

# GEM Detectors for SuperBigbite

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## Original GEM production Plans: WBS 2

- Goal: build 29 GEM modules by 03/2015 - 27 more to go, new goal 07/2015
- Funding: \$ 541 k

Date	Milestone	Notes
08/15/2013	WBS 2 GEM contract in place	Done as of 09/30/2013
09/30/2013	Orders for GEM chamber components placed	Done
02/01/2014	First Batch of GEM foils arrived	arrived in 04/2014
05/30/2014	Complete the production of 5 modules, test and deliver to Jlab	2 completed and tested by 06/2014
09/30/2014	Complete the production of another 10 modules	
03/01/2014	Complete the production of the remaining 14 modules	

- Assumes production of ~ 2 modules per month: feasible with established procedures. - this was shown to be possible for the first two modules; will depend on foil shipments from CERN.
- Related Goals: Design and fabricate two holding frames, assemble and test with a full complement of electronics.

## GEM production Plans: WBS 3

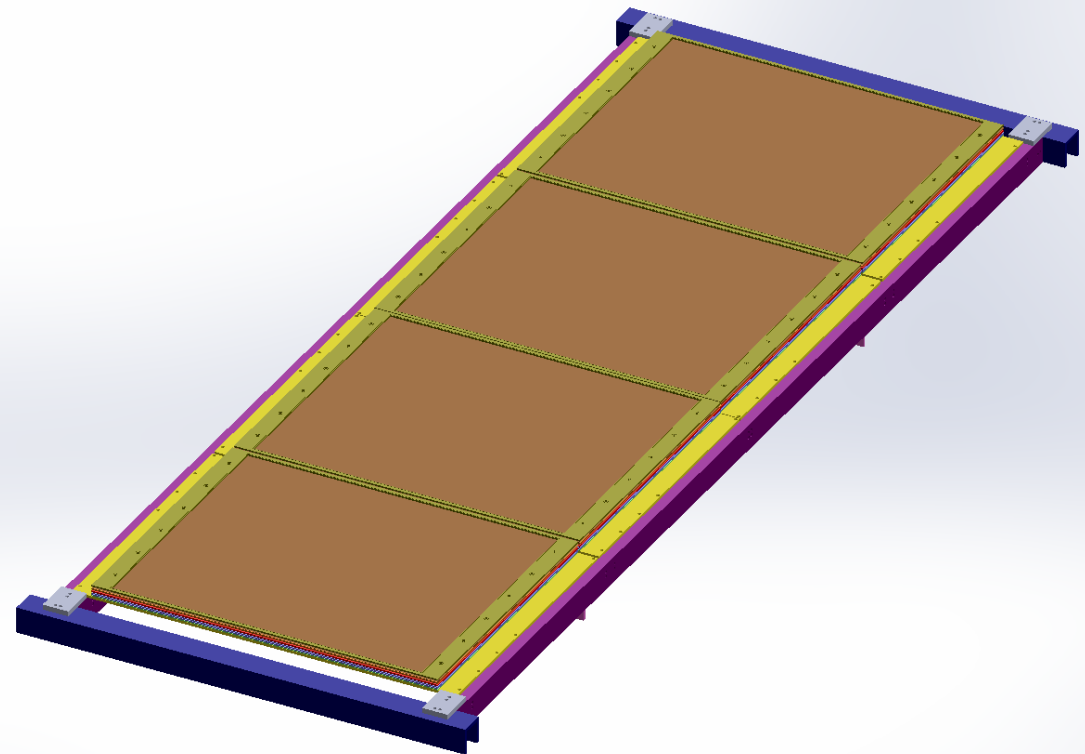
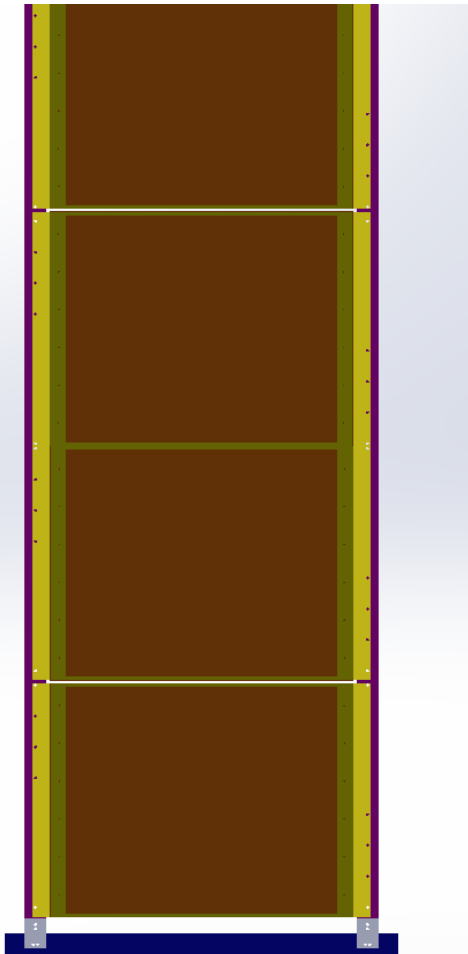
### □ 11 GEM modules

- Fabricate 11 GEM modules.
- Assemble eight 50 cm x 200 cm GEM detector layers for polarimeter.
- Equip all GEM modules with electronics and test.
  - Time required: 12 months starting July 2015.

# Things we need to start thinking about

## □ Chamber Holding frame

- Initial plan has W&M designing and fabricating the frames
- A concept design done at UVa

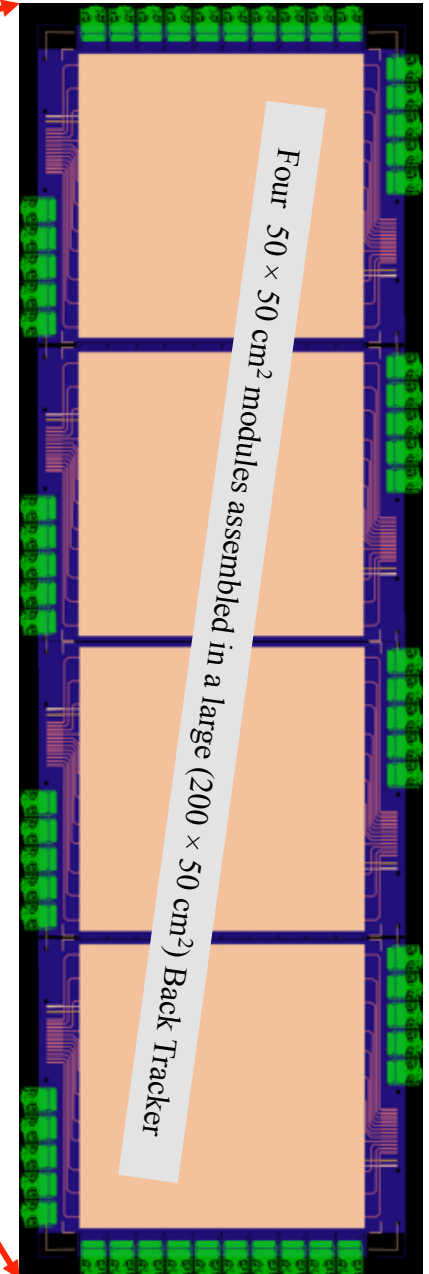
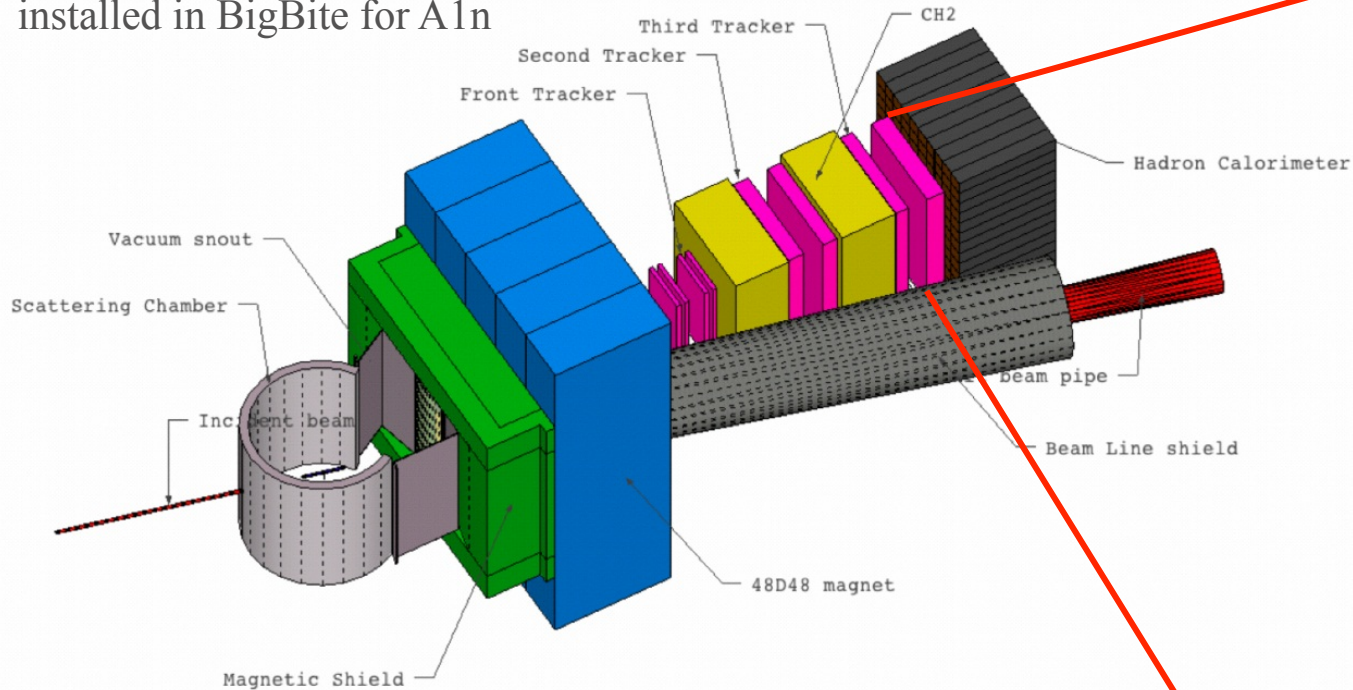


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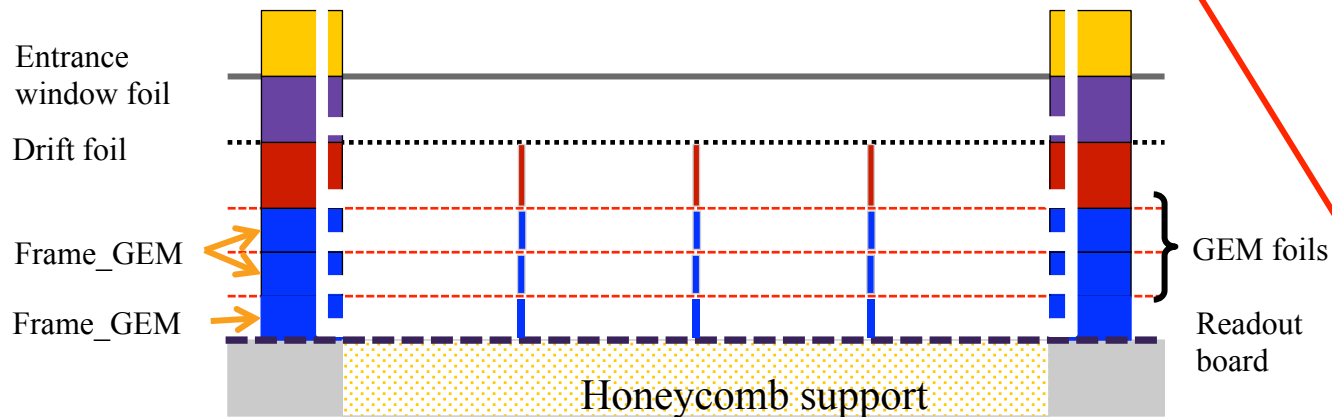
# SBS Back Tracker GEM Chambers

Plan to have one fully equipped 200 cm 60 cm layer by December 2014, and have two full layers by May 2015: these two layers will be installed in BigBite for AIn

SBS Back Tracker Chamber



Cross section view of Back Tracker 50 x 50 cm<sup>2</sup> Triple GEM module



## Electronics for Back Trackers

- ❑ Reading all readout strips in the 40 modules requires 112,640 (22x128x40) readout channels. - too expensive
- ❑ In the 2-to-1 combination scenario, given the geometric constraints of the GEM modules, 61,440 channels (480 APV cards) required.
- ❑ With approximately 10 % spares, leading to 530 cards (67,840) channels in total

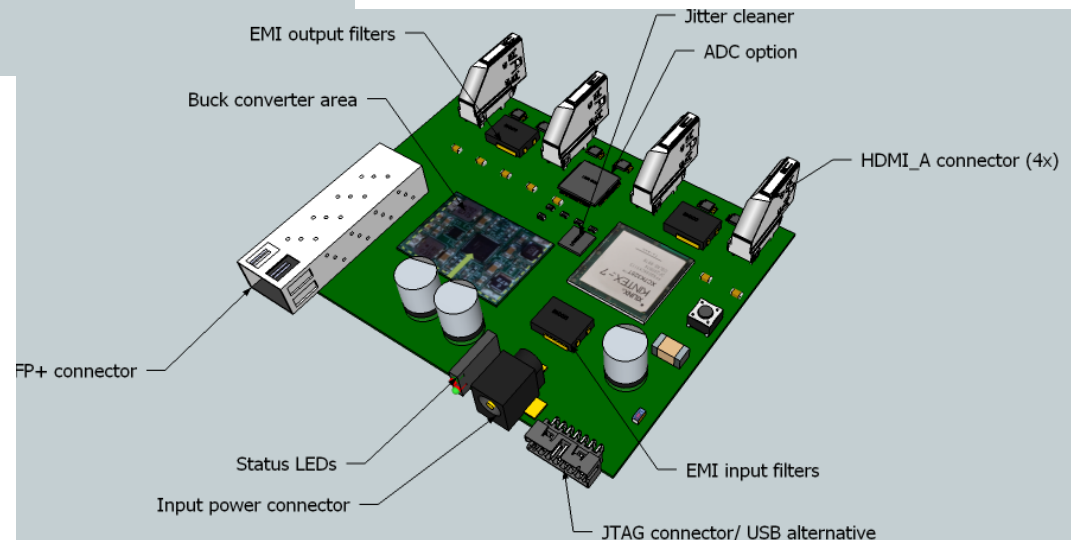
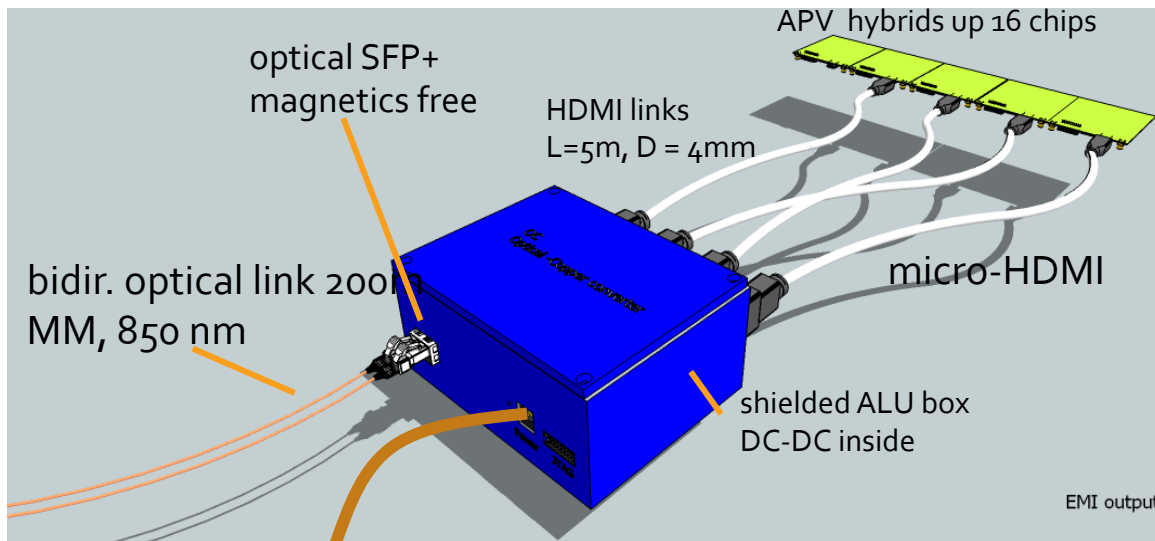
## Electronics for Back Trackers

- SRS versus MPD.
  - Both systems could be ready in the needed time frame.
  - Both systems need some development work to meet rate requirements etc.
  - The costs are very similar
    - MPD: ~ \$ 335 k ( \$ 290 k: hardware + \$ 45 k manpower)
    - SRS; ~ \$ 337.5 k ( \$ 240 k: hardware + \$ 45 k manpower + \$ 52.5 k R&D costs)
- For either option: need 2-to-1 adapters: estimated cost \$ 44 k.
- Total electronics cost ~ \$ 380 k (~ \$ 5.60/chan)

# Electronics for Back Trackers

- SRS: R&D proposed for this summer and fall:

## Optical to Copper (OC) Box (with ADC option for APV25)



Radiation tolerant APV25-  
SRS hybrids v5



## Electronics for Back Trackers

- Proposal: we commit to the relatively small amount of R&D required for SRS this summer, evaluate the finalized system in the fall. In the meantime assemble, setup run and evaluate the new configuration MPD electronics we recently acquired. Then by comparing system performance, firm costs, and production schedules, make a final decision by the end of fall.