THE GLUEX DETECTOR IN HALL-D AT JEFFERSON LAB

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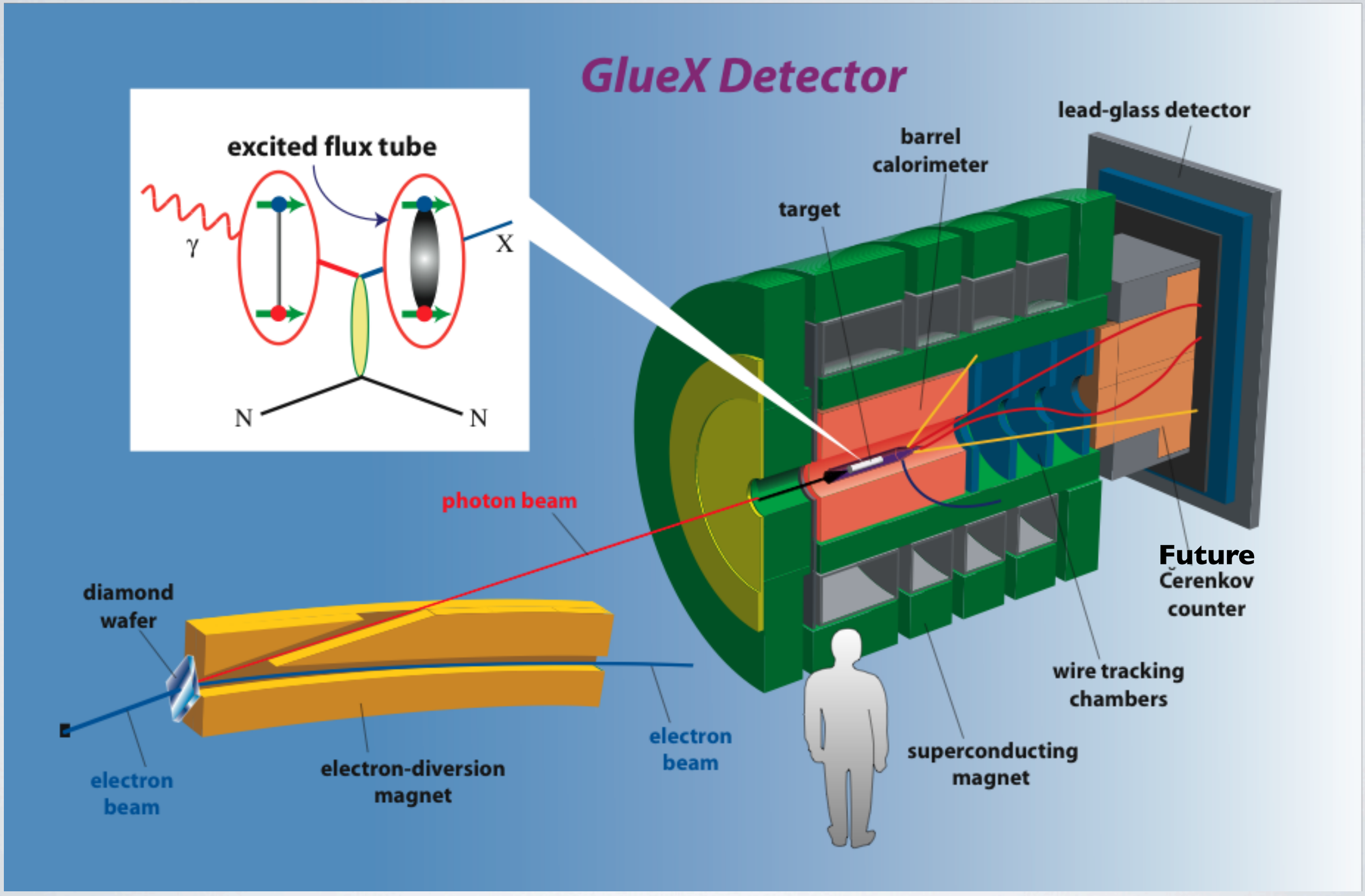
Outline

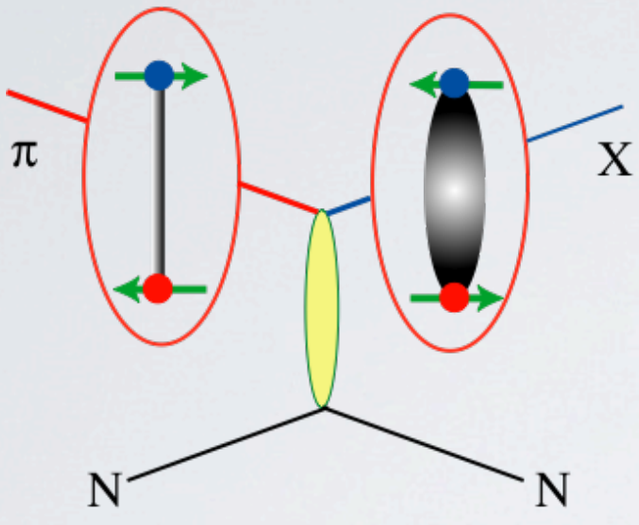
The GlueX Detector.
The Search for exotic mesons.
The construction of Hall-D
The construction of GlueX

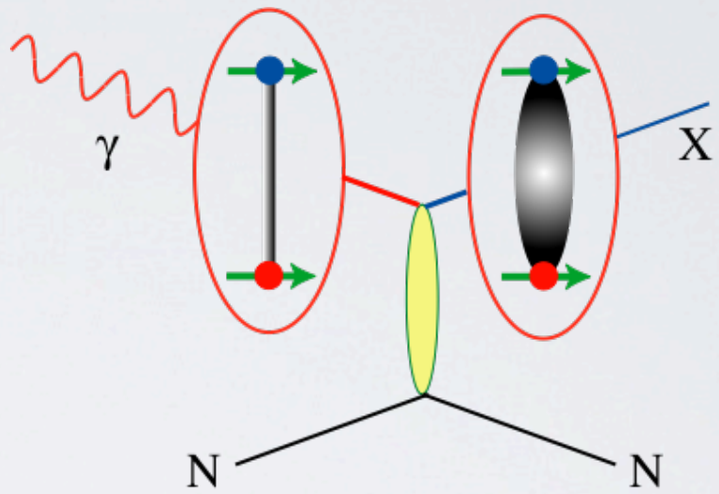
The GlueX Experiment



Photoproduction

More likely to find
exotic hybrid mesons
using beams of photons



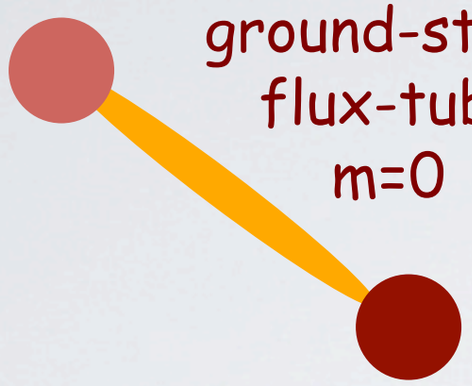


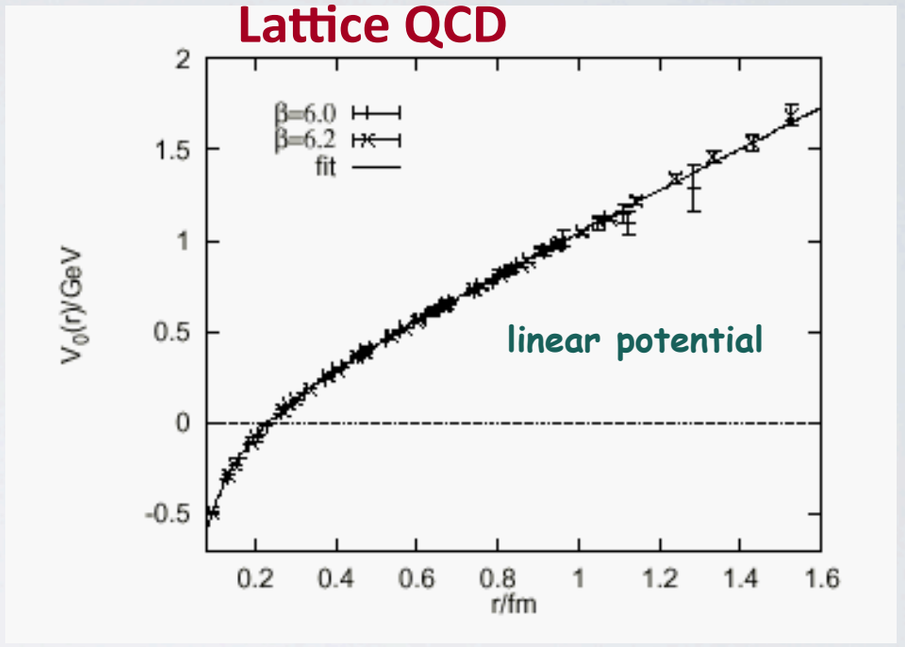
Simple (0^{++}) natural parity exchange with L=1: 0^{+-},1^{+-},2^{+-}

J. Dudek et. al, PRD 79 (2009) Compute radiative decays in charmonium to normal and hybrid mesons. Rates are comparable. Work currently underway to compute the same for light quarks.

8.4-9 GeV tagged, linearly polarized photon beam, up to 10^8/s

QCD Potential

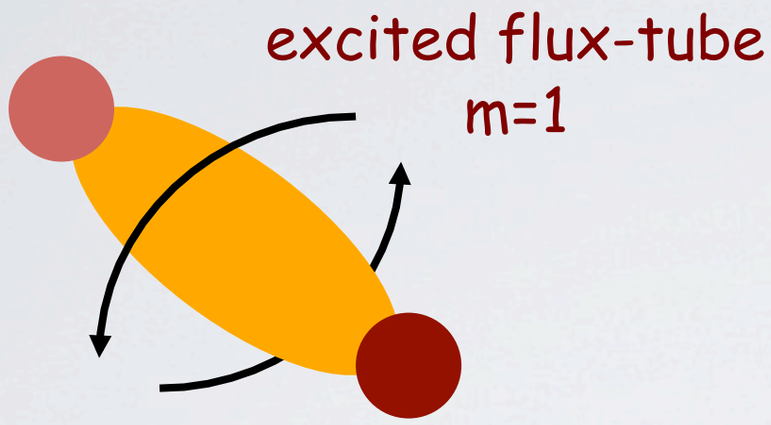


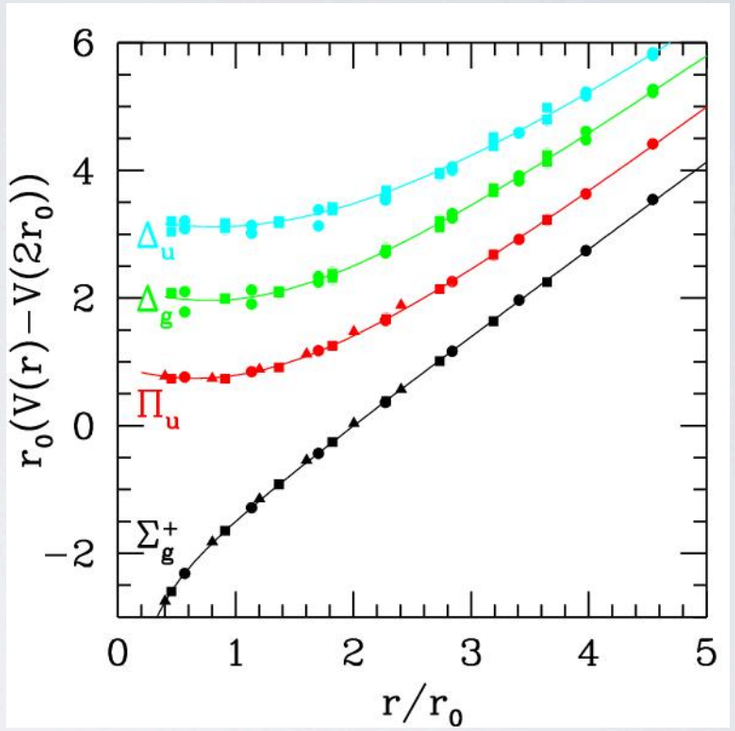


The normal mesons are built up from a "quark-antiquark pair" with and a "ground-state" flux tube.

(π,K,η,η')	(ρ,K^*,ω,Φ)	(b_1,K_1,h_1,h_1')	$(\cdots)$
$J^{PC}=0^{-+}$	$J^{PC}=1^{--}$	$J^{PC}=1^{+-}$	$0^{++},1^{++},2^{++},2^{--},2^{-+},3^{++},3^{--},3^{+-}$

QCD Potential





Gluonic Excitations provide an experimental measurement of the excited QCD potential.

S=0,L=0,m=1

J=1 CP=+

$J^{PC}=1^{++},1^{--}$

(not exotic)

S=1,L=0,m=1

J=1 CP=-

$J^{PC}=0^{-+},0^{+-}$

$1^{-+},1^{+-}$

exotic $2^{-+},2^{+-}$

Many of the hybrid nonets have exotic quantum numbers.

QCD Potential

Lattice QCD predicts exotics ~2GeV.

3 nonets of exotic-quantum number states.

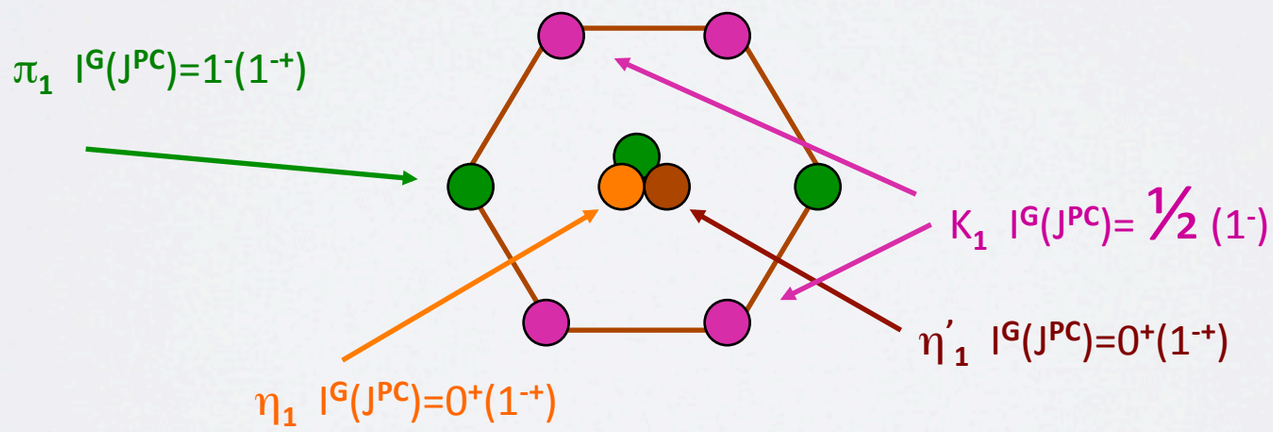
Decays expected to 4-5 pions with and photons.

GlueX has been designed to detect these.

Large acceptance for these final states.

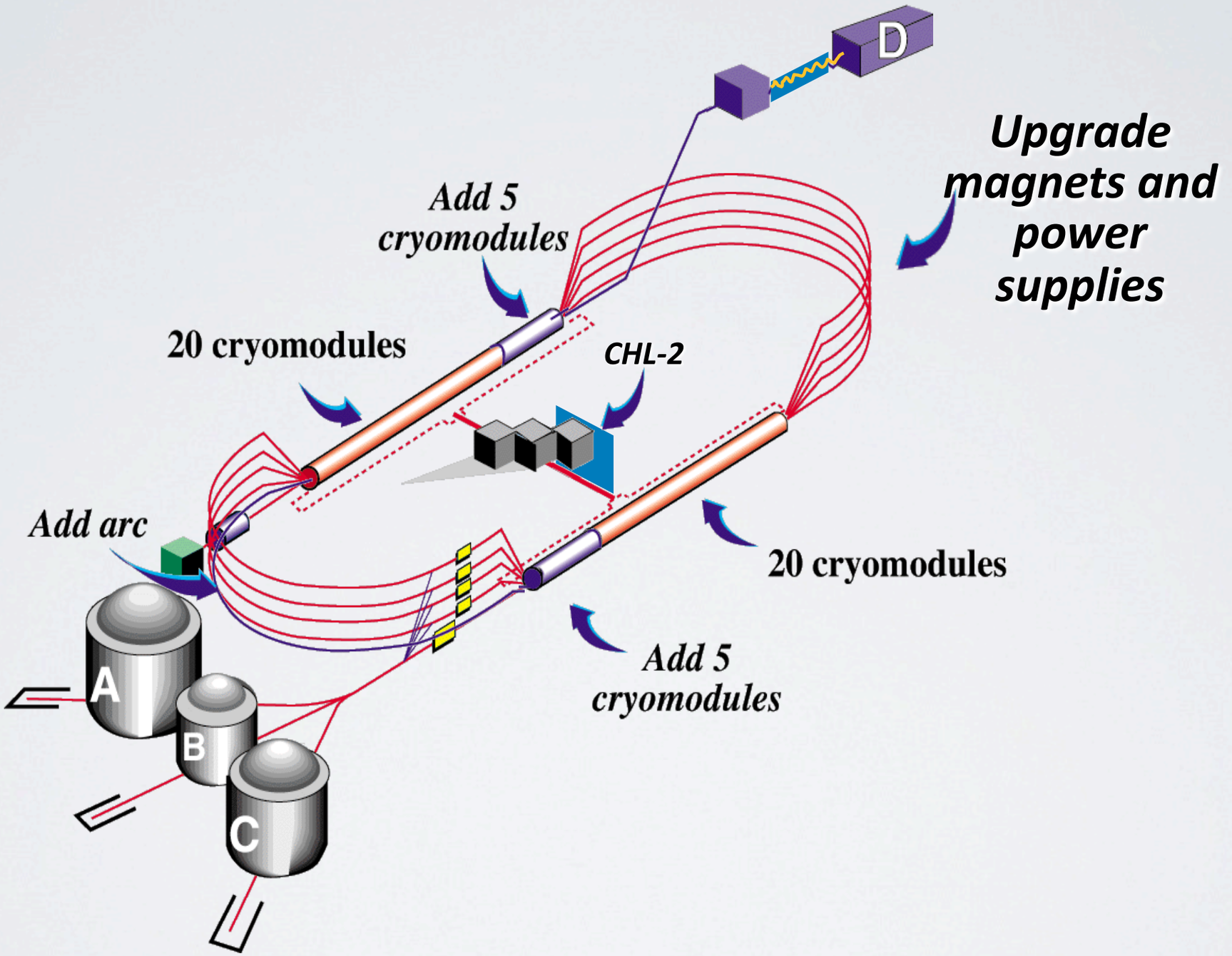
Good resolutions.

Partial Wave Analysis tools to carry out analysis.




GlueX Here
Jefferson Lab
Accelerator
Newport News
VA

The 12-GeV Upgrade



Hall D: February 2010

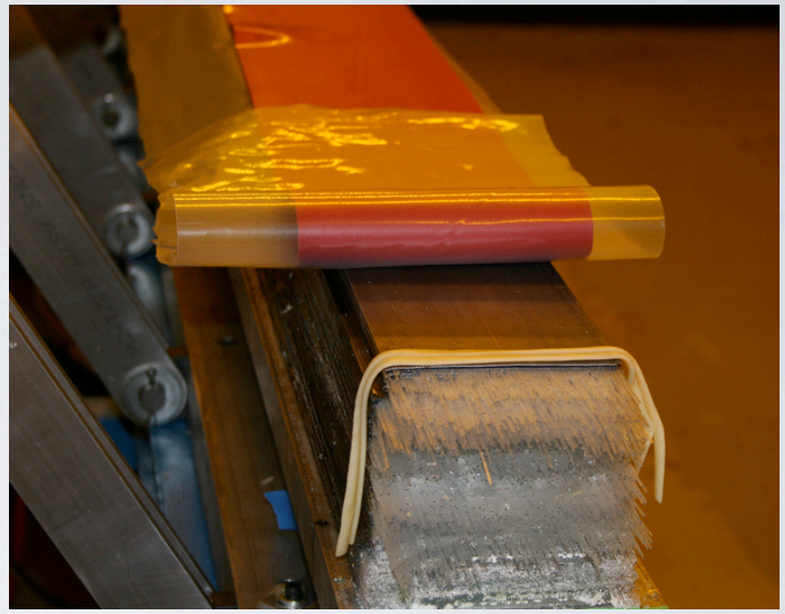
Expect some occupancy late in 2010

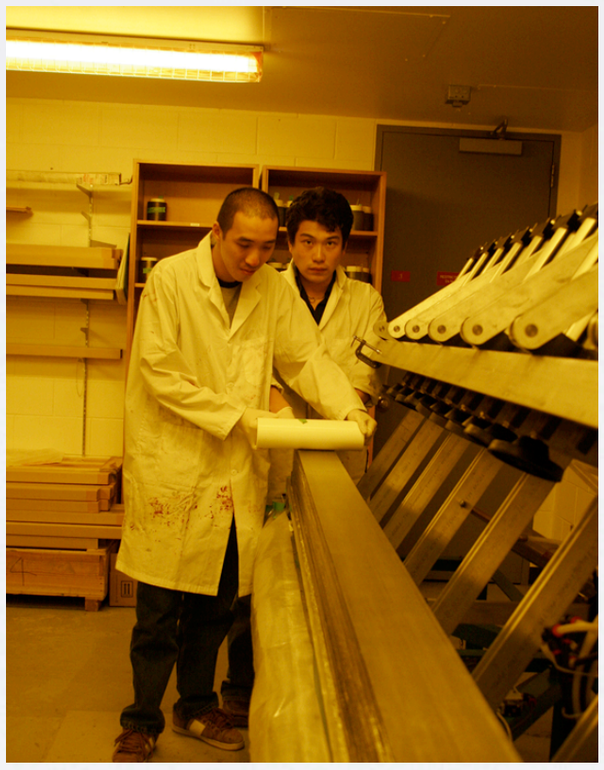
Detector Construction (2009/2010)

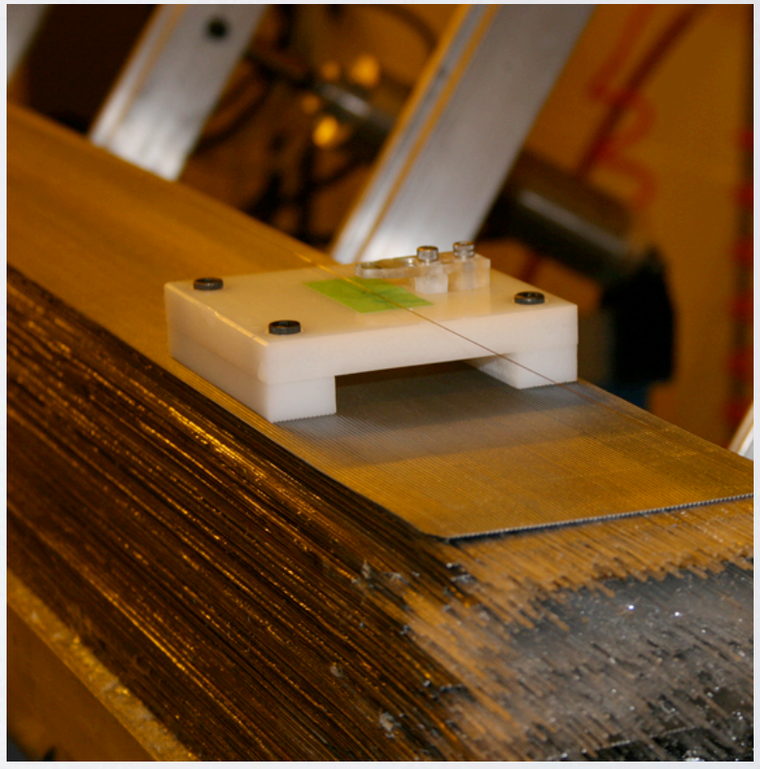
48-module Bcal at University of Regina

Completing modules 3 and 4.

First shipments to JLab in April







Detector Construction (2009/2010)

Lead-glass Forward Calorimeter at Indiana University

Contract for construction in place soon.

Work starting spring 2010

Central Drift Chamber at Carnegie Mellon

Contract for construction in place soon.

Work starting spring 2010

More contracts starting in 2011 and 2010

The GlueX Detector in Hall D

The 12 GeV upgrade of Jefferson Lab is currently under construction.

Construction of Hall-D broke ground in April 2009.

Construction of the GlueX detector has started.


Hall-D Groundbreaking

Current plans call for the first beam in HallD/GlueX in late 2014.

Summary:

The GlueX Detector and Hall-D at JLab are under construction.

We expect to start the search for exotic mesons in 2014.

There are other physics programs that are starting to materialize for GlueX

PrimEx on the eta approved in 2010.
A workshop on these activities in 2010.