

Prototype Modules

MATHUSLA Canada Group

V1.0 (@UVic)

- Layers:
 - 1 (bottom): 24 bars / 12 channels
 - 2: 20 bars / 10 channels
 - 3: [?? bars oddly-sized] / 22 channels
 - 4 (top): 20 bars / 10 channels
- Total height: 2.4m
- Bars: 4cm x 1cm x 1m, with grooves, Fermilab-produced
- Fiber: Saint-Gobain BCF92, 1.5mm, each piece loops thru 4 bars
- SiPMs: Hamamatsu, S13161-3050-AE-08 (8x8 array, 50um pixel pitch)
- DAQ: CAEN FERS-5200 & DT5202
- Fibers run from bar ends to SiPM array mounted on readout board
 - light-tight protective end-caps for fibers

V1.0 (@UVic)

Potential studies:

- Mechanical structure issues
- Basic track reco with cosmics
- Fiber bending radius
- Basic triggering (4 layers)
- Gaps between bars / hit efficiencies
- Light yield with full length WLSFs
- Timing studies
- Comparison of different scintillator types/geometries

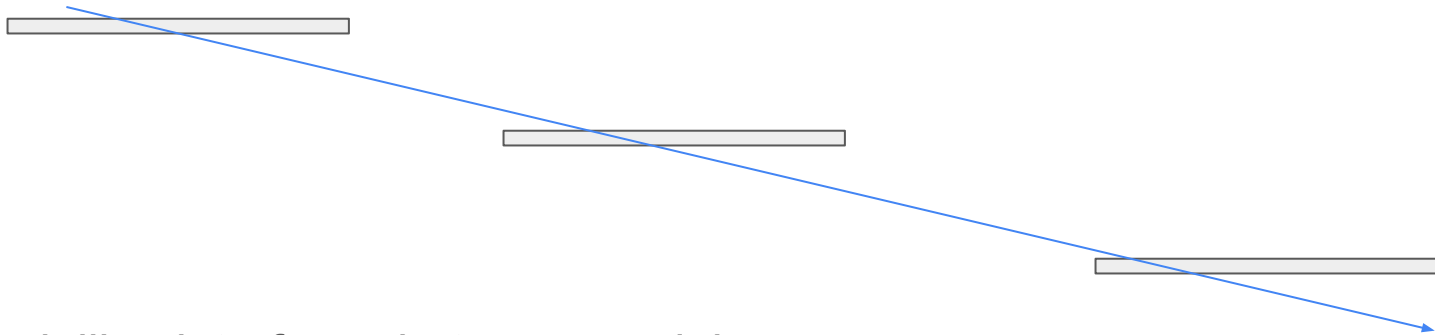
V2.0 (@Toronto)

- Layers: 5, each 24 bars / 24 channels
- Total height: 2.4 m
- Bars: 4cm x 1cm x 1m, with holes, Fermilab-produced
- Fiber: Saint-Gobain BCF92, [1 or 2] mm, each piece loops thru 2 bars
 - Could re-construct with other fiber types here as well, e.g. Jim's new Kuraray
- SiPMs: Hamamatsu, S14160 (50um pixel pitch)
- DAQ: CAEN DT5550W & A55PET4
- Individual SiPMs up against bar ends
 - PCB (with pre-amp) to carry SiPM signals to readout board
 - Compression-fitting mounting apparatus to keep each SiPM in place
 - Layers easier to move / manipulate individually, since there's less dangling fiber to be kept light-tight

V2.0 (@Toronto)

Potential studies:

- PCB design issues
- Holes vs grooves in scintillator bars
- “Large angle” tracking



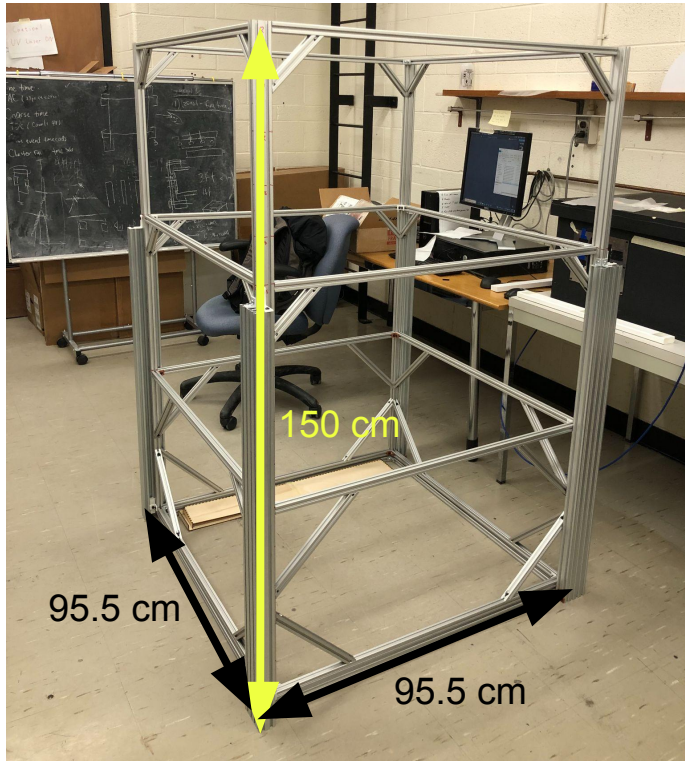
- Modelling interfaces between modules



Module Frame

Max height 2.5 m

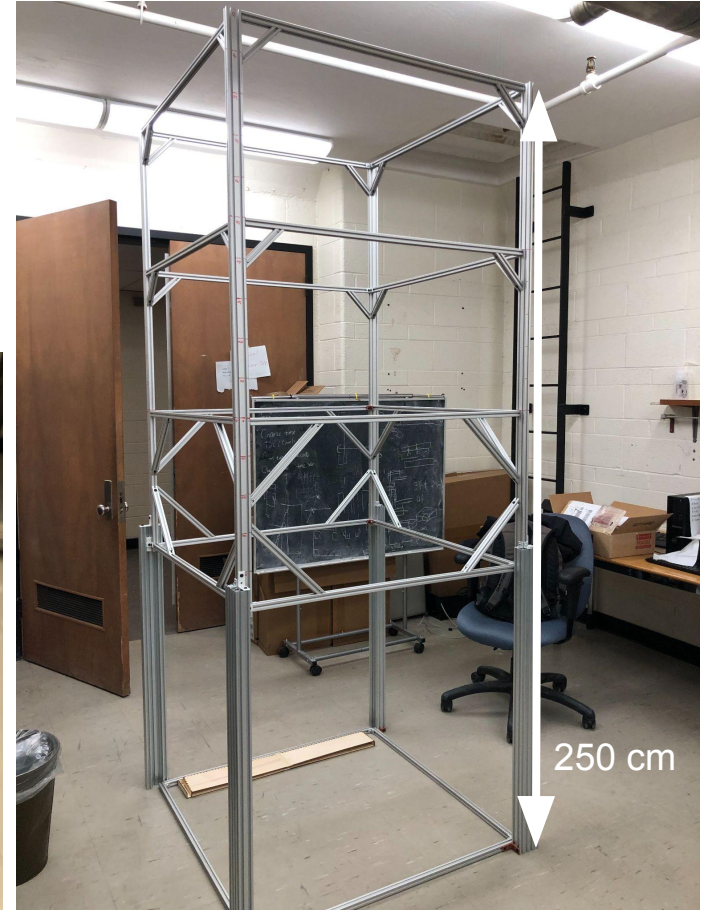
Supports max 5 layers



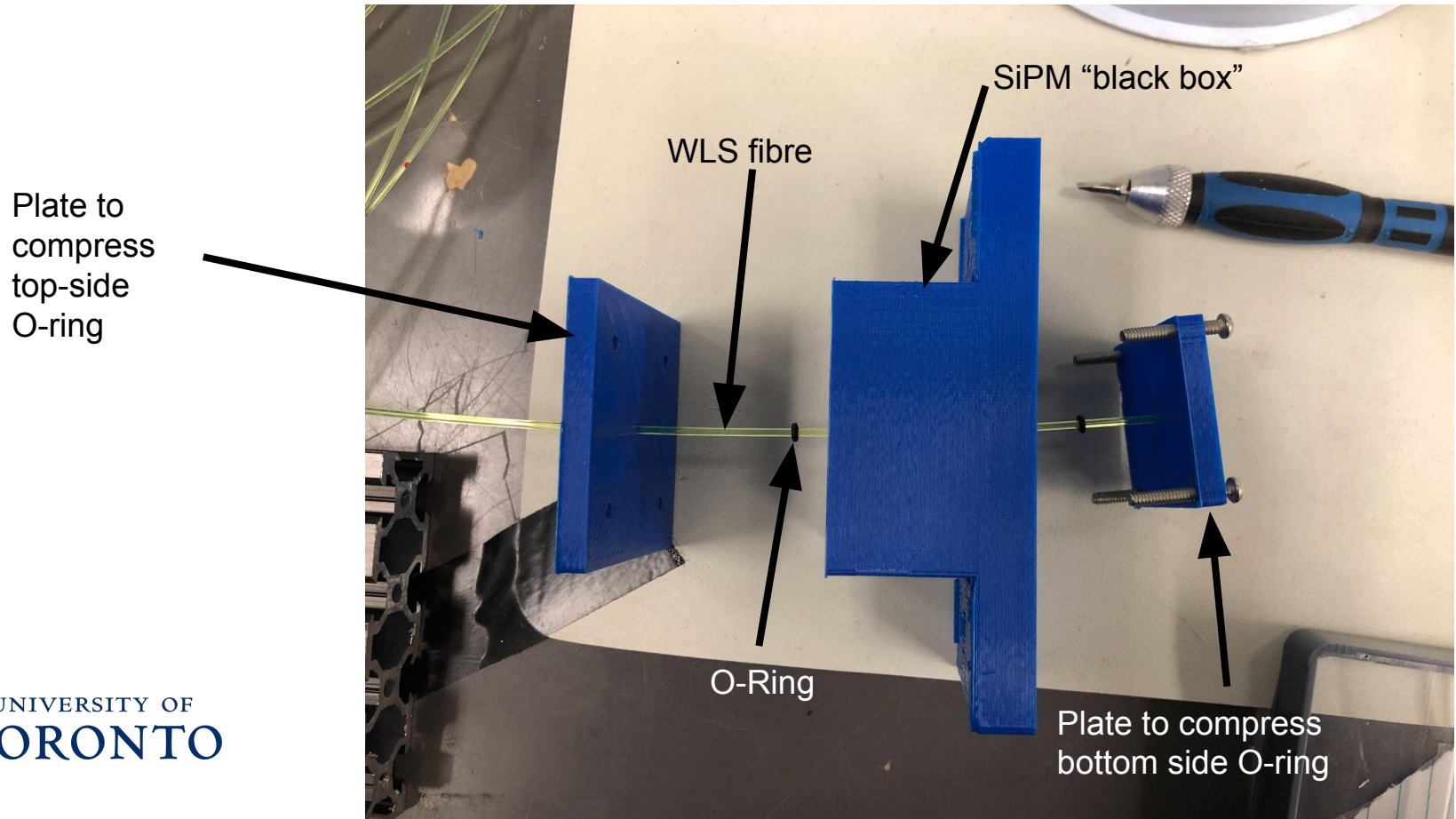
Left: Module frame in its lowest height

Right: Module frame raised to max height

Bottom: “Braking” connectors for sliding mechanism to hold the module height



SiPM Connector



V3.0 (future)

- Expand v2.0 to use longer bars (put two 1m bars end-to-end?)
- Increased height?
- Built-in LED calibration units?