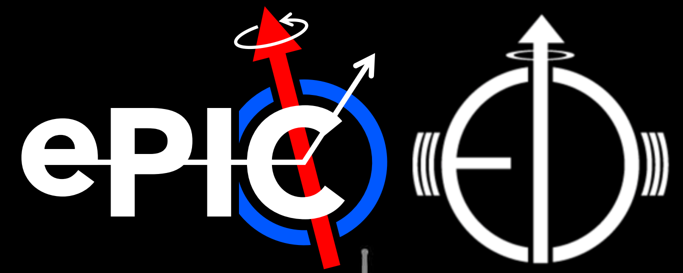
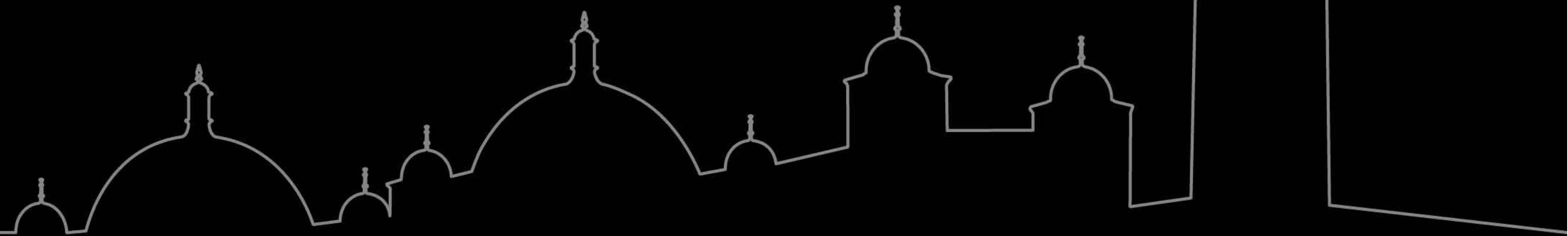


ePIC SVT OB FPC Implications

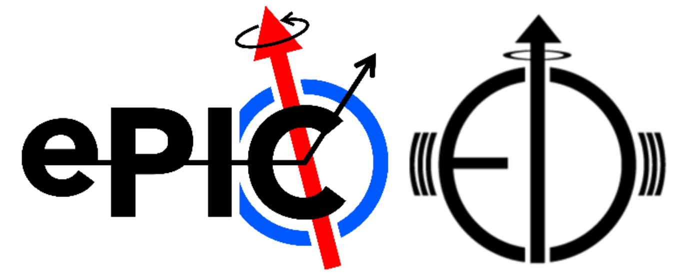
James Glover

EIC-UK WP1 (MAPS)

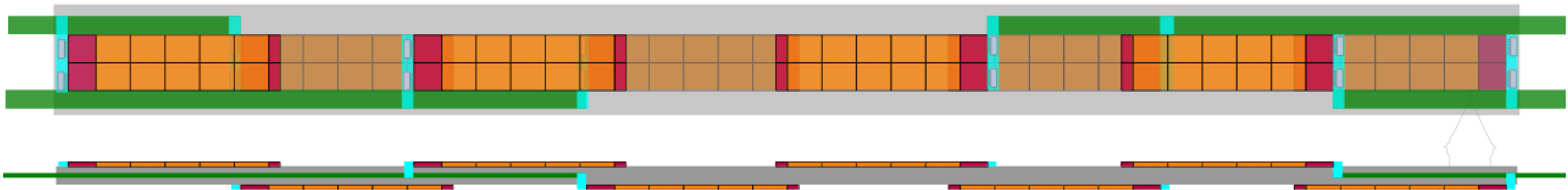
Wed, 6th November 2024



Previous OB EIC-LAS groupings



- Minimising the material and (main)FPC length was a priority.
- Lead to designs and groups that linked EIC-LAS on both stave surfaces.



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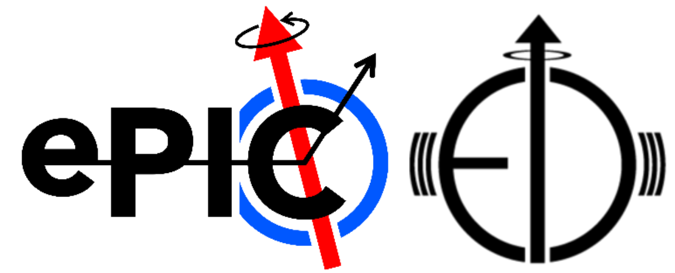
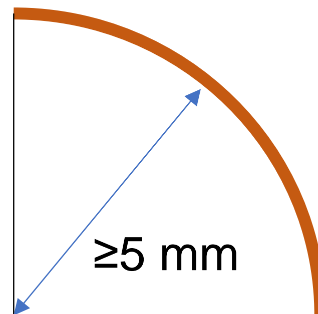
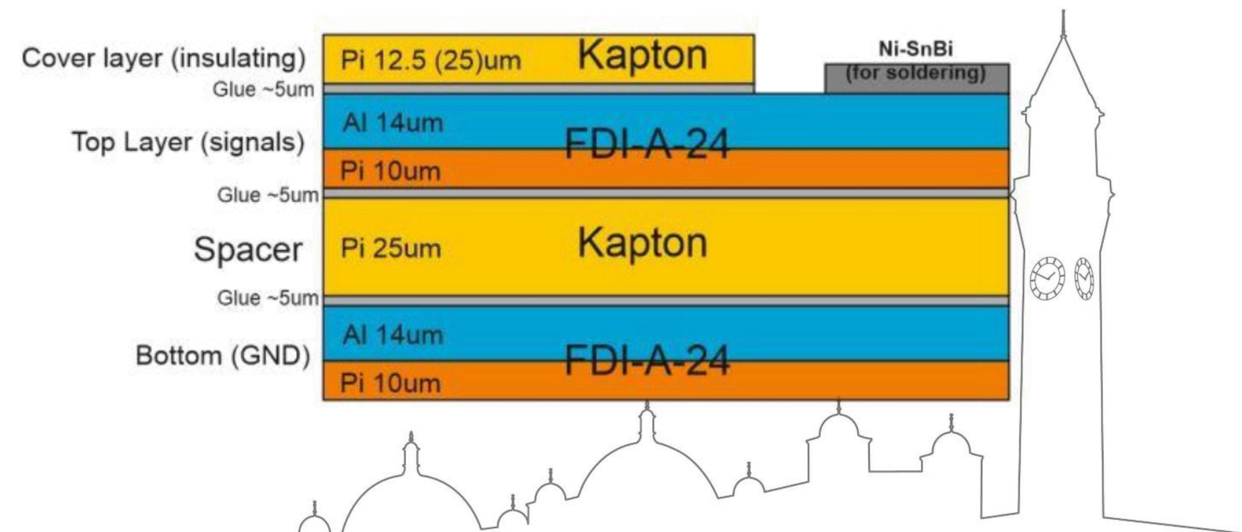
FPC bend radius



- The FPCs from LTU have a stack up of Kapton (25 μm), glue (5 μm), and aluminium foil (14 μm + 10 μm support).
- $\mathcal{O}$(110 μm) total thickness.
- The composition of this stack up limits the flexibility of the circuit.
- A minimum bend radius of 5mm has been stated to prevent the aluminium foil from fracturing within the stack up.





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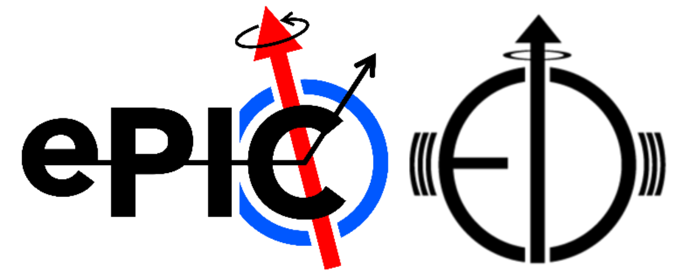
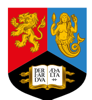
Stave thickness



- Current (curved) staves have $\mathcal{O}$(4 mm) between silicon of edge of stave – thickest (central) point of stave is $\mathcal{O}$(8 mm).
- Planned flat stave thickness is $\mathcal{O}$(6 mm), to keep similar volume for airflow.
- FPC bend radius dictates a stave thickness of >10 mm (assuming 180° of rotation).
- The FPC bend radius makes interconnection between stave faces impractical!



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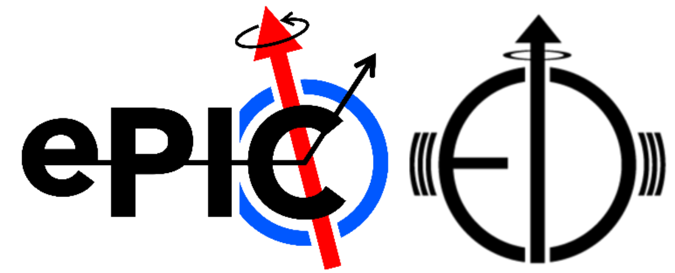
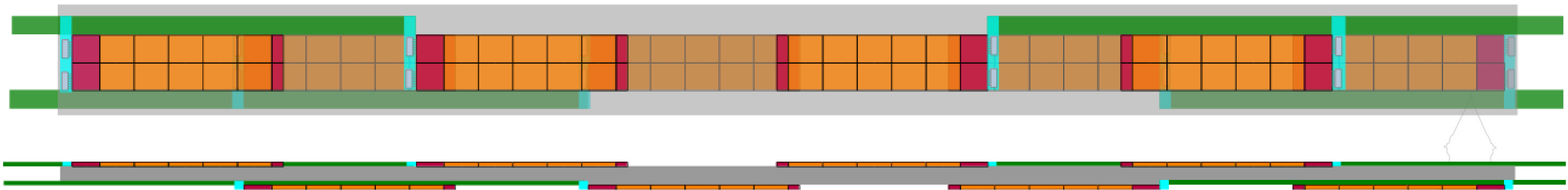
New OB EIC-LAS groupings



- To keep the stave thickness (and associated material) minimal, we need all EIC-LAS groups by 1 (main)FPC to be on the same stave side.
- Not too problematic for L4.

Layer 4 (EIC-LAS w. 5*RSU)



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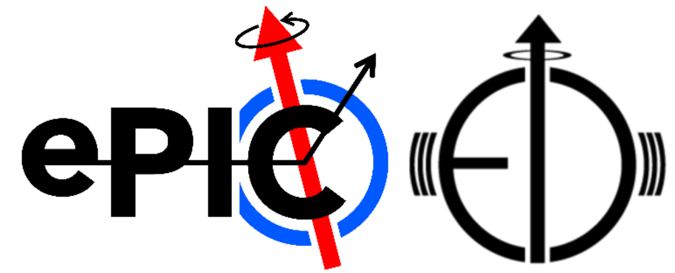
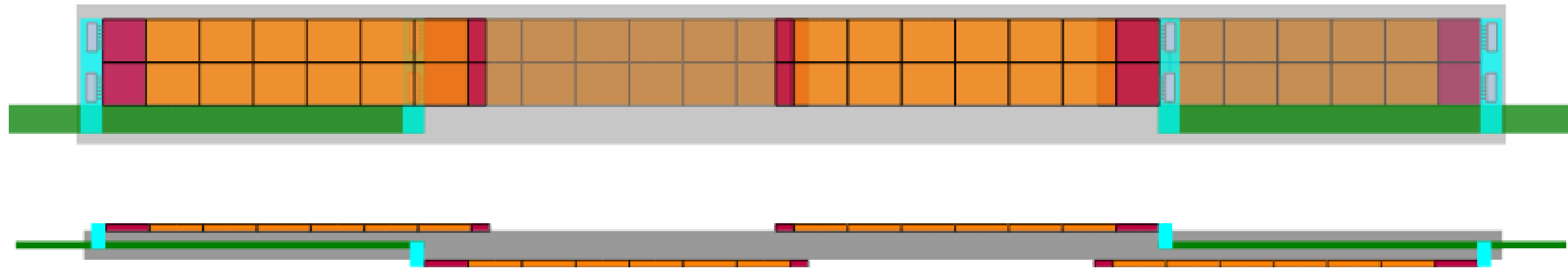
Comparisons can be seen in the support slides.

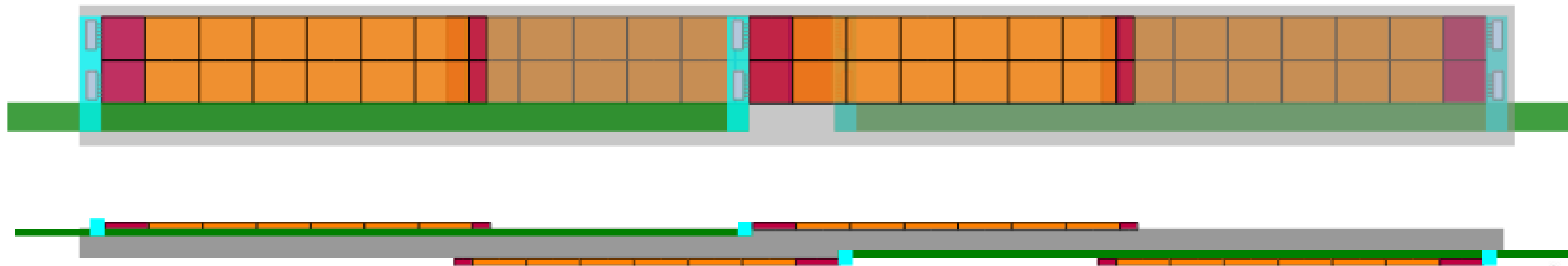
L3 adds complications

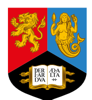


Previously, convenient for low material around IP



New (potential) groupings, more material (around IP and more FPC)!





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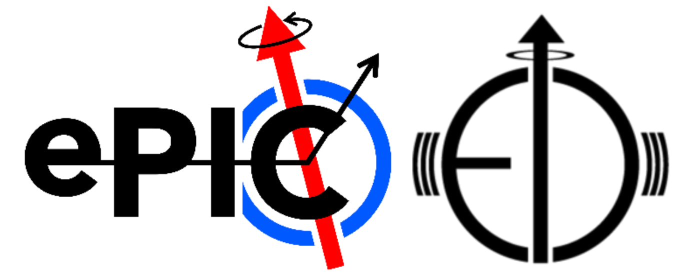
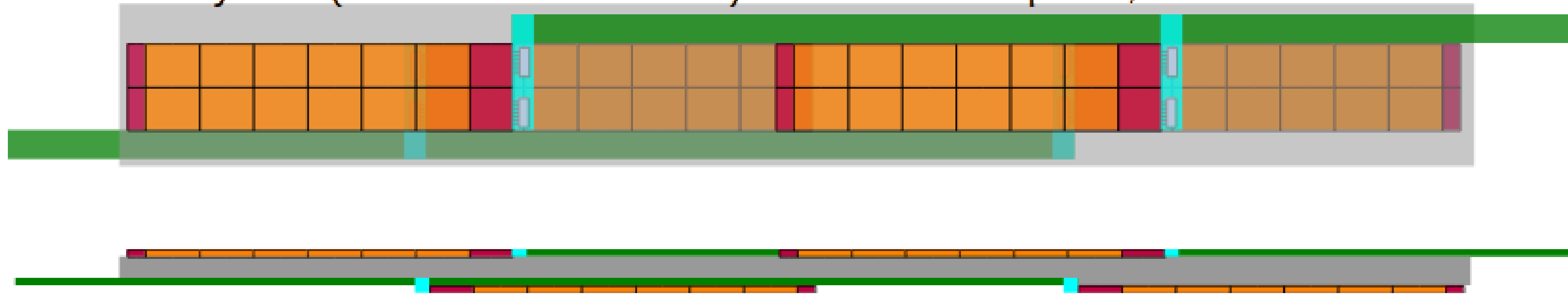
Alternative L3 options



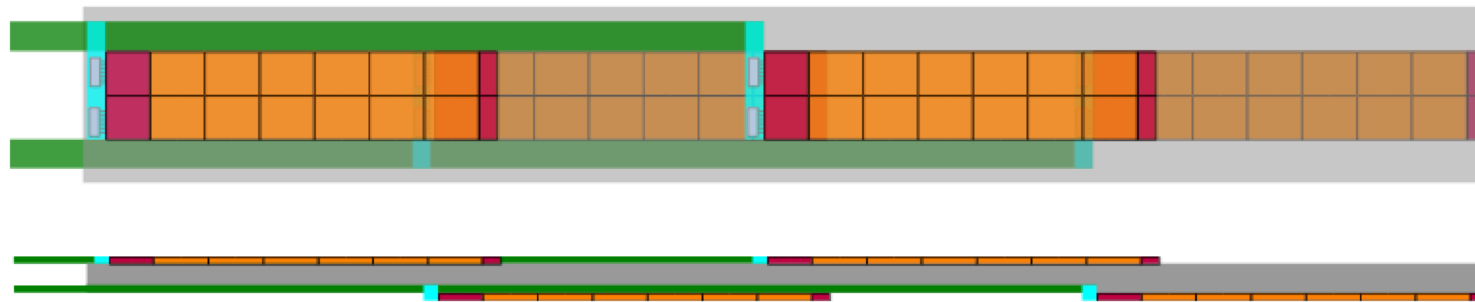
Less silicon around the IP and dead space at stave ends (more FPC):

Layer 3 (EIC-LAS w. 6*RSU) – less dead space, more material



Simplest construction (e.g. ½ L4 style), with 1-sided readout:

Layer 3 (EIC-LAS w. 6*RSU) – 1-sided readout



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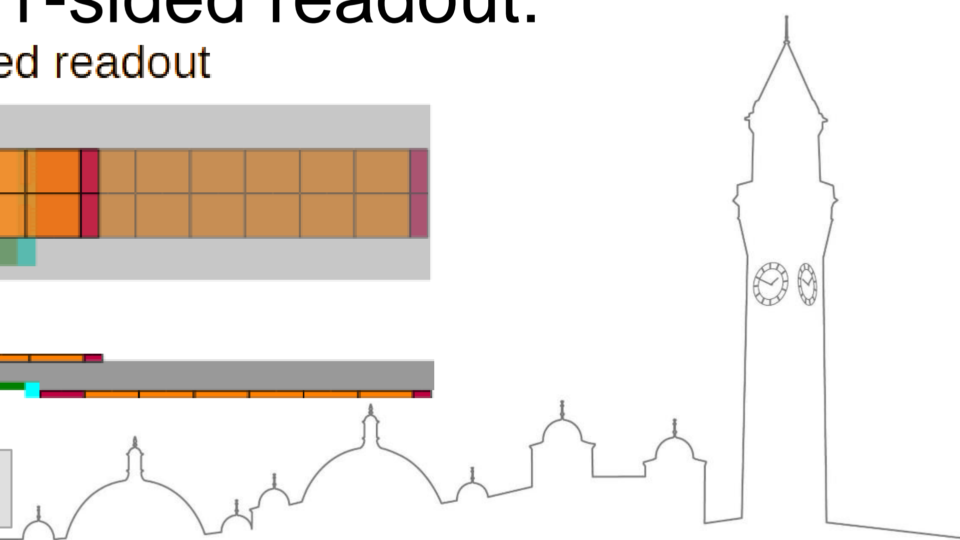
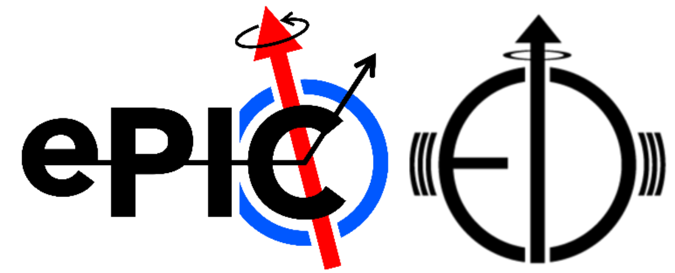
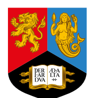


Comparisons can be seen in the support slides.

Bridge FPC (module) testing



- How do we test modules (2 EIC-LAS) through the (bridge)FPC?
- If we bond the (bridge)FPC to a test board, the bond area will not be reusable, ∴ it cannot be the same bond area as intended for the interconnection with the (main)FPC.
- 14 μm of aluminium is (probably) too fragile to probe.
- We need dedicated test pads on the (bridge)FPC.
  - How many times will we test a stand-alone module?
  - Will we need a sacrificial extension for the (bridge)FPC for testing?
    - Is this then cut off when mounting the module to the stave (to save material)?
    - Need a reliable cutting procedure to not damage the module and/or stave.



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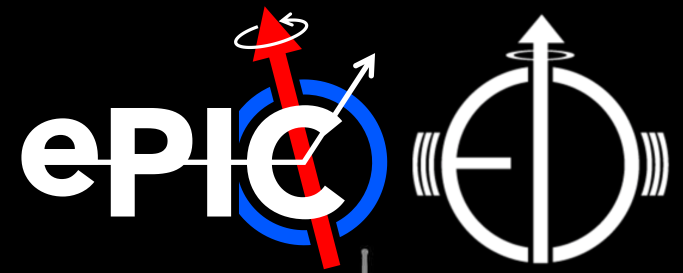
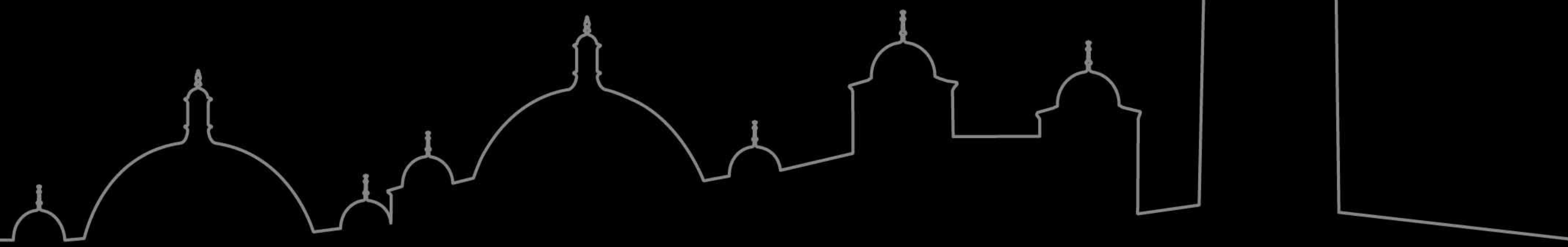


Thank you very much!

Any questions?



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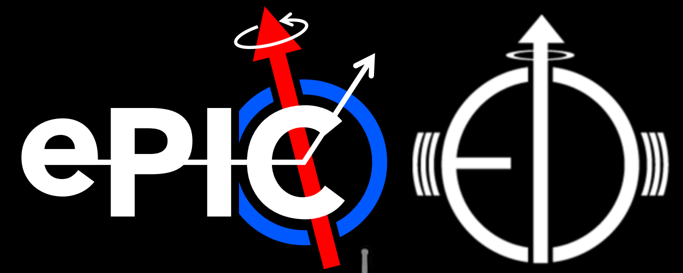
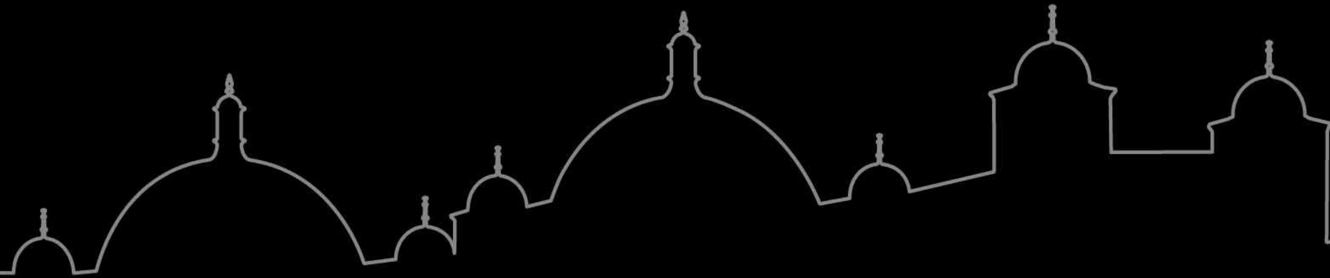
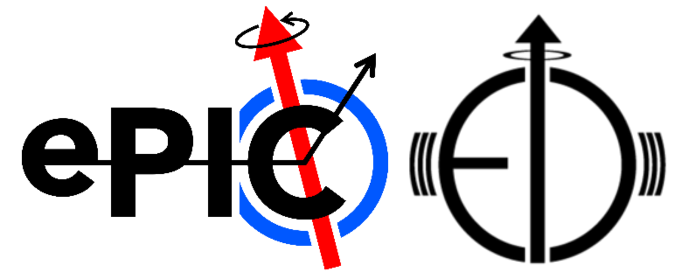


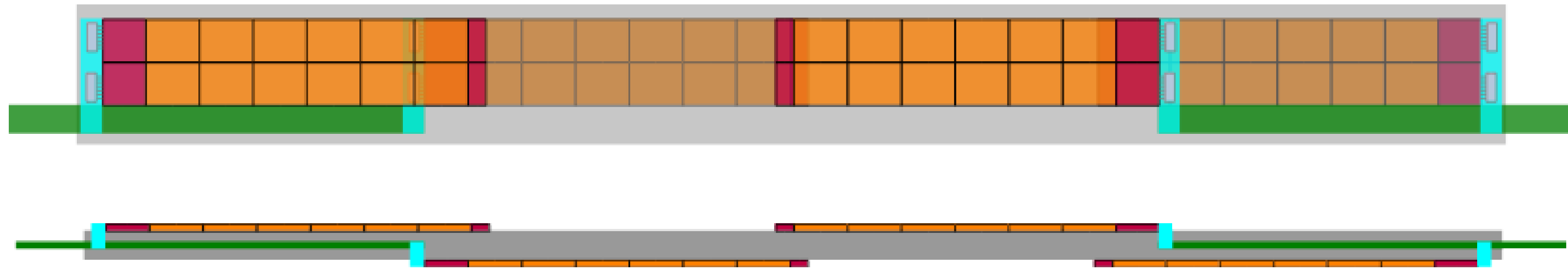
Additional (support) slides



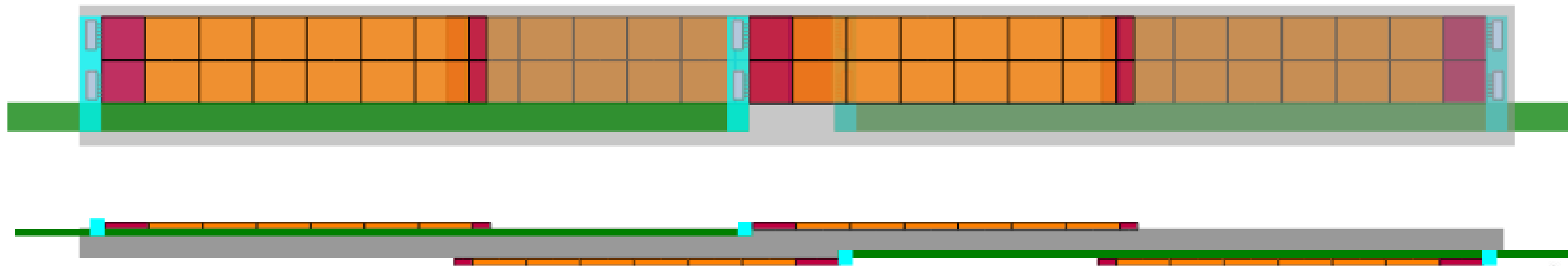
L3 adds complications

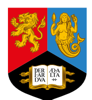


Previously, convenient for low material around IP



New (potential) groupings, more material (around IP and more FPC)!





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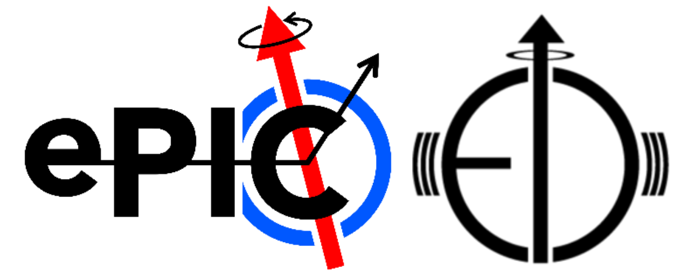
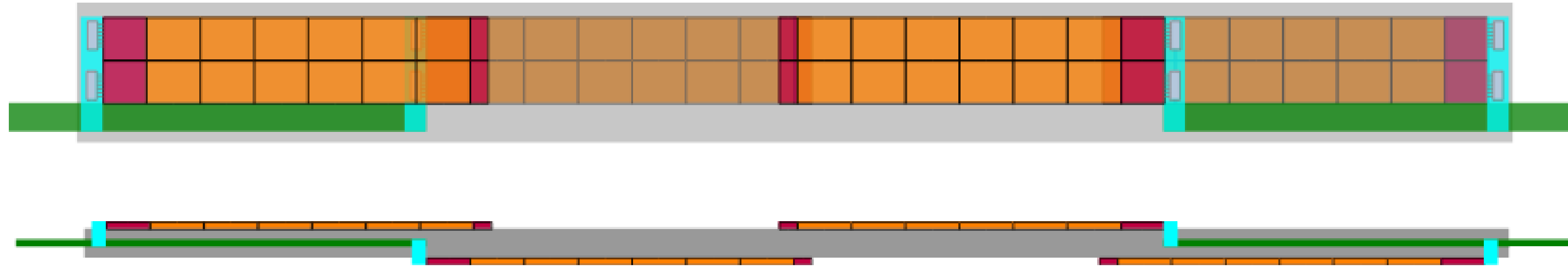
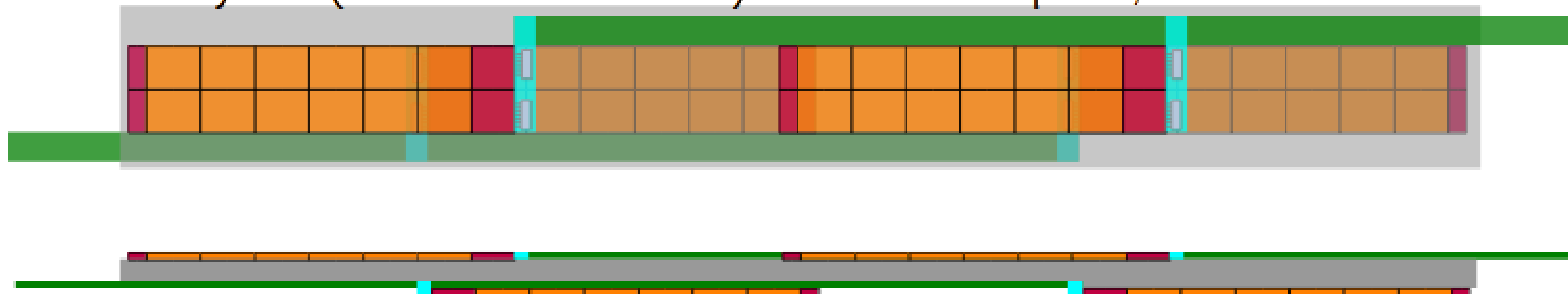
Compare L3 (less dead space)

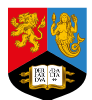


Previous groupings:



Less dead space (more material):

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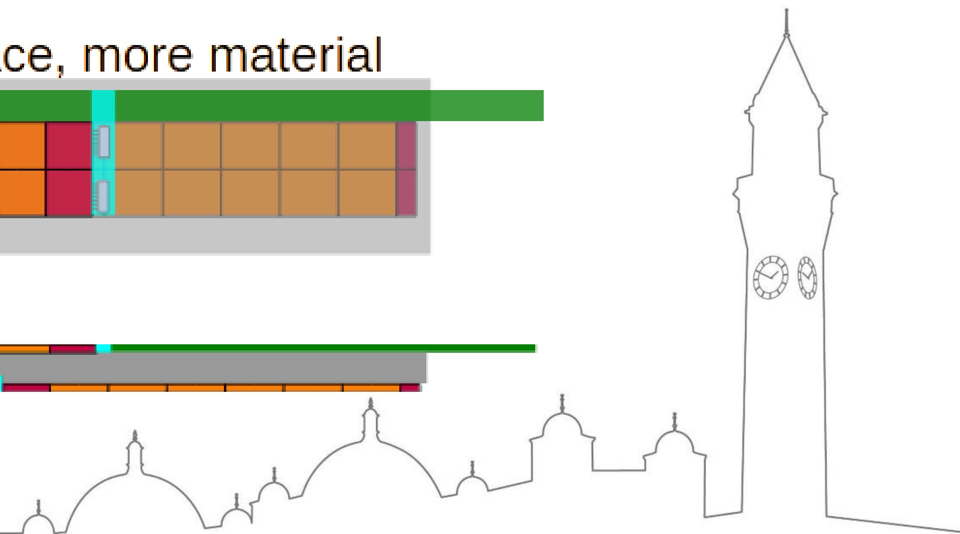
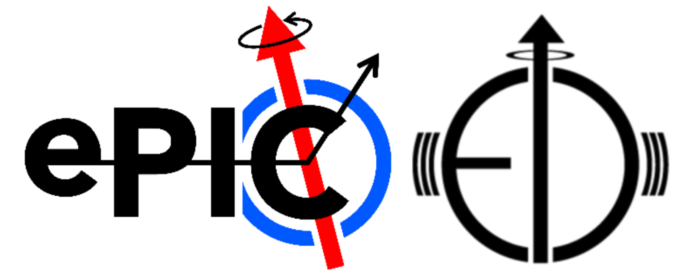
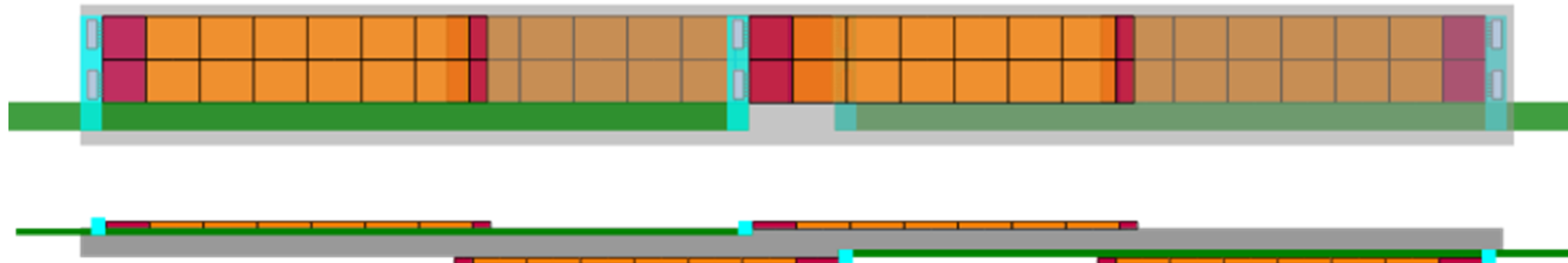


Compare L3 (newer groupings)



New (potential) groupings, more material (around IP and more FPC)!



Less dead space (more material):

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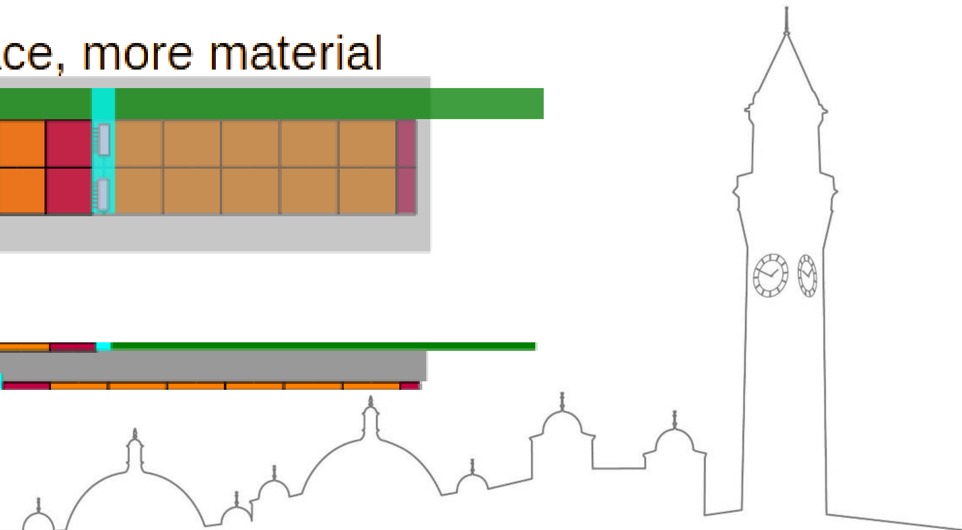
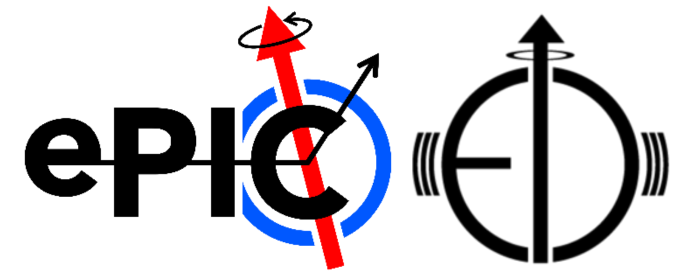
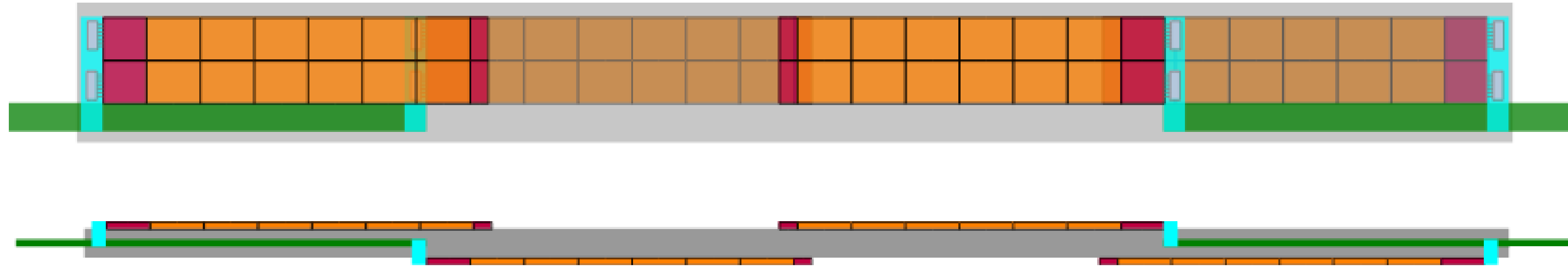


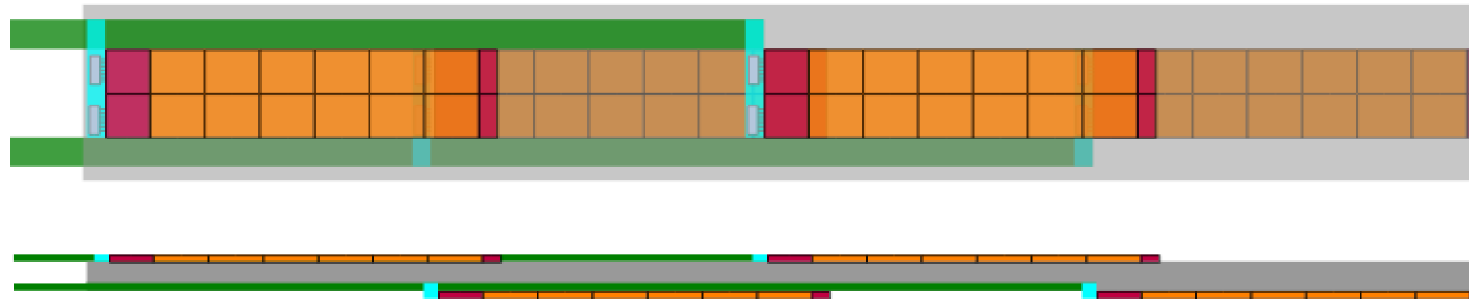
Compare L3 (1-sided readout)

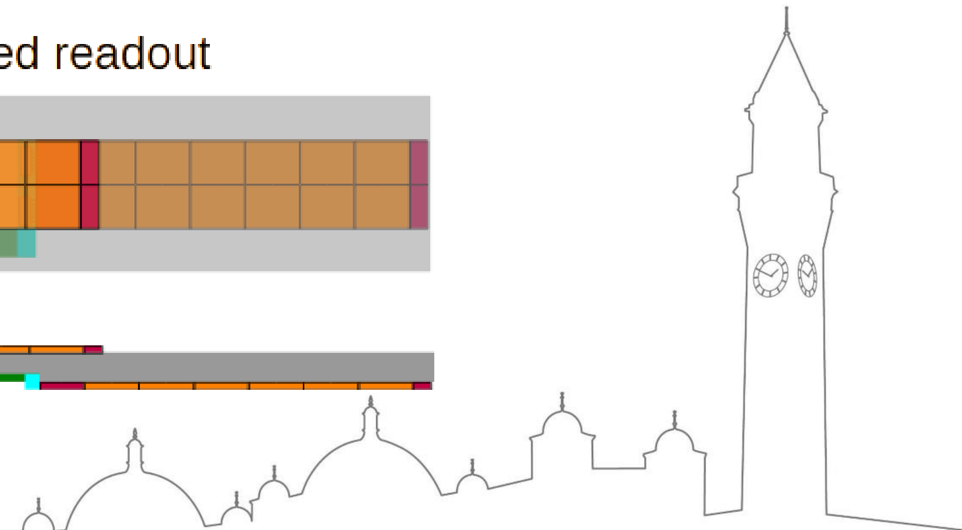


Previous groupings:



1-sided readout:





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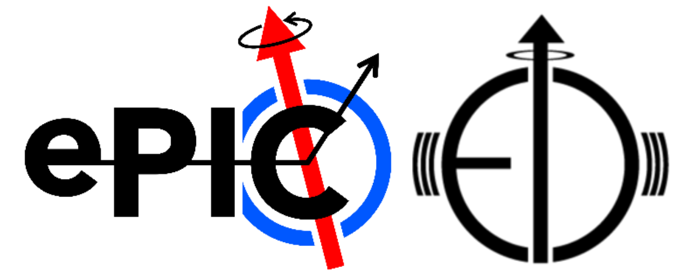
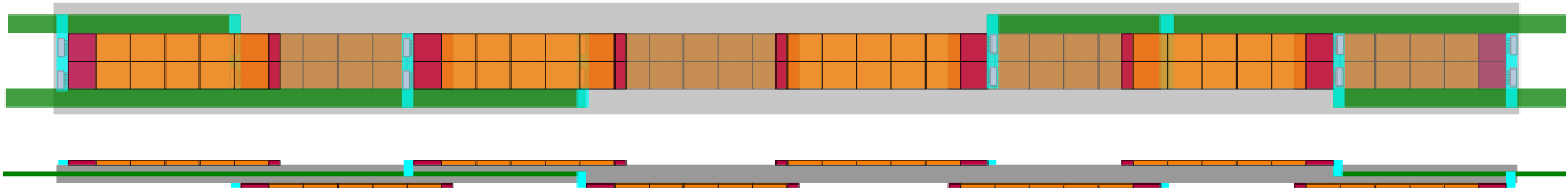
Compare L4



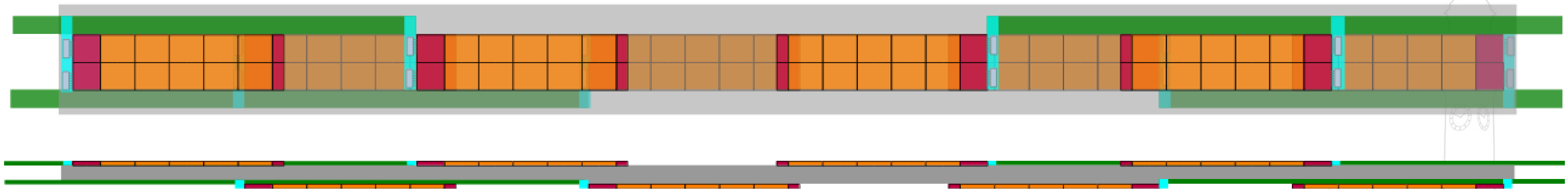
Previous groupings:

Layer 4 (EIC-LAS w. 5*RSU)



New groupings (FPC change only):

Layer 4 (EIC-LAS w. 5*RSU)



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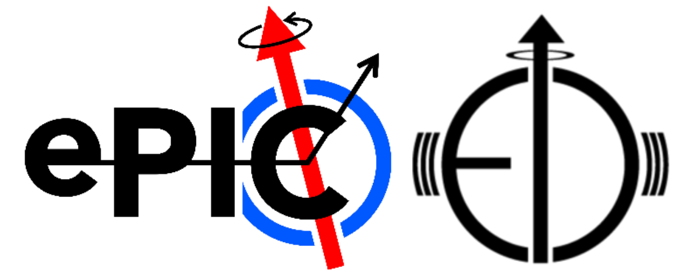
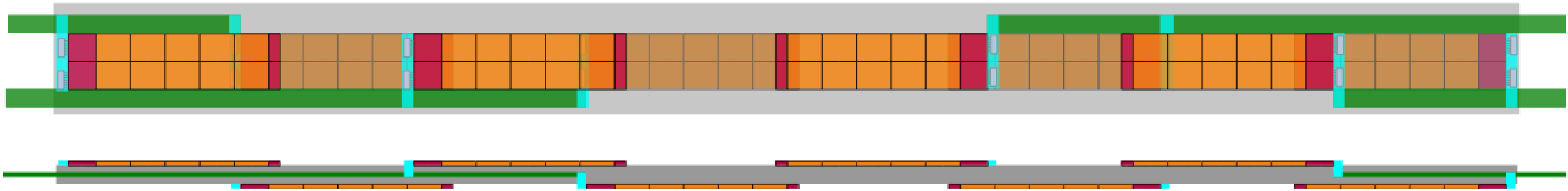
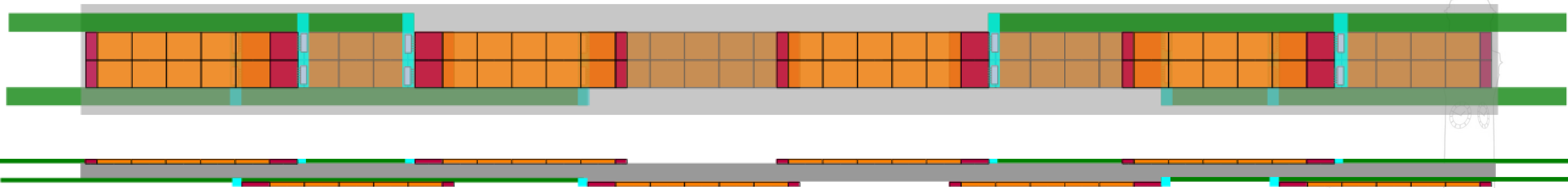
Compare L4



Previous groupings:



New groupings (complex FPC, less dead space):



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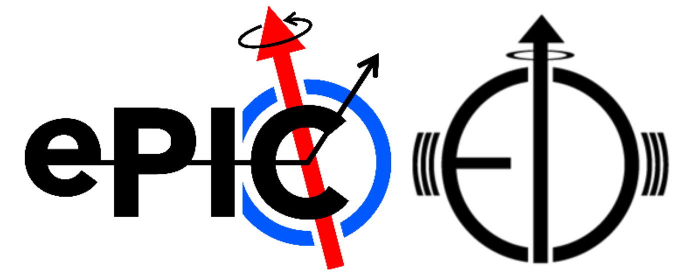
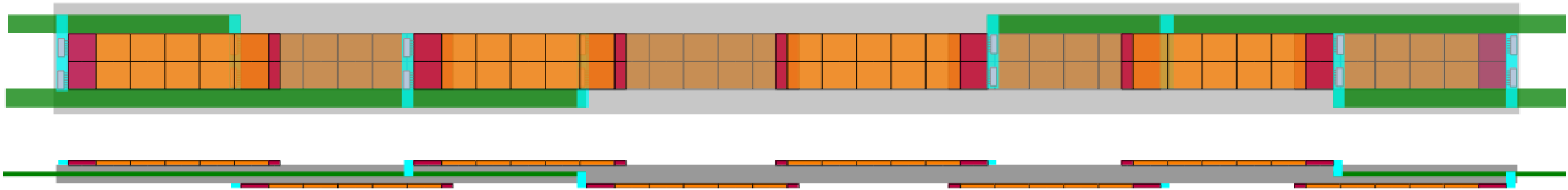
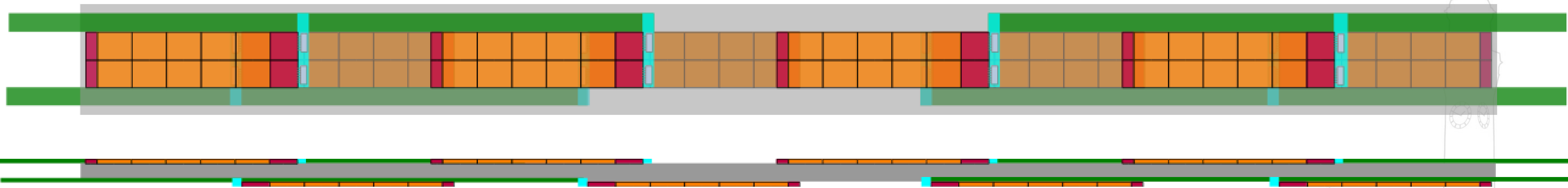
Compare L4



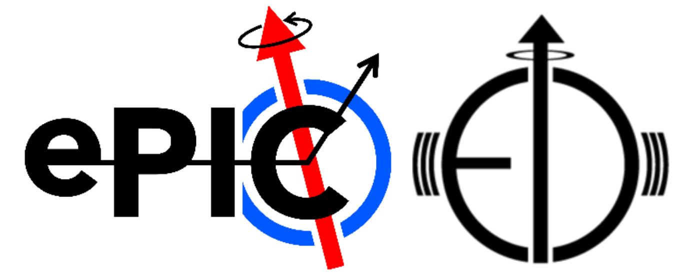
Previous groupings:



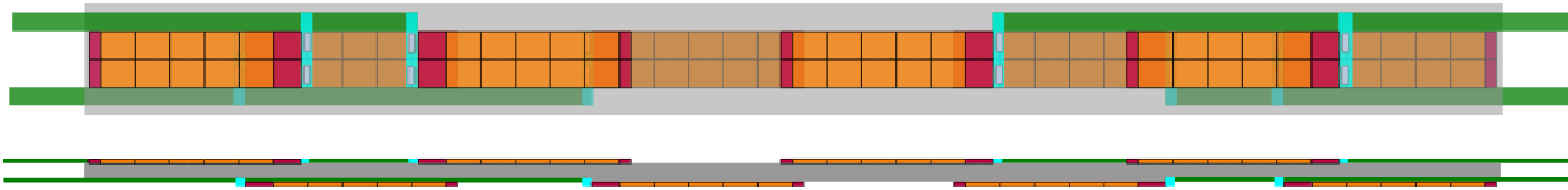
New groupings (simpler FPC, less dead space):



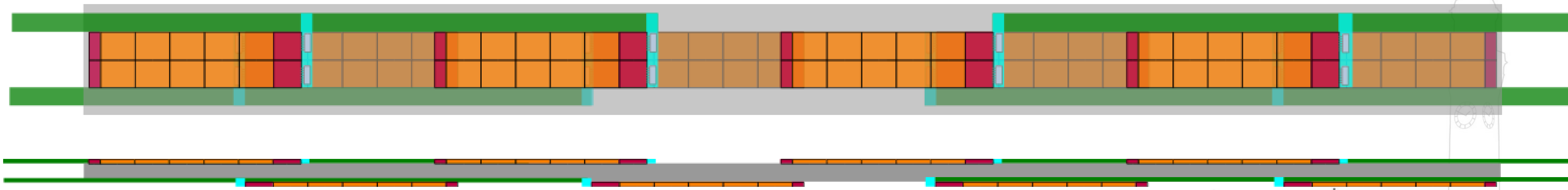
Compare L4 (less dead space)



Complex FPC:



Simpler FPC:



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