

# SiPM Scheme with HGCRROC/CALOROC

Norbert Novitzky (ORNL)



# SiPM expected

1.3x1.3 mm<sup>2</sup> SiPM  
(Outer region ~90%)

3x3 mm<sup>2</sup> SiPM  
(Inner region ~10%)

## Very conservative estimates after radiation damage:

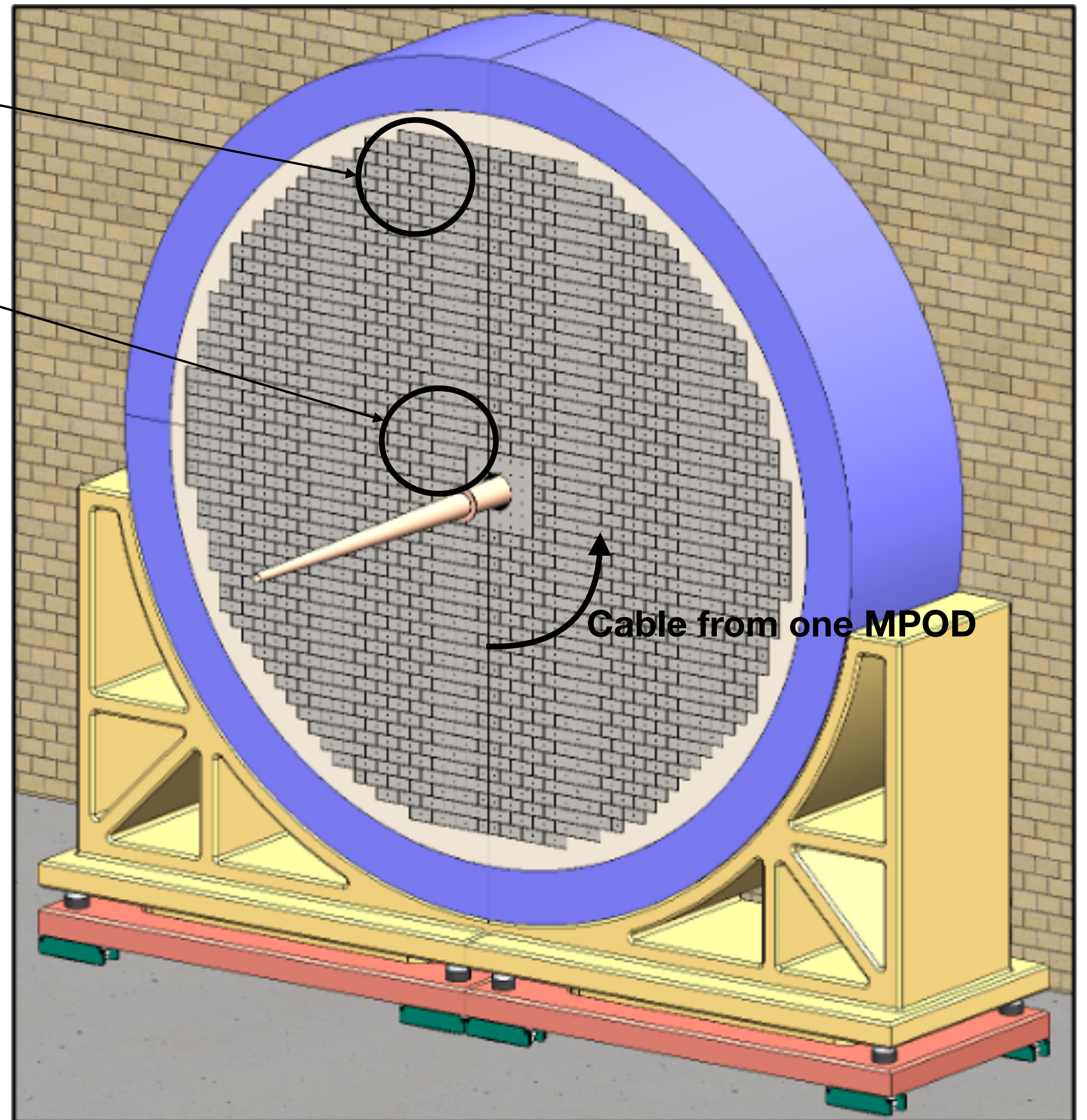
- 20  $\mu$ A in small SiPM
- 100  $\mu$ A in larger SiPM

8M modules have in total 1 FEB, 520 SiPM:

- 10.4 mA per 8M module
  - 52 mA per 8M module
- > Total: ~16 Amp

Design consideration of connections:

- The two half have to slide away from each other (no cross connection)
- Concentric circular design:
  - Per channel of the MPOD:
    - Adjusting the same bias voltage to similar SiPM's
    - Receive similar amount of radiation
    - Need to study the exact radiation doses



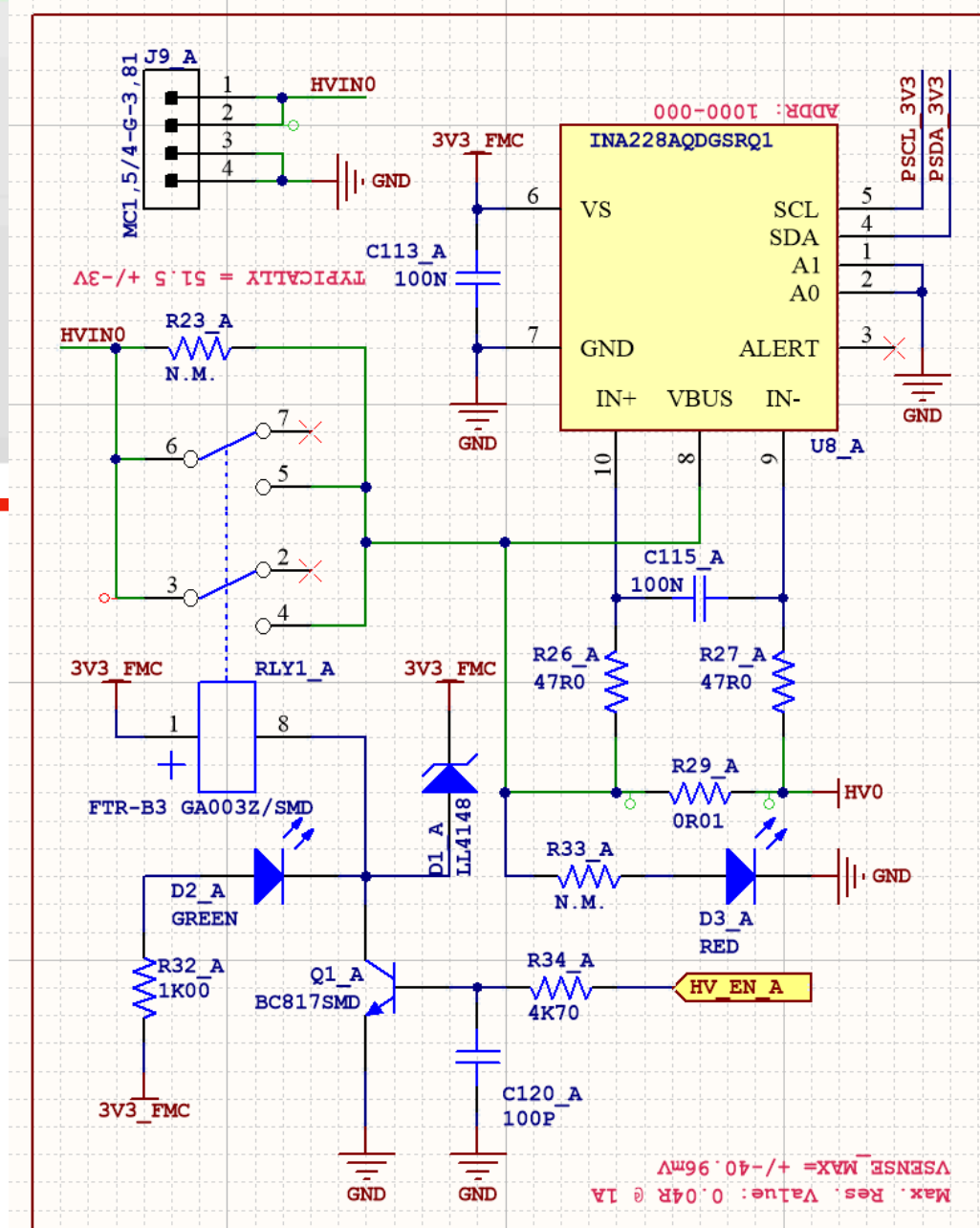
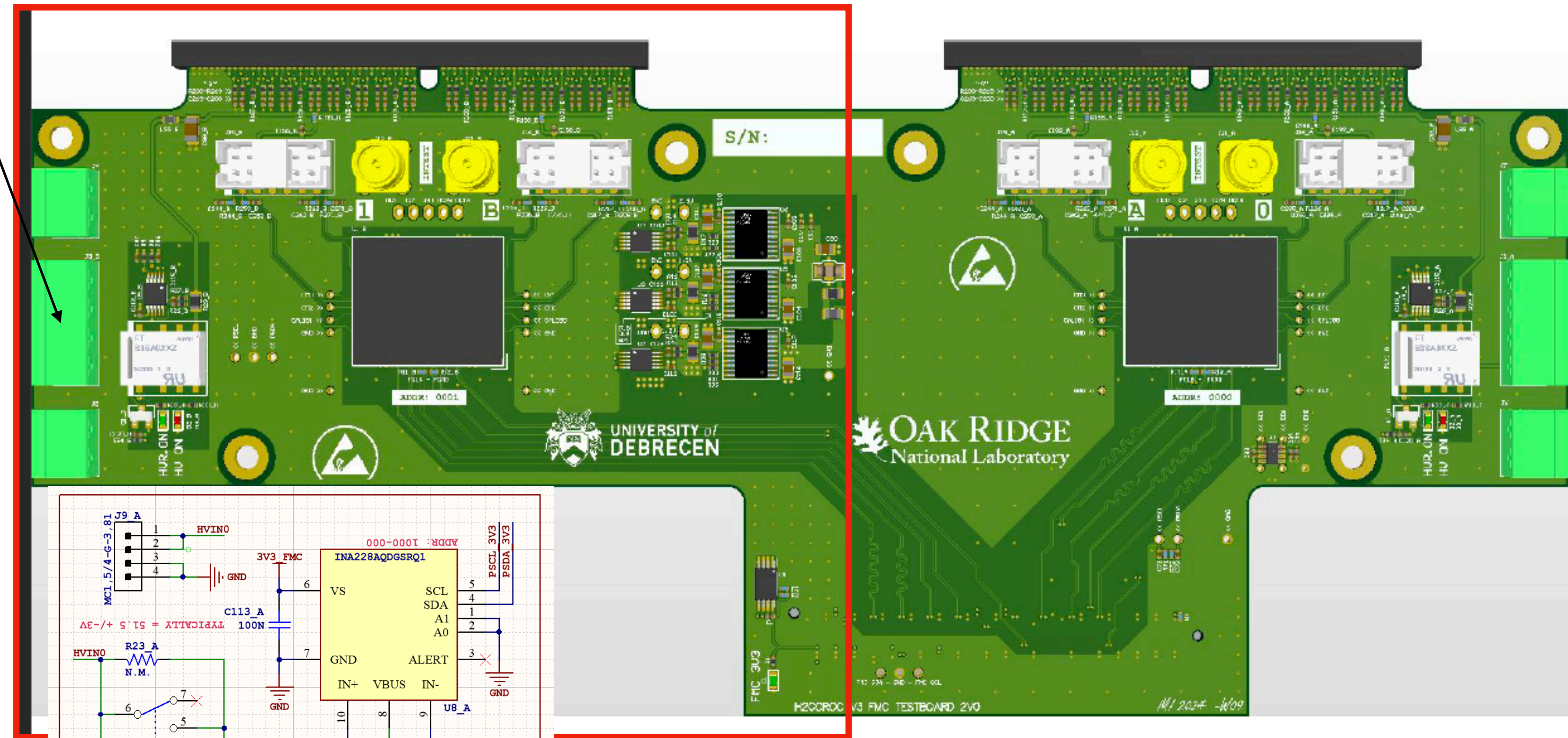


# FEB prototype

## Protoboard2.0 in production

### Current design (adopted to final FEB also):

- Single Bias voltage input to the FEB
- Enable/Disable HV input from the FPGA
- LED control light
- Monitor the bias voltage and/or the leakage current per FEB (part of the slow control)

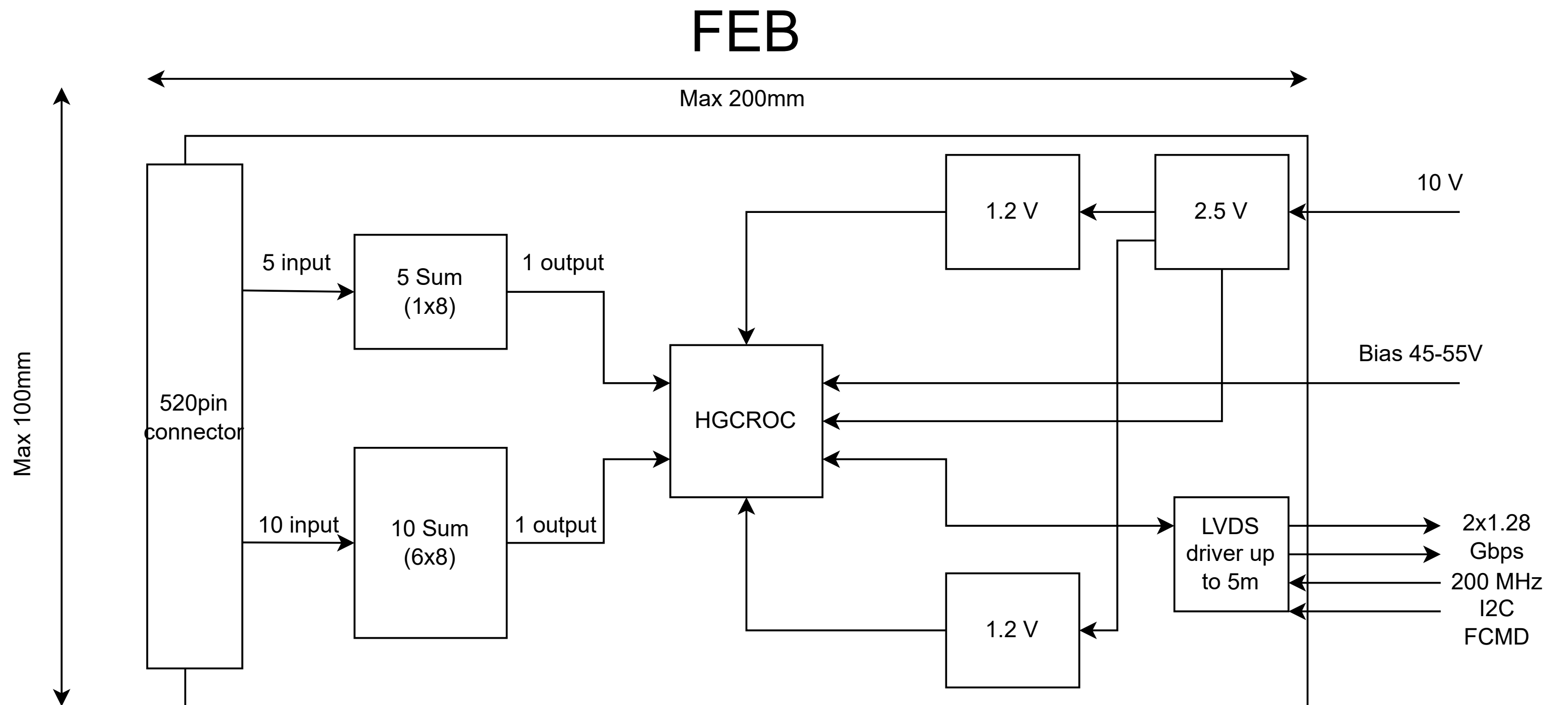




# Initial FEB design

## FEB design skeleton:

- It will evolve from the protoboard2.0 with some modification:
  - Remain the monitoring and bias handling
- All active electronics on the FEB
- Summing circuit:
  - We still do some R&D on this which one is the best, there are several ideas so far
- Will receive one common bias for all SiPM
  - HGCROC offers and adjustment inside the ASIC — need to figure out if it can be applied with a summing circuit



## Bias ~45-55 V

