

LumiCal Silicon Sensor

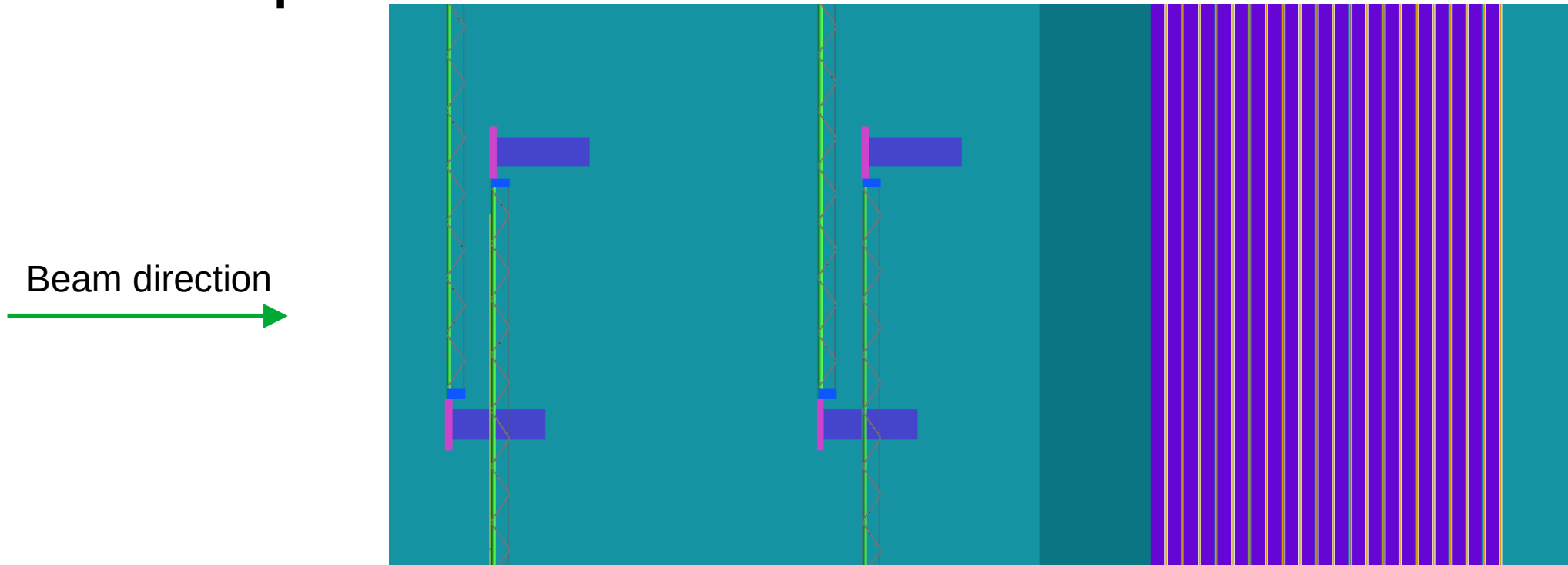


Oleksandr Borysov



LUXE ECAL meeting
March 6, 2024

ECal implementation



Absorber

Tungsten alloy:

- W : 93%
- Ni : 5.25%
- Cu : 1.25%

3.57

0.93

Fanout and HV Kapton:
mixture of

- Kapton,
- epoxy,
- Cu.

Fractions are proportional
to layers thickness.

Silicon sensor:

Si 320 μm .

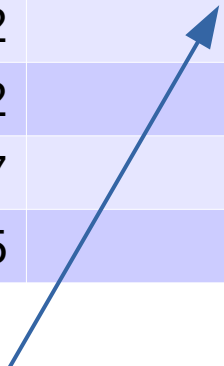
Al metalization 20 μm

Carbon fiber

Air gap

Layer components

Layer components	Thickness (mm)	Position before the Component in layer 1 (mm)	
Tungsten	3.57	4340	
Gap	0.14	4343.57	
Front Fanout	0.15	4343.71	
Metalization (pads)	0.02	4343.86	
Si sensor	0.32	4343.88	4344.04
Metalization (HV)	0.02	4344.2	
Fanout HV	0.15	4344.22	
Carbon fiber	0.13	4344.37	
		4344.5	



Middle of the sensor

LumiCal sensor specifications

Wafer specifications:

n-type silicon, p+ strips, n+ backplane
crystal orientation <100>
320 um thickness +/- 15 um

General ratings

Chipfigure: heptagon
Coordinates of corners: (-50837,113713) , (-25040,118800)
(0,120685)
(25040,118800) , (50837,113713)
(20291,-285) , (-20291,-285) [um]

Number of strips: 64 x 4 (total 256) ch
Strip pitch: 1800 um
Strip P+ width: 1600 um
Strip AL width: 1700 um

backplane: ALL Al metalization

inspections and specs.

Inspections: (/detector)

- ① I-V characteristics (0-200V) at most inner guard ring
- ② C-V characteristics(0-150V) at monitor PD.
and estimated full depletion voltage (Vfd).
- ③ NG channels.
DC NG(ch short ,Bad isolation , Leaky strip)

(/LOT)
Vfd: <120 V
NG channels: <2% (5ch max)
GRId@100V: <500 nA
GRId@200V: <3 uA

“Fanout glue proposal”

