

SBS Coordinate Detector Status Update

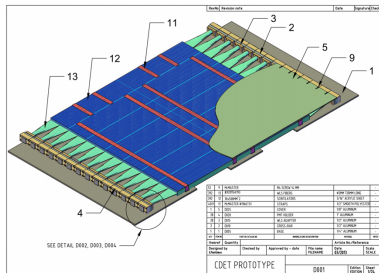
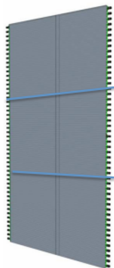
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SBS Weekly Meeting / December 18, 2013

- Coordinate Detector (“CDet”) in SBS experiments:
 - GEp5: vertical coordinate detector (WBS3 - Proton Form Factor)
 - GMn/GEN: proton tagger (WBS2 - Neutron Form Factor)
- Proposed change to CDet design from GEM-based scheme to PMT/Scintillator-based one.
- Proposal to change CDet scheme submitted to SBS Management in early September 2013.
- Change to PMP for CDet presented at SBS Program DOE Panel Review on Nov. 4-5, 2013.
 - Panel suggested modifications to PMP to reflect PMT/Scintillator-based scheme.
- CDet awaits formal approval to be included in SBS PMP.

Plans for CDet

- CDet placed in front of **E**Cal ($0.8 \text{ m} \times 3.0 \text{ m}$) and **H**Cal-J ($1.2 \text{ m} \times 2.7 \text{ m}$).
- Construct **six scintillator** horizontal-strip “**modules**” ($1.2 \text{ m} \times 1.0 \text{ m}$).
- **Two planes** of ($1.2 \text{ m} \times 3.0 \text{ m}$) for both sets of experiments.



- One plane includes **three 1-m tall segments**.
- Each segment covers ($1.2 \text{ m} \times 1.0 \text{ m}$) area:
 - 400 scintillator bars of ($0.5 \text{ cm} \times 3.0 \text{ cm} \times 60 \text{ cm}$);
 - light collected via WLS fibers, detected by 16-channel maPMT;
 - front-end card produces a logical signal for 1877S TDC.

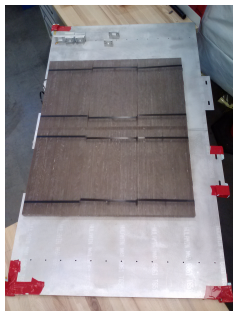
Multi-anode PMT tests

- Two types of PMTs:
 - Hamamatsu H8711 (qty. 186) - "Type 1"
 - Hamamatsu R5900-M16 (qty. 416) - "Type 2"
- 602 PMTs (~ 10,000 channels) were tested by SMU students in summer, 2012.

Number of Bad Pixels	PMT Type							
	Type 1 Gain				Type 2 Gain			
	Poor	Average	Good	High	Poor	Average	Good	High
0	2	36	79	54	27	68	34	47
1	-	5	1	-	32	45	13	11
2	-	1	2	-	26	33	4	-
3	-	1	-	-	11	22	-	2
4	1	-	-	-	7	8	1	1
5	-	-	-	-	4	4	-	-
6	-	-	-	-	3	2	-	-
7	-	-	-	-	1	1	-	-

- Total of 168 PMTs required for CDet.

- Construction of **prototype CDet** at JLab.



- Complete mechanical checkout and light enclosure tests of prototype.
- Urgent need for technical manpower for two-months help with prototype.
- Final design specifications for scintillators and mechanical support.
- R&D to implement the new **trigger/DAQ** idea at SMU.

- Basic design with budget developed -
⇒ November 2013.
- Technical design review -
⇒ March 2014 (2 months float).
- Mechanical checkout and light enclosure tests of prototype completed -
⇒ July 2014 (4 months float).
- Purchase orders placed for scintillators and WLS fibers -
⇒ September 2014 (2 months float).
- Three detector modules instrumented -
⇒ September 2015 (6 months float).
- Two detector planes tested with cosmic rays -
⇒ November 2015 (6 months float).