

GlueX a new facility to search for gluonic degrees of freedom in mesons.

While gluonic degrees of freedom in nucleons are well established its counter part in mesons has not been confirmed. The properties of the of mesons are attributed to quark degrees of freedom only.

The GlueX detector facility in Hall-D at Jefferson lab in Newport News is part of the 12GeV upgrade and dedicated to the search for gluonic degrees of freedom in mesons by scattering high energy linearly polarized real photons of up to 9GeV from nucleon targets.

To provide the necessary good detection coverage over 4π , part of the detector resides within a large solenoid magnet surrounding the target. In the bore of the magnet a straw tube cylindrical drift chamber around the target and a series of cathode-strip wire chambers downstream of the target are used for particle tracking. Two electromagnetic calorimeters, one cylindrical shaped inside the magnet (BCAL) and one downstream (FCAL) of the magnet provide the necessary detection capabilities of photons from neutral meson decays.

The former is based on a lead scintillation fiber matrix the latter on lead glass. The optical readout of the BCAL is based on silicon photo multipliers that are insensitive to the high magnetic field of the solenoid.

A cylindrical plastic scintillator hodoscope around the target and two hodoscope planes downstream of the solenoid in front of the FCAL electromagnetic calorimeter complement the detector by providing timing information.

To handle the large data rate, custom electronics for digitization, trigger and readout has been developed and built at Jefferson Lab. The flash analog to digital converters run at 250MHz sampling the analog signal every 4ns and forming energy sums at the same rate. This information is shipped via optical link at the same 250MHz rate to a trigger decision logic. Data readout rates of up to 300MB/s are expected to be written to disk at high luminosity running. The level 1 trigger electronics uses VXS, a VME based system with a high-speed switch-fabric on the back plane.

Detector construction is starting now and the facility is expected to start operation in April 2014.

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Track Classification: Detectors (LHC and R&D) and Accelerators