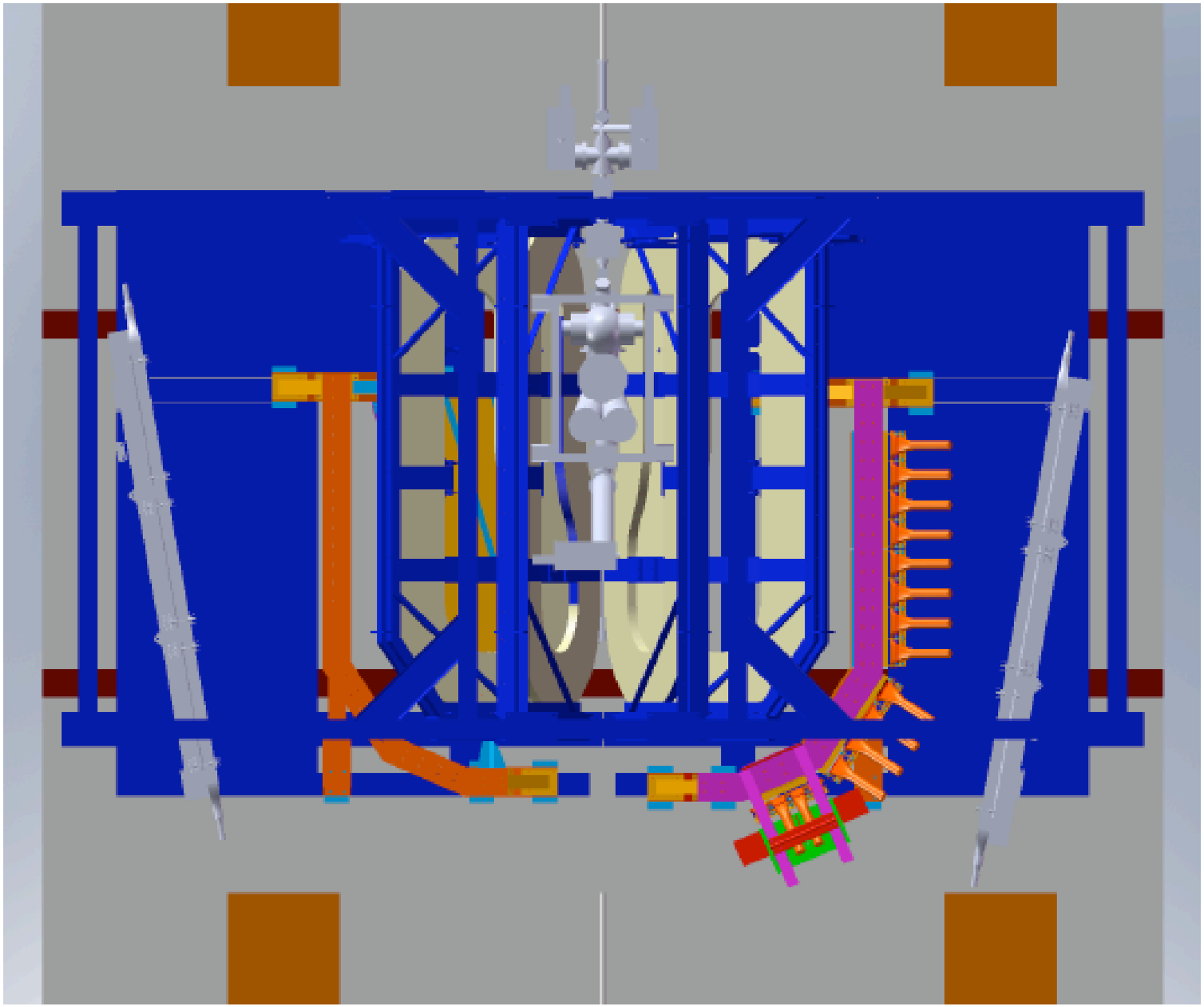
BLAST in ARGUS Location



XY View



XZ View



What We Could Bring / What We Need

BLAST Detector

- total weight ~ 40 t
- 5×10 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:CO_2
- Cerenkov, TOF, neutron(?)
  - 350 PMTs
  - 350 HV, 350 signal cables
- existing cables ~45 m
- laser flasher system
- 6 electronics racks
  - 2 FASTBUS, 2 NIM/CAMAC, 2 HV
  - ~2 tons AC cooling

BLAST Toroid Magnet

- power supply requires:
  - 2500 A, 480 V, 3 phase AC
- power supply delivers
  - 7000 A, 225 V DC
- power supply cooling
  - 30 gallons/minute
- magnet cooling
  - 200 gallons/minute
  - 30° C temp. rise

Turbo pumps

Unpolarised H/D source

Atomic Beam Source

Electronics and computers

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

Next Talk

Stop Here

Organisation

Name

Mailing List

Web Page

Future Meetings

Proposal

Name ?

History

- BLAST - Bates Large Acceptance Spectrometer Toroid
  - systematic study of spin dependent electromagnetic interaction
  - elastic form factors of nucleons and deuteron, deuteron structure, pion production, ...
- BLAST@Bonn
  - idea from Michael Kohl
- BLAST@DORIS
  - suggestion from Uwe Schneekloth
- Two photon experiment
  - idea from Richard Milner, seminars at DESY and Zeuthen
  - encouraged by R. Heuer
  - presentation and support from PRC

What to call it now?

- BLAST@DORIS
- Two Photon
- Olympus
- …..

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

Further Meetings

Steps to forming a collaboration?

Proposal to DESY PRC, Fall 2008

Next meetings ?

- MIT ?
- DESY ?
- Gordon Conference - Photonuclear Reactions 10-15 August, 2008

Proposal

Formal Proposal to DESY PRC in Fall, 2008

- Physics argument
  - two photon contribution
  - future physics measurements
  - radiative corrections
  - Monte Carlo simulations
- BLAST detector
  - detector upgrades
- DORIS accelerator
- Commissioning, calibrating, and operation
- Costs
- Schedule
- Manpower