

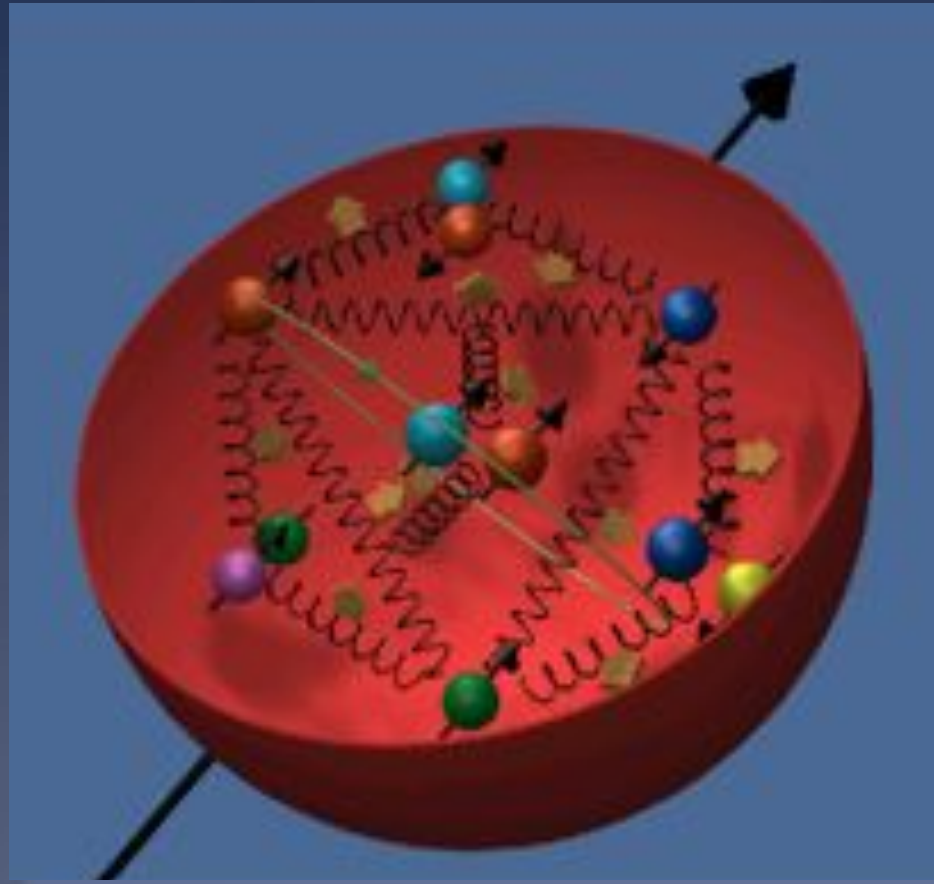
Nuclear Physics at VU

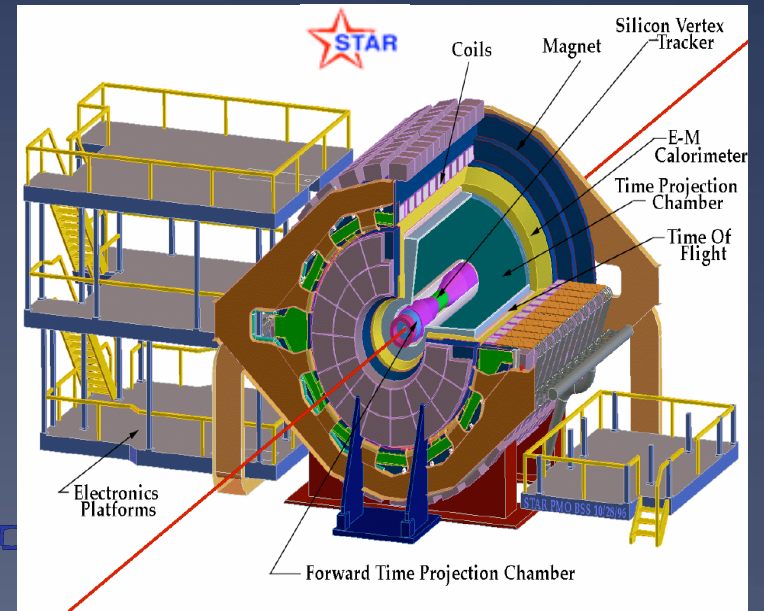
Summer Opportunities



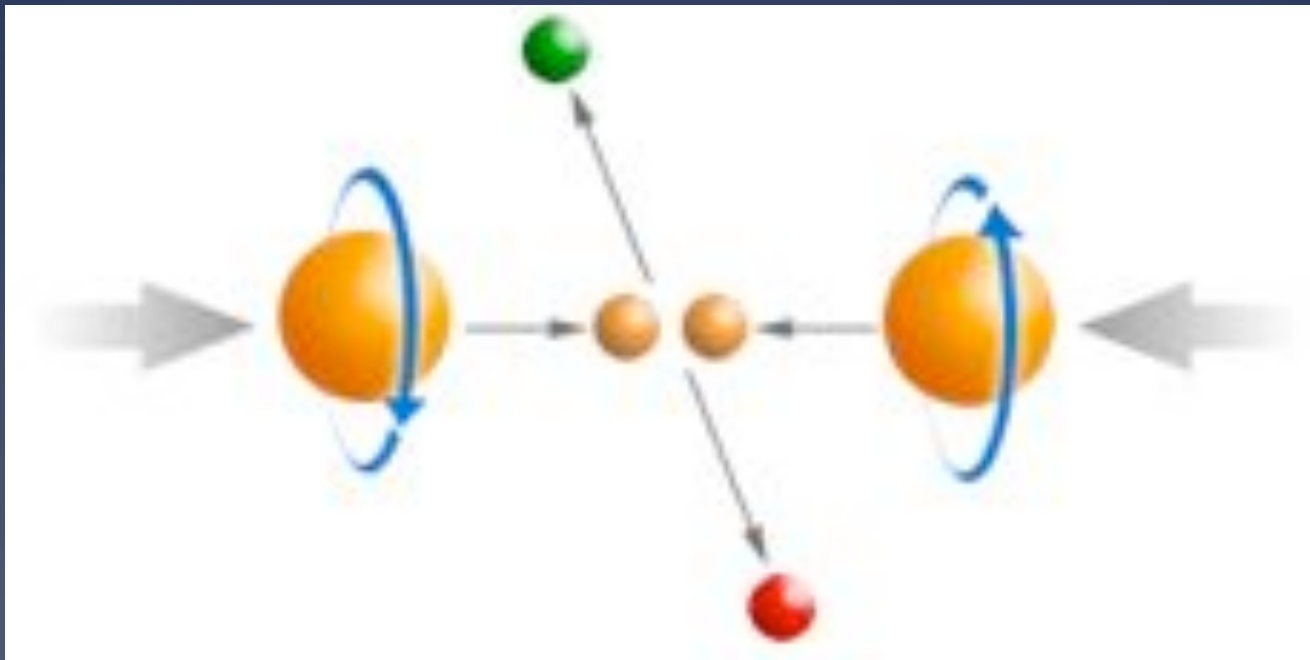
Professors
Koetke,
Manweiler,
Stanislaus,
Grosnick,
Paul Nord
Colleagues at
ANL, BNL, MIT ...
and Students

What is the source of the proton's
intrinsic angular momentum,
or SPIN?

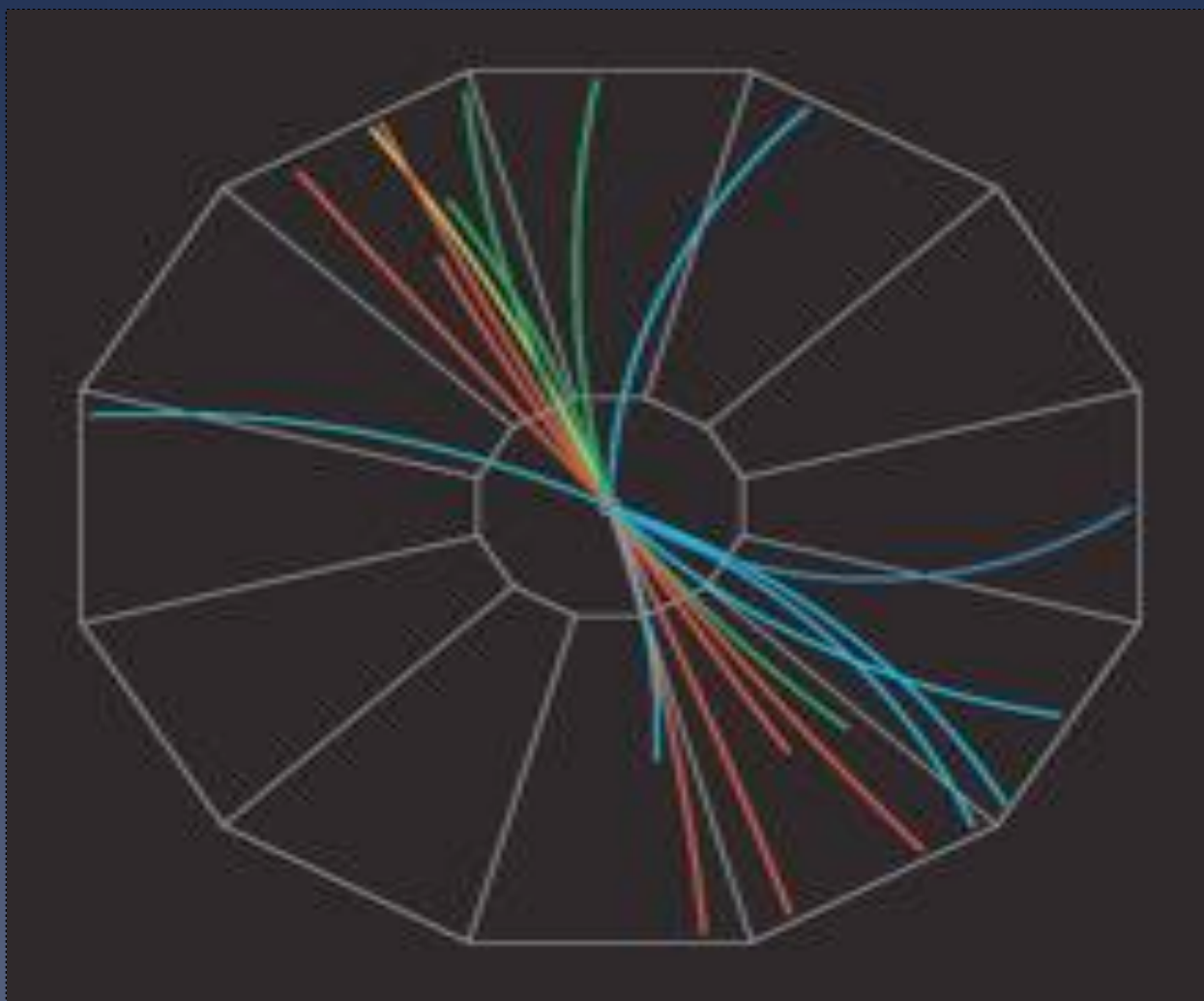








Proton – Proton Di-Jet Event





Indiana Dunes?



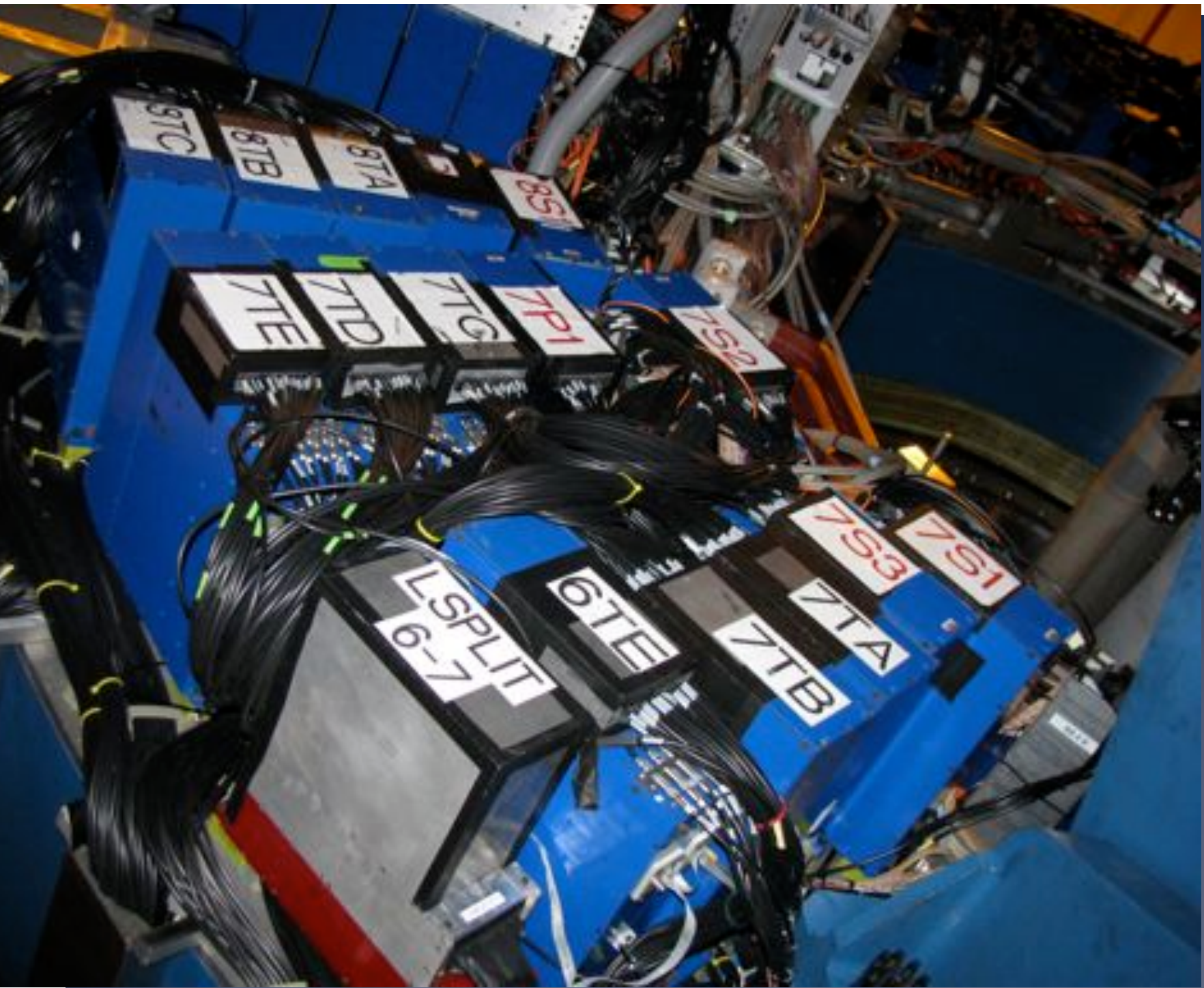


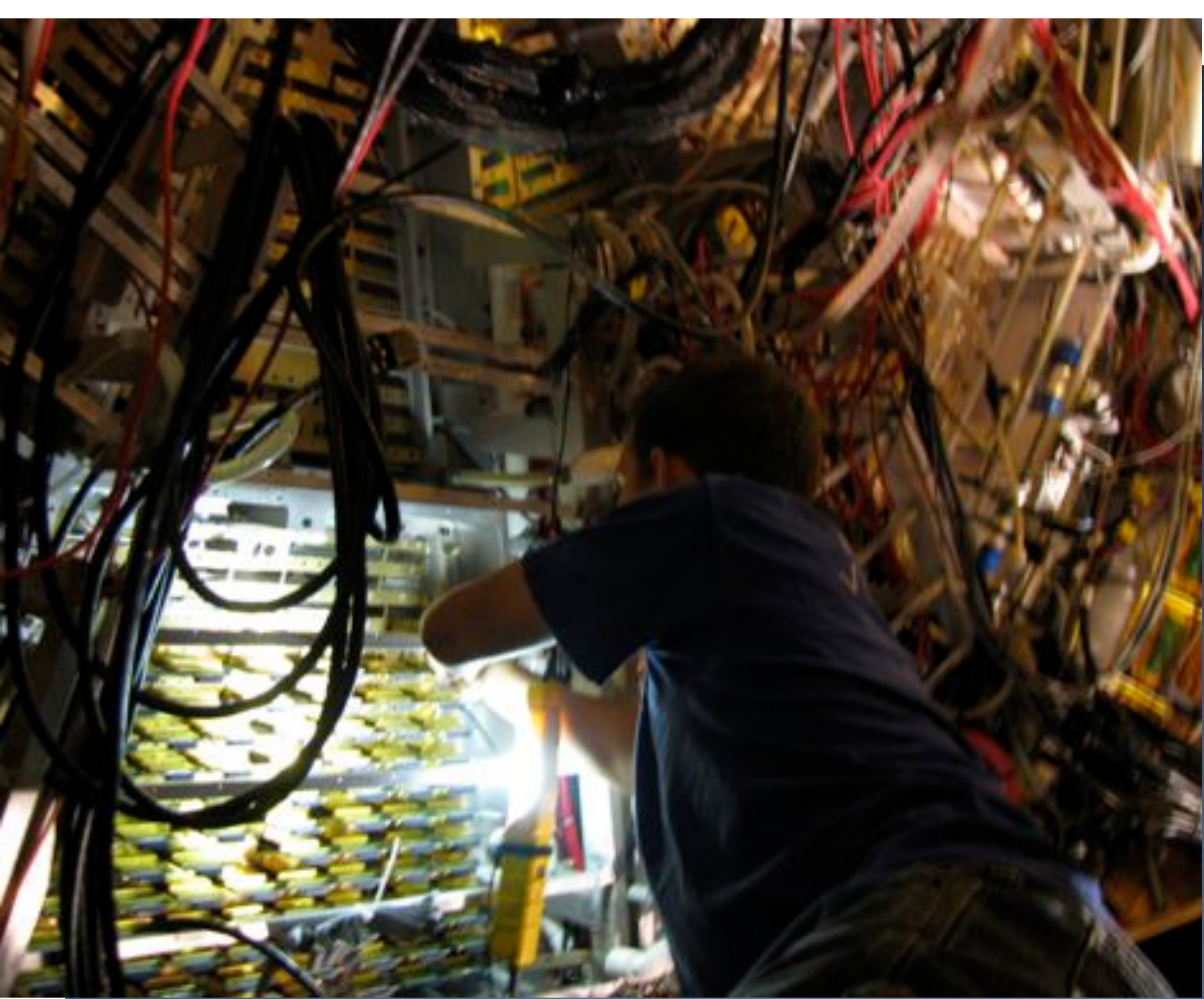


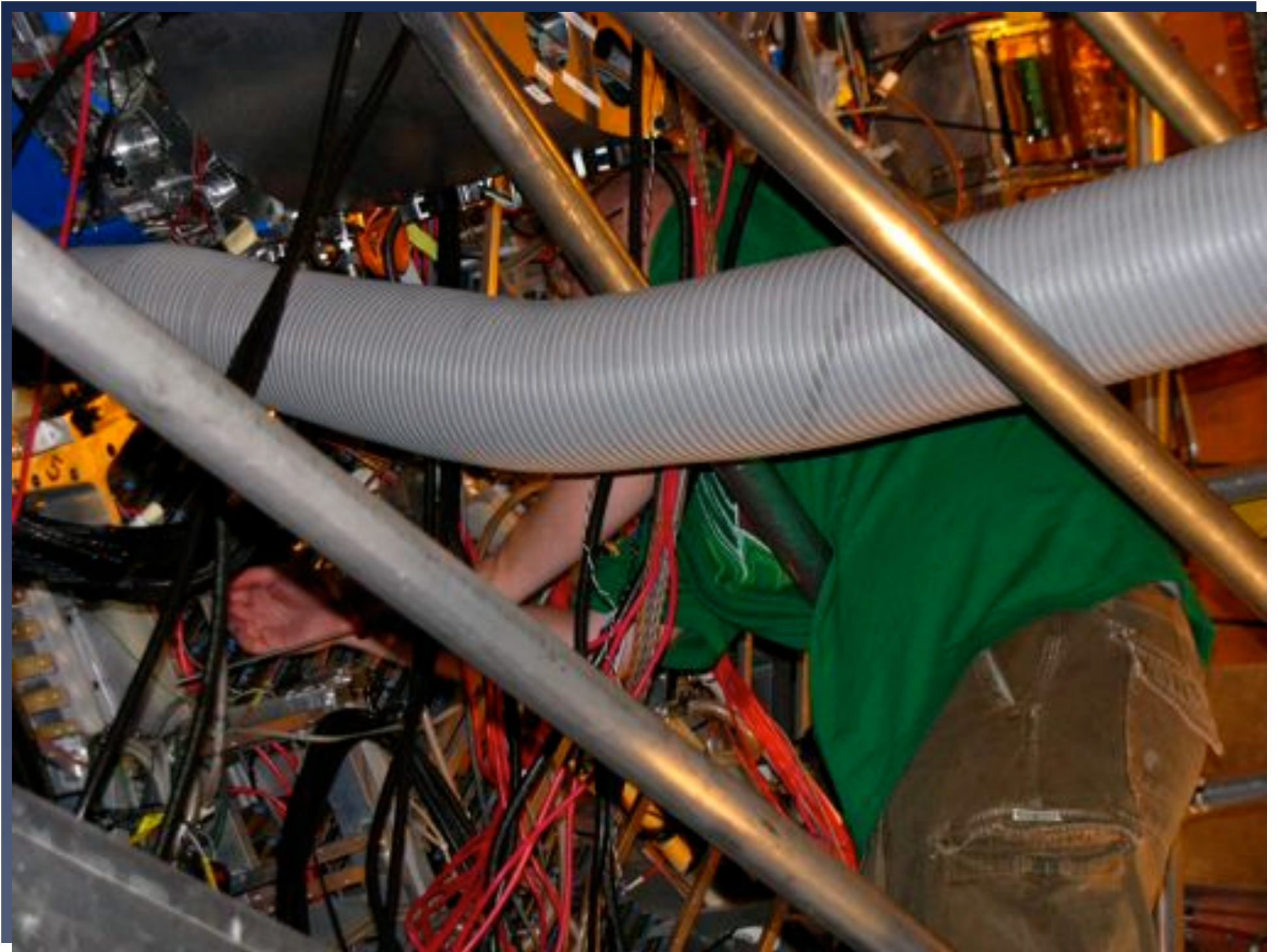




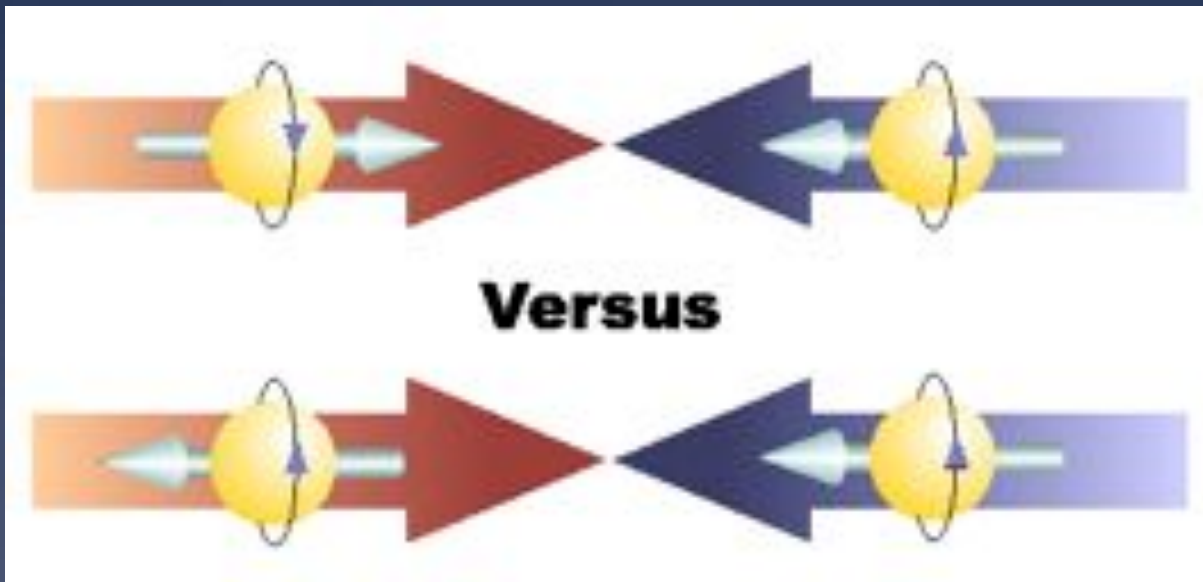




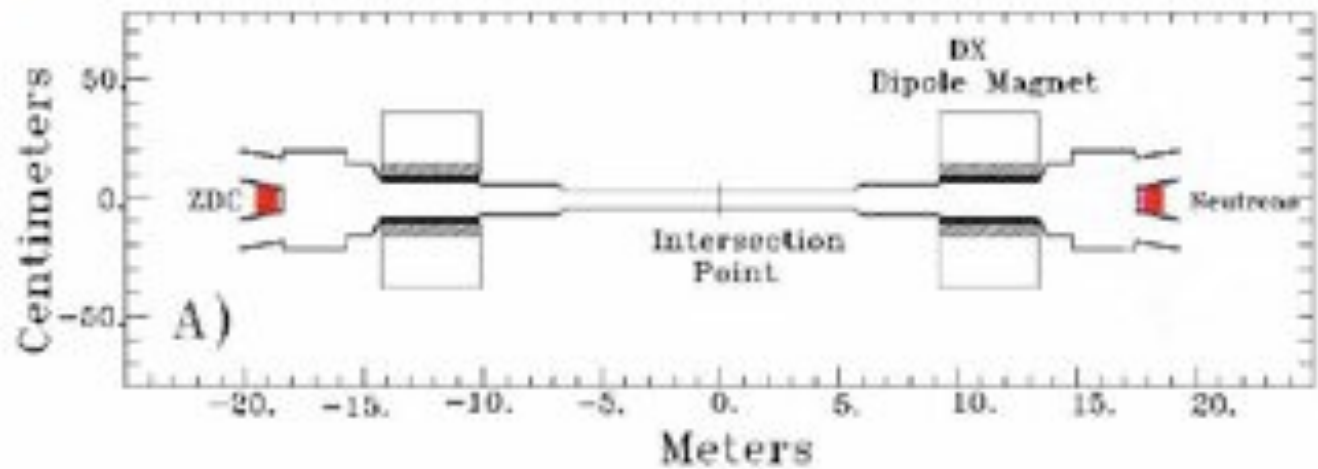
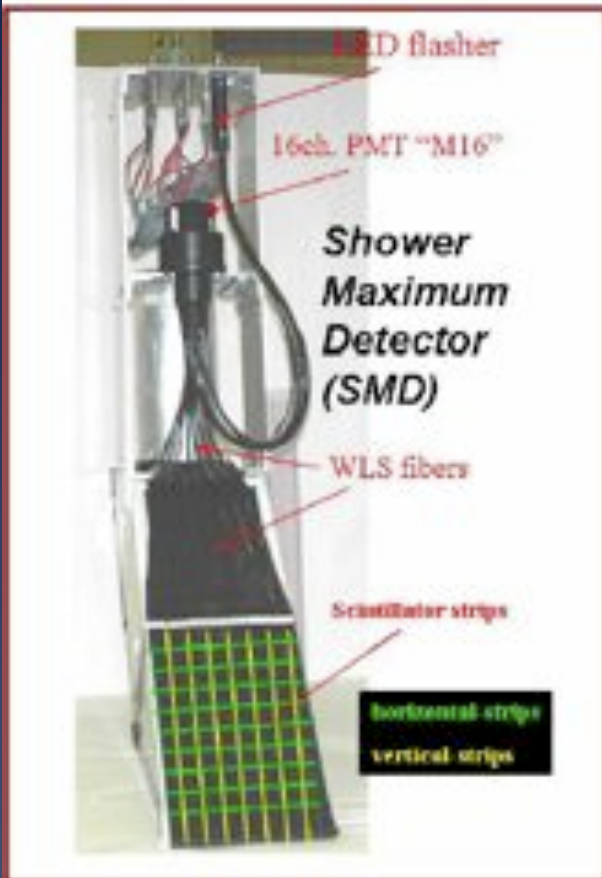




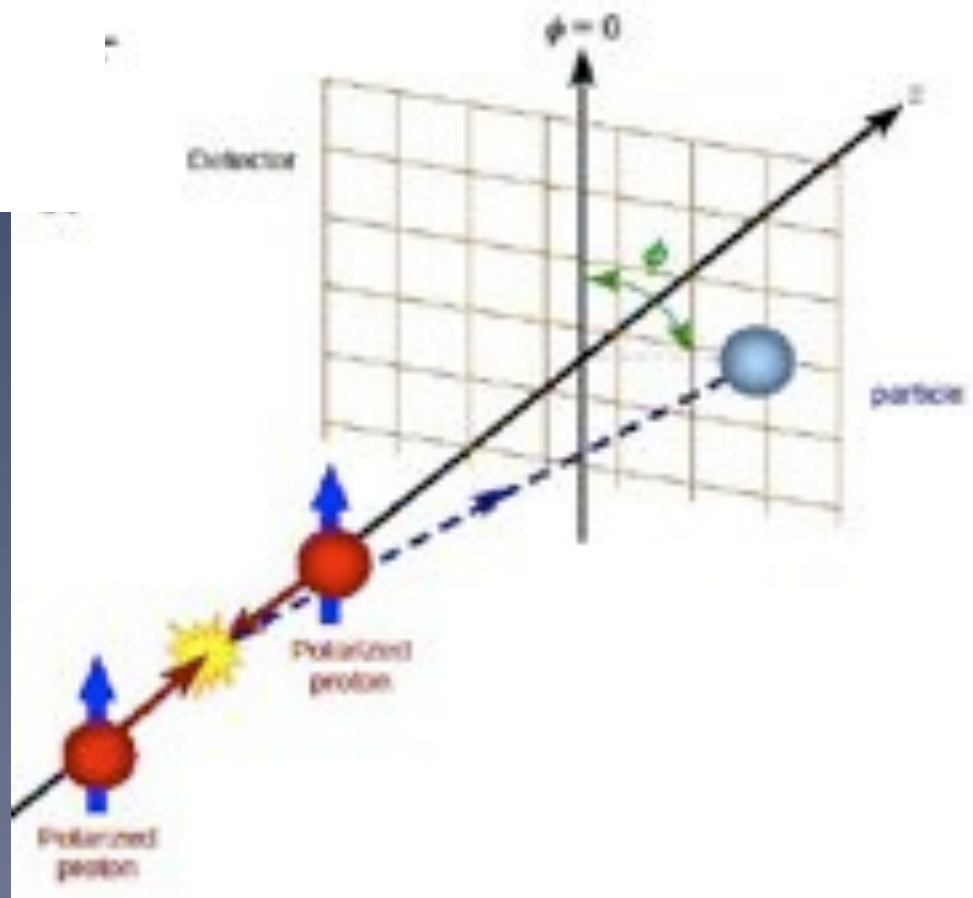
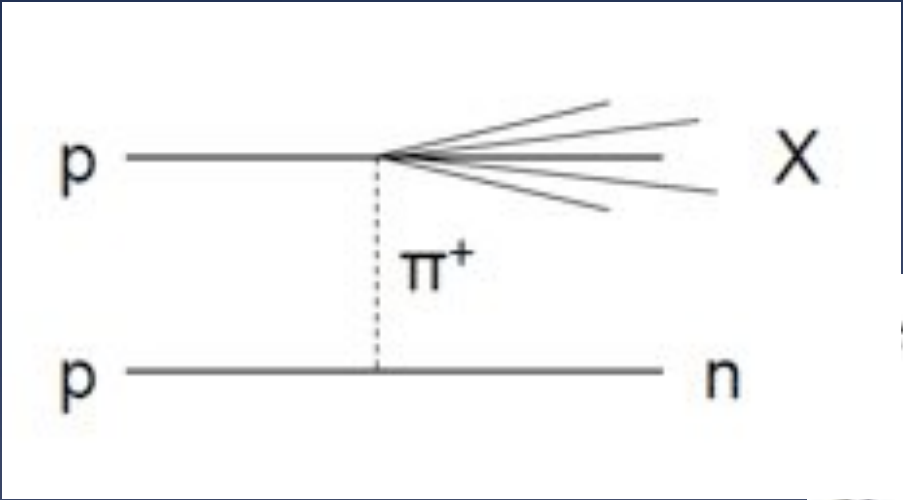




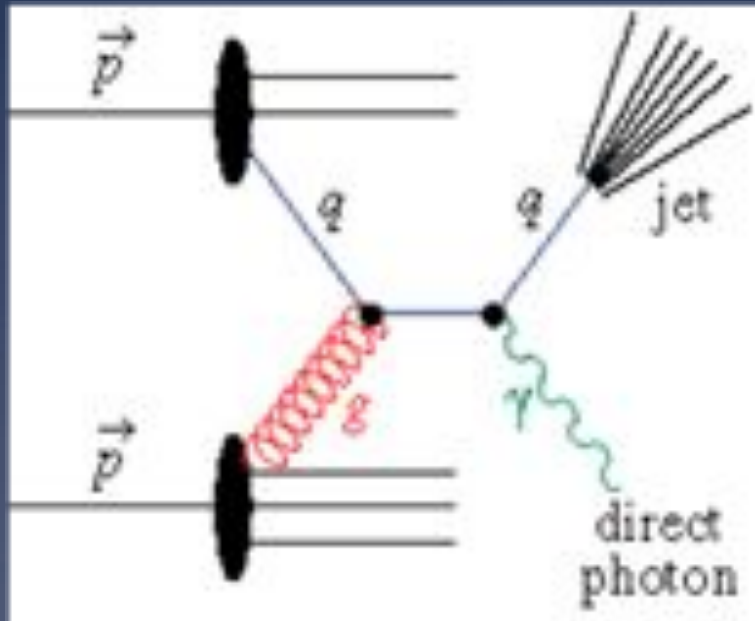
The Zero Degree Calorimeter Measures Polarization of the Beams



The Reaction detected by the ZDC



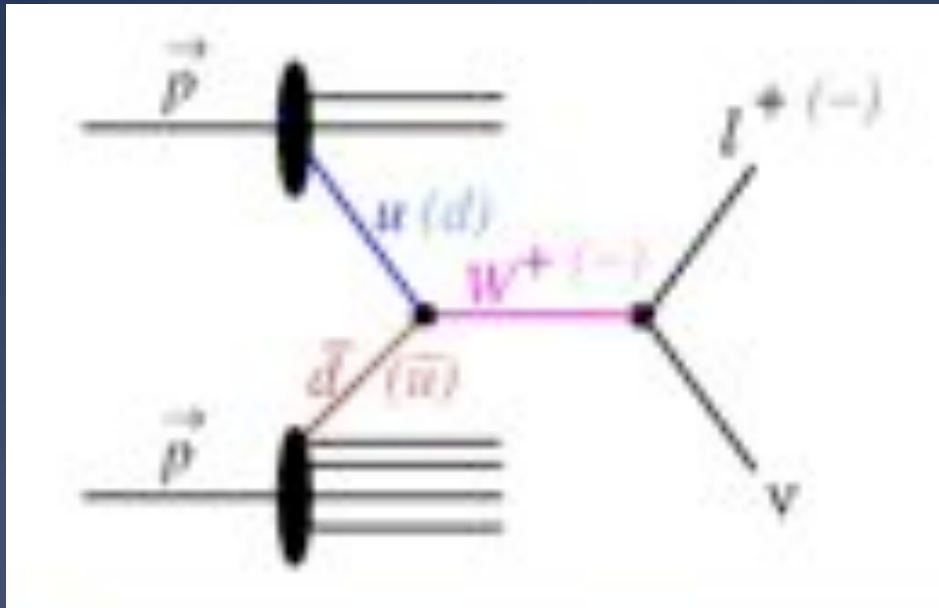
How to Measure the Gluon's Contribution to the Proton Spin



Quark-Gluon Compton Scattering
-- leading-order contribution to
Prompt Photon Production

What's in the SEA?

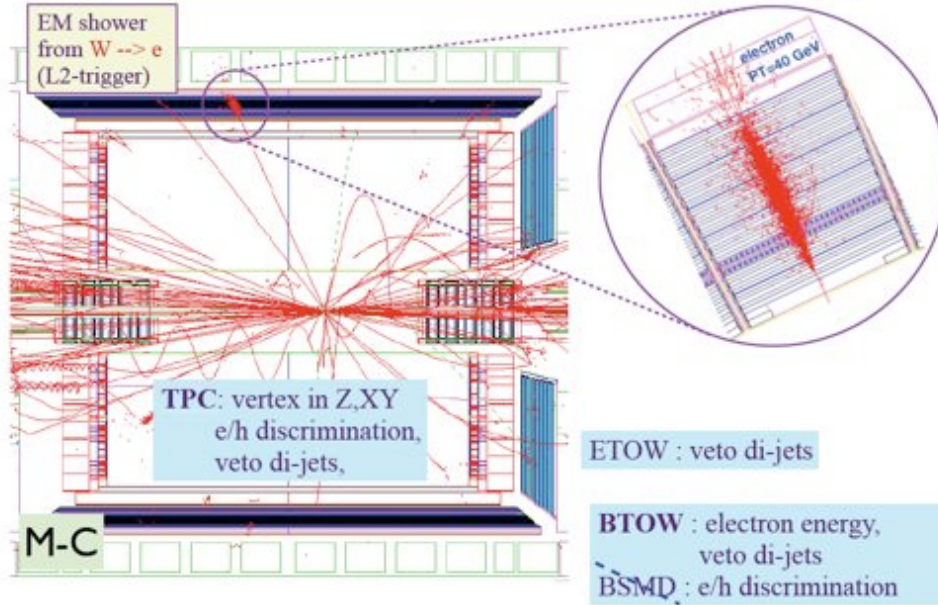
Anti-Up and Anti-Down Quarks



$$u + \bar{d} \rightarrow W^+ \rightarrow e^+ + \nu$$

$$\bar{u} + d \rightarrow W^- \rightarrow e^- + \bar{\nu}$$

Measurement of W_s at STAR



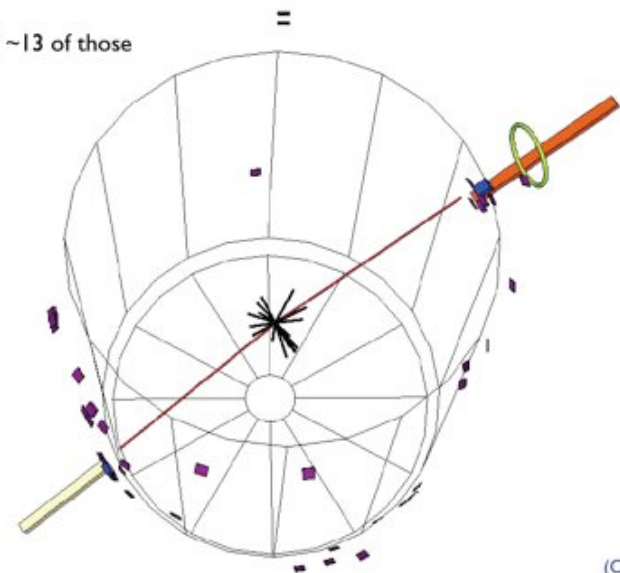
Detector essential for this W analysis

W (Z) measurement, pp500, Run 9

Jan Balewski, MIT

Our MIT Colleagues' Recent Work

We found ~13 of those



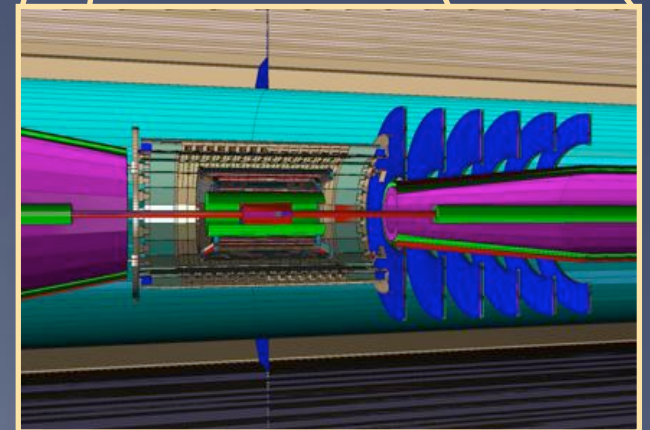
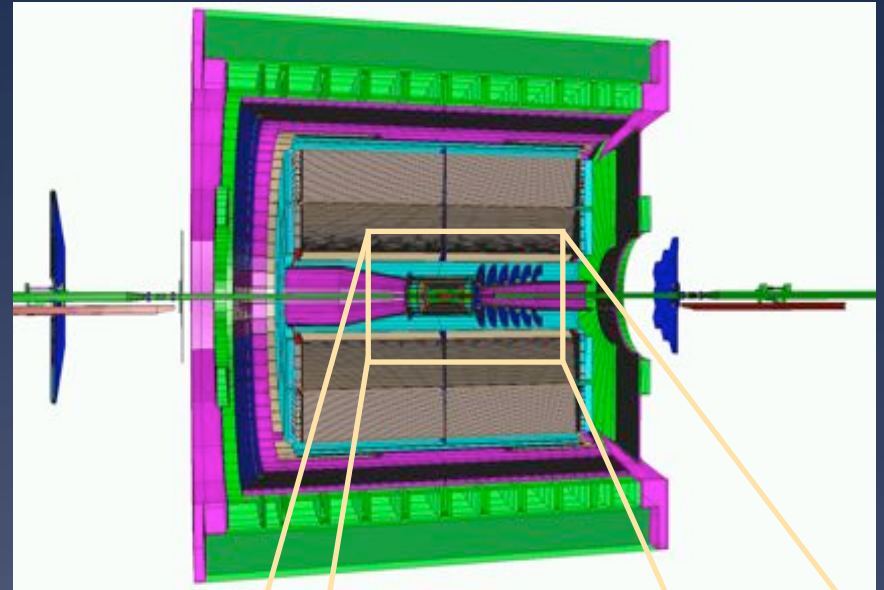
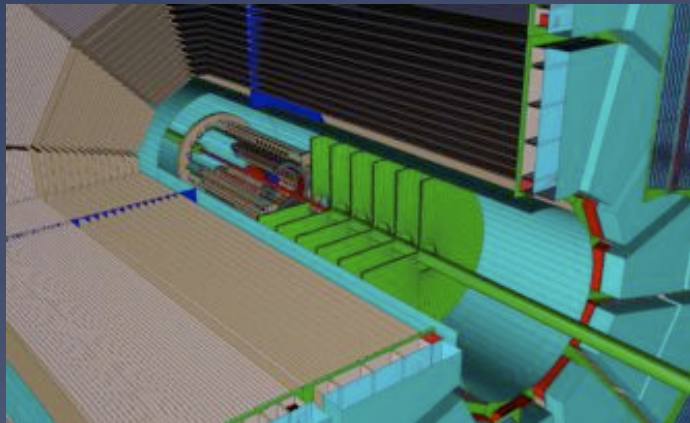
(C) Matt Walker, MIT

W (Z) measurement, pp500, Run 9

Jan Balewski, MIT 13

The FGT

Forward Gaseous electron multiplier Detector



le-GEM: GEM foils at MIT



The Results? ...

The image shows a man with glasses and a light blue button-down shirt standing in front of a large scientific poster. The poster is titled "Invariant Mass Reconstruction in the STAR Endcap Calorimeter" and lists authors: Benjamin Barber, Dr. Jason Webb, Dr. Robert Marwiler. The poster is divided into several sections: "Abstract", "THE END CAPS" (with diagrams of the calorimeter), "Clustering" (with histograms and flowcharts), "Percolation Clustering", and "Results" (with plots of invariant mass distributions). The man is wearing a name tag that says "Barber" and "University of Maryland".

Invariant Mass Reconstruction in the STAR Endcap Calorimeter

Benjamin Barber, Dr. Jason Webb, Dr. Robert Marwiler

Abstract

The STAR Endcap Calorimeter (ECAL) is a large, segmented calorimeter located in the STAR experiment at the Relativistic Heavy Ion Collider (RHIC). It is designed to measure the energy and momentum of particles produced in heavy-ion collisions. The ECAL is composed of several calorimeter cells, each of which is made of a stack of lead crystals. The energy of a particle is measured by the amount of light produced in the crystals. The ECAL is used to study the production of particles, such as photons and hadrons, and to measure the energy flow in the collision system.

THE END CAPS

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Clustering

The ECAL data is processed using a clustering algorithm to identify individual particles. The clustering process involves identifying clusters of cells that are close to each other in the calorimeter. The energy of each cluster is then calculated by summing the energy of the cells in the cluster. The clustering process is performed for each event, and the results are used to reconstruct the invariant mass of the particles.

Percolation Clustering

The percolation clustering algorithm is used to identify clusters of cells that are close to each other in the calorimeter. The percolation clustering process involves identifying clusters of cells that are connected to each other by a path of cells. The energy of each cluster is then calculated by summing the energy of the cells in the cluster. The percolation clustering process is performed for each event, and the results are used to reconstruct the invariant mass of the particles.

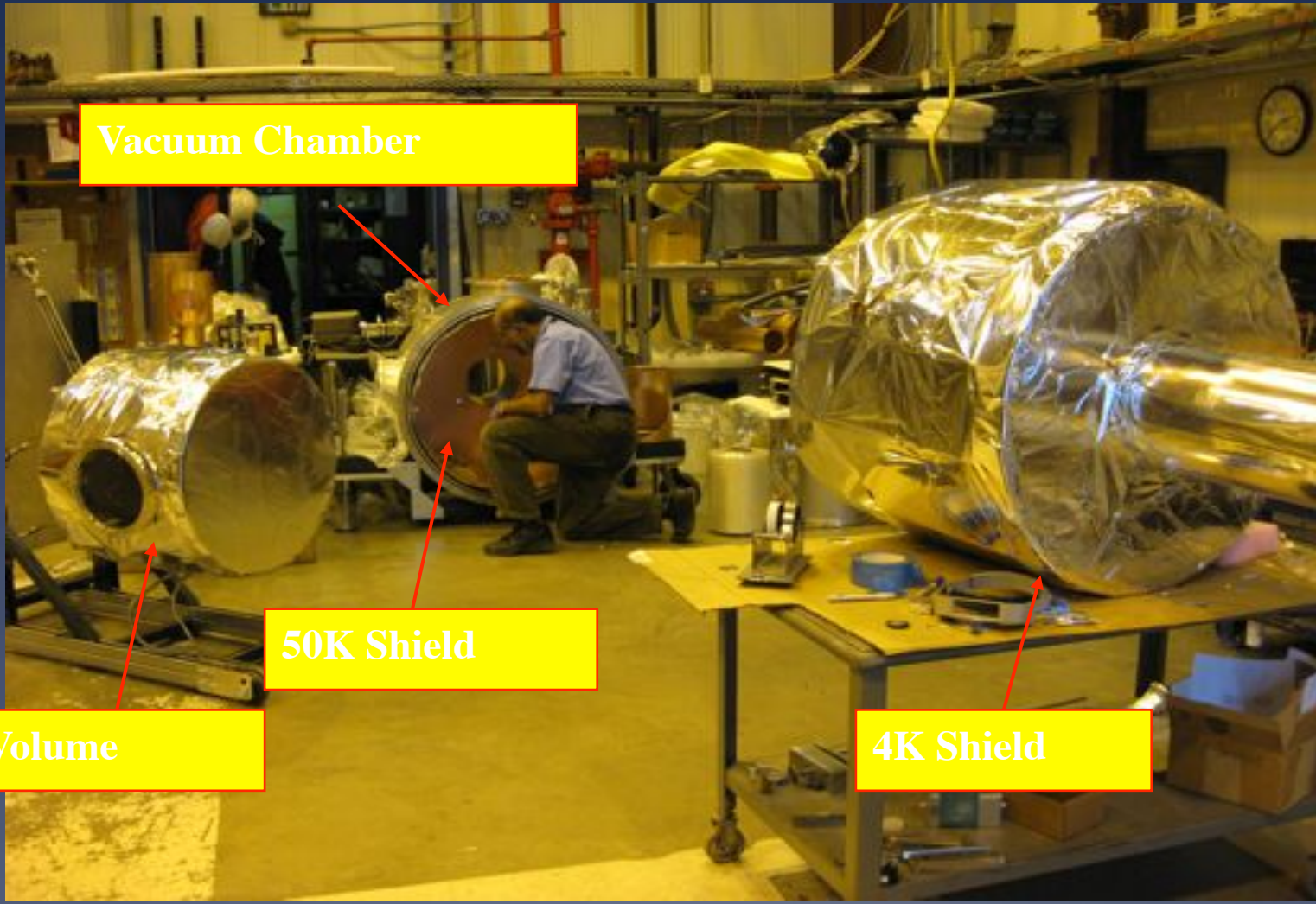
Results

The invariant mass distributions for the ECAL are shown in the figure. The invariant mass is calculated from the energy and momentum of the particles. The invariant mass distributions are shown for different collision systems and for different particle species. The invariant mass distributions are used to study the production of particles and to measure the energy flow in the collision system.



Thank You - The End



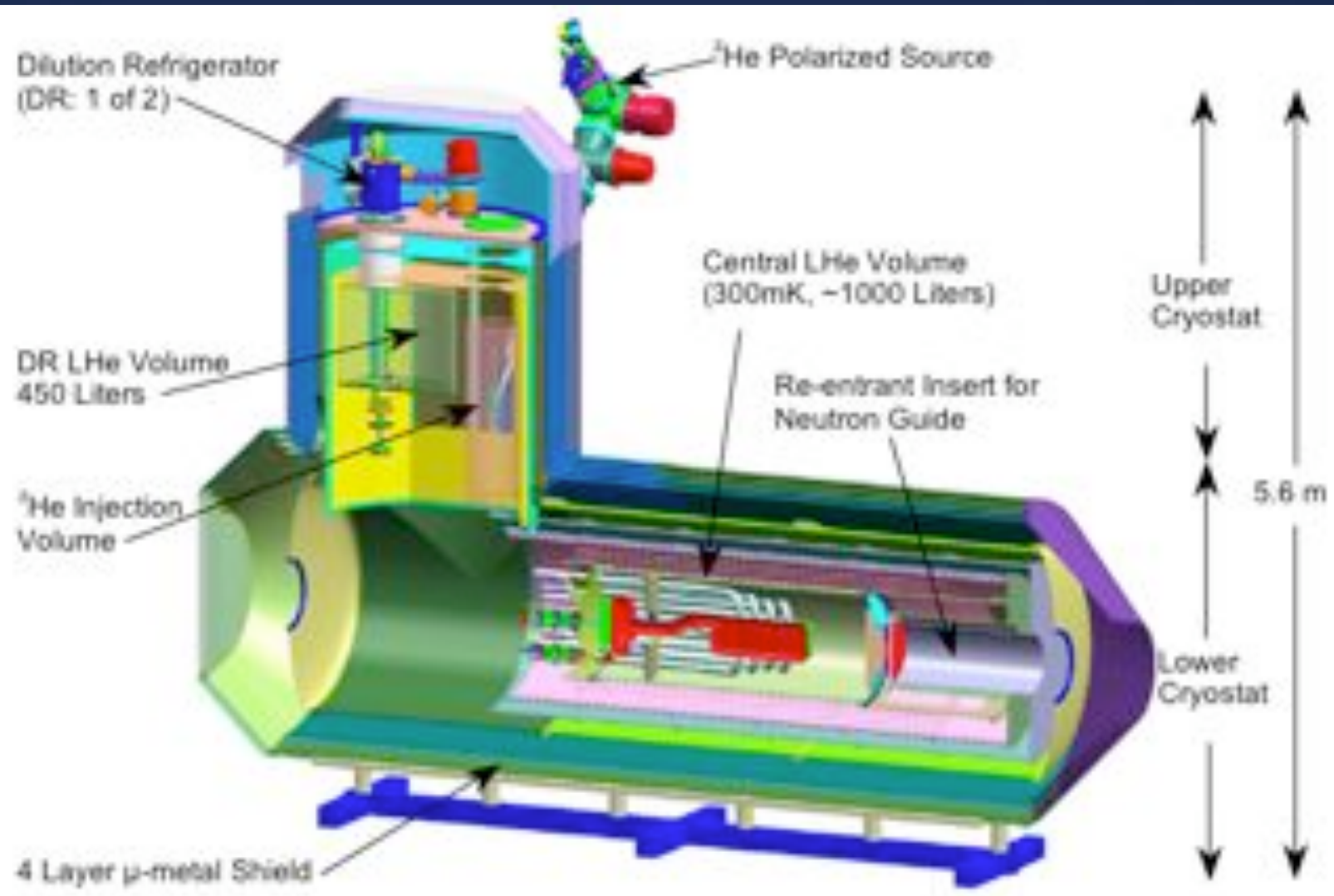


Vacuum Chamber

50K Shield

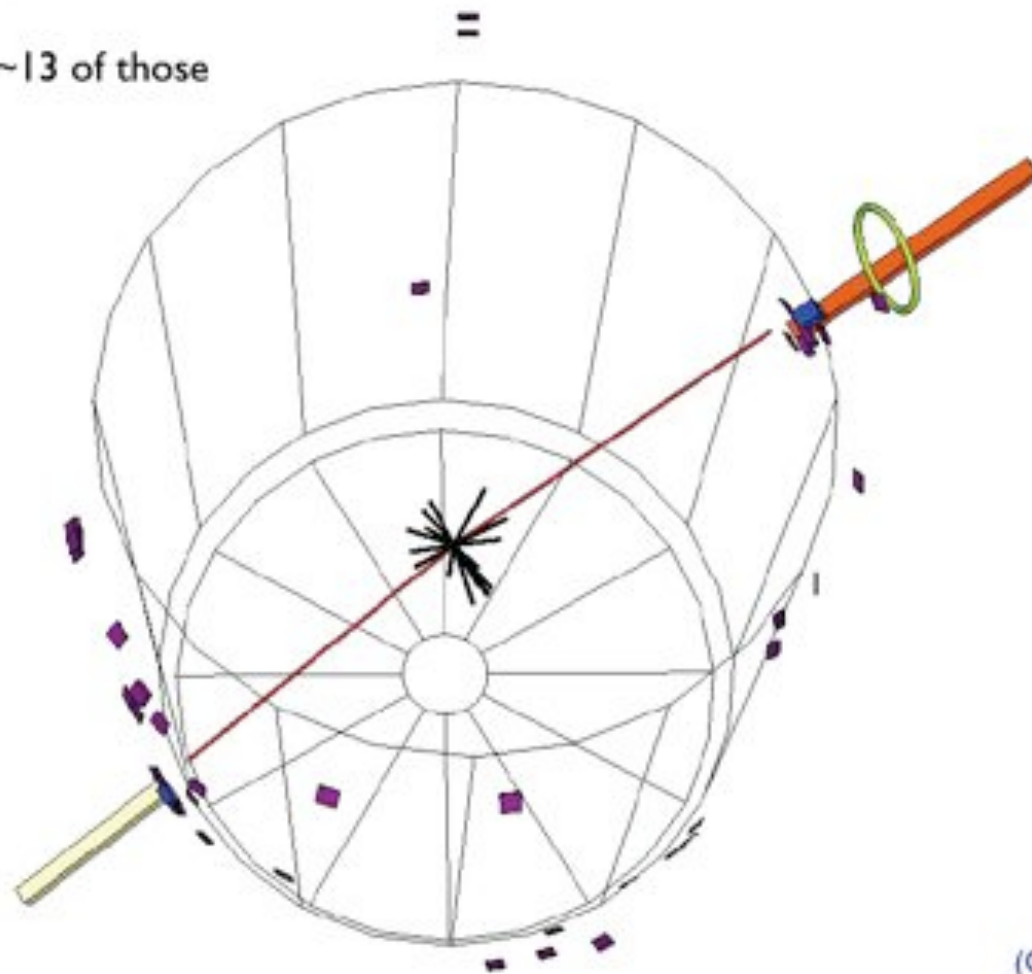
Central Volume

4K Shield





We found ~13 of those



(C) Matt Walker, MIT

