

Power cables

Status & Constraints

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Current Situation

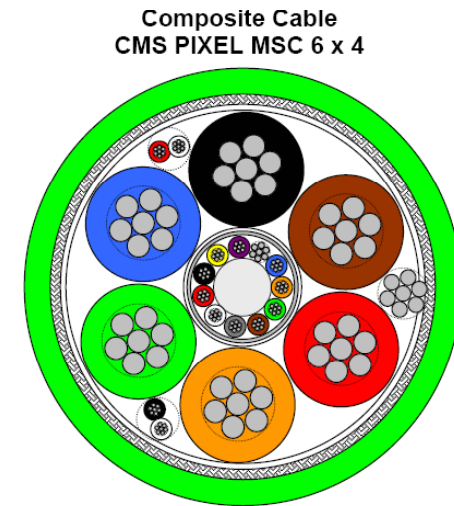
3 layers of BPIX served by 64 MSC and 8 AUX cables

Max. current: 4.5A Vana; 9A Vdig per cable (12 modules)

1 cable channel per quadrant of BPIX

Voltage drop (44m): 1V + 1V (return)

Power loss: 27 W \rightarrow \approx 10 W/m in cable channel



Single conductor: $R=0.2 \Omega$ (44m)

What's the heat load in the channels now?

Upgraded BPIX (SLHC)

Assumptions: full SLHC luminosity $10^{35} \text{ cm}^{-2} \text{ s}^{-1}$
max. irradiation of ALL 4 layers

ROC current @2.5V: $I = 560 + 450 + 440 + 570 = 2020 \text{ A}$

L1 L2 L3 L4

→ 500A for one quadrant (= single cable channel)

16 MSC cables available with 3 current loops each (10A)

Voltage drop (44m): 2V + 2V (return)

→ 120 W/cable → → 44 W/m load on cable channel

For cable channel PP1 → PP0: with MSC a 3mm^2 : 58W/m @ worse cooling!

Conclusion

With existing channels/cables direct 2.5 V supply seems impossible because of large power losses with insufficient cooling.

→ Use higher voltage supply and divide down at the detector (supply tube)