

Coordinate Detector Preparations for GMn

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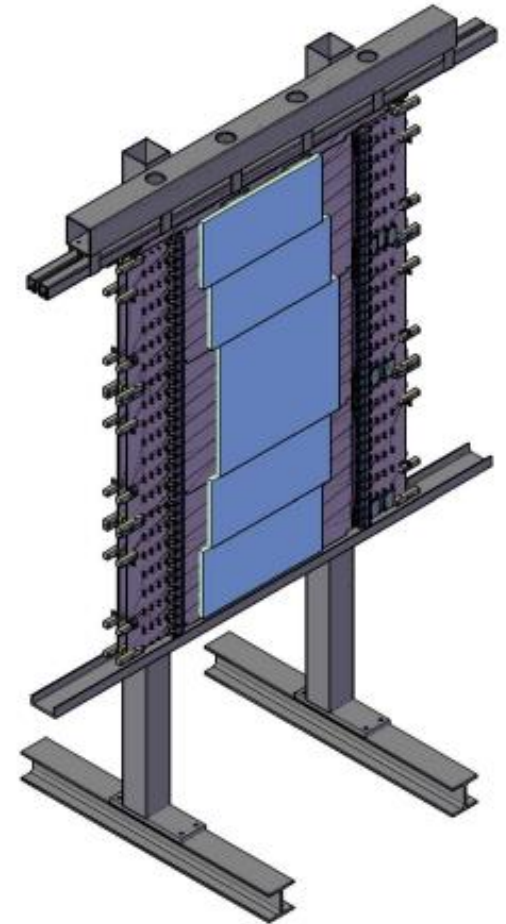
Christopher Newport University

SBS GMn Readiness Review

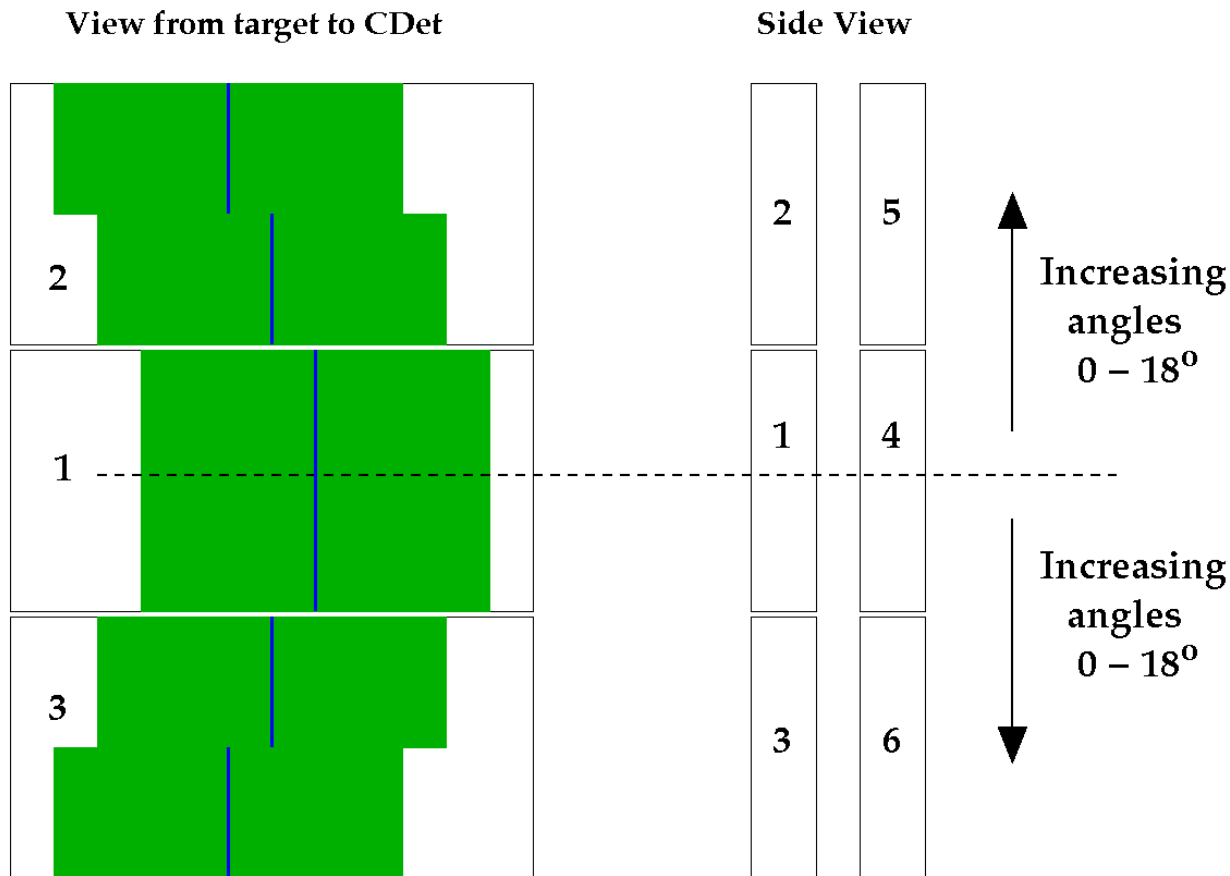
30th October 2018

Coordinate Detector (CDet)

- A scintillator detector for charged particle detection.
- **GEn/GMn**: placed in front of hadron calorimeter (HCAL) to tag protons.
- 6 modules; 3 per plane; 28 scintillator **groups** in each module.
- Each group consists of 14 scintillator **paddles**.
- Total of 2352 channels.
- Each paddle has a **wavelength shifting fiber** (WLS) along its center for light collection.
- Each group of WLS connected to 16-channel **maPMT**



CDet Module Layout



- Center mirror for left/right divide
- Allows cone acceptance matching
- Scintillator paddles angled to point shortest side directly at the target.

Scope of Project

- Complete the commissioning of the detector in the testlab.
- Test assemble one plane in the testlab.
 - then deassemble for transfer to the hall
- Assist in the installation of the detector in the hall – assembly, cabling, etc.
- Provide software for CDet analysis to be included in SBS analyzer.
- CNU is NOT providing any of the requirement equipment or ancillary supplies (cables, connectors etc.)

Status and Support

Engineering Support	Connect modules together Hang planes from frame	✗ ✗	Design work. Parts required.
Hall A Technical Group Support	Trial assembly in test lab Transport detector to Hall A Assembly and installation	✗ ✗ ✗	→ Spring 2019 → require help (e.g. crane use)
High Voltage System	CNU providing new HV crate	✗	Cabling & connectors needed
Data Acquisition System	TDCs identified and tested DAQ to be assembled	✓ ✗	Need guidance for students
Low voltage (NINO)	Power supplies, cabling & distribution boards	✗	Boards identified
Analysis software	In development	✓	

Available Manpower

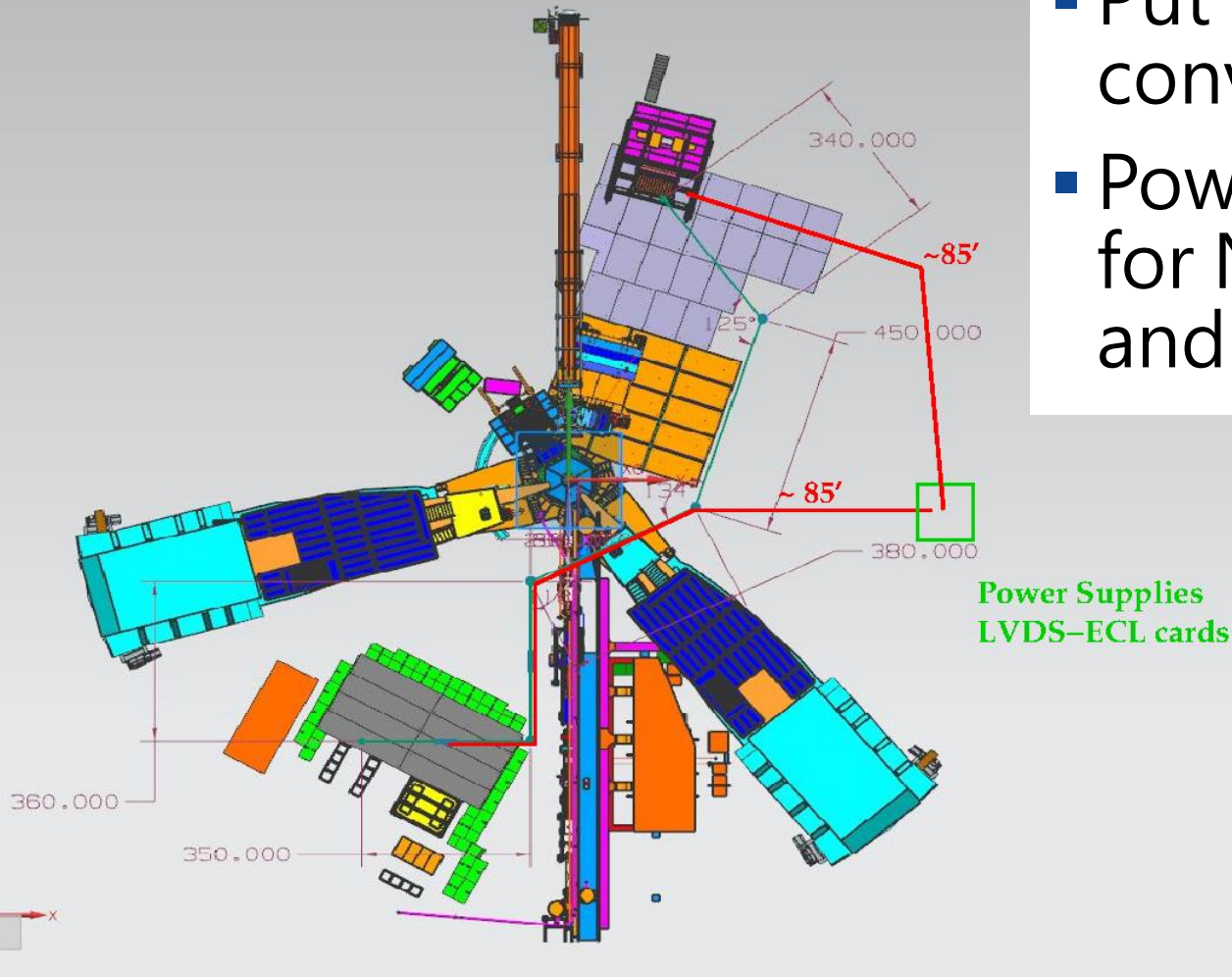
- Two undergraduate students during the academic year – upto 10 hours/week/person
- Two undergraduate students during the summer session
- Two faculty members to contribute
 - Ed Brash contributing to software for both the HV controls and the analyzer
- Everyone will require correct training to assist with installing (e.g. cabling) detector in hall.

Timeline of Completion

- Jan. 2019 : Complete commissioning of M2 and M3 in test lab.
- Spring 2019: Trial assembly of M1/M2/M3 on the frame in the test lab.
 - Determine all cabling, power supply logistics
- Summer 2019: Complete commissioning of M4, M5, M6 in test lab.
- Summer 2019: DAQ assembly
- Software considerations to move in tandem as needed.

Hall Layout for GMn

- Put signal converters in hall
- Power supplies for NINO cards and converters?



Summary

- Commissioning in progress
 - Module 2 being tested now.
- Considering requirements of experiments
- Identifying all components required.
 - Some components need to be purchased
- Working with engineering group and hall A technician group to identify needs and time required for installation.

Backup Slides

List of Items for Completion

- Commissioning in the testlab.
 - Cosmic data on every scintillator – charge equalization, threshold, crosstalk and efficiency
- Trial assembly in the testlab
 - Engineering support required
- Identify all equipment required for DAQ
- HV system
 - CNU providing a new HV crate (not the cables or connectors)
- Low voltage for NINOs
 - need distribution boards/panel

Help requested from JLab

- All cables (signal and HV), connectors, HV boxes, patch panels and any other ancillary supplies or equipment. (✗)
- All DAQ modules and components. (✓)
- Require help to integrate CDet into DAQ. (✗)
- Require engineering and tech support (✓)
 - trial assembly in the test lab (spring 2019)
 - transport to the hall
 - final assembly in the hall (assembly, cabling & safety training)

Data Acquisition System

- GMn will only use TDC signals from CDet
- DAQ will require 2688 channels (only 2352 used – 14 channels per PMT)
- Need 28 LeCroy 1877 TDC modules (+ spares)(✓)
- Need 12 LVDS-to-ECL converter boards (✓)
- Need 326 (168x2) 16-channel ribbon cables (✗)
- Cables need to be ≤ 100 ft long

Power Supply Systems

- CNU purchased a new CAEN HV system (✓)
 - 4 pods, 64 channels per pod
- Need all connectors and cables for detector (✗)
- Need **12** HV distribution boxes (✓)
 - Mount on each module; 1 in use
- Need low voltage (6 V) high current power supplies for NINO cards
- Need 4 power distribution boards to take supply to individual NINO cards. (✓)