Update on beam loads on IR collimators

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WP10
Energy deposition & R2E

ColUSM#120

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Simulations:
- Horizontal crossing (250 μrad).
- Ultimate: 7.5 Lo.
- Power values scale with luminosity.

Collimators:
- 3 TCLs.
- 4 TCTs.
- Considering 14 σ for TCLs and 10.5 σ for TCTs for 2.5 μm emittance.

Masks:
- In front of Q4, Q5 and Q6.
# Energy deposition in the collimators

<table>
<thead>
<tr>
<th>collimator</th>
<th>inner/upper jaw</th>
<th>outer/lower jaw</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCLX4</td>
<td>226</td>
<td>157</td>
</tr>
<tr>
<td>TCTXV4</td>
<td>6.6</td>
<td>6.9</td>
</tr>
<tr>
<td>TCTXH4</td>
<td>3</td>
<td>14</td>
</tr>
<tr>
<td>TCL5</td>
<td>19</td>
<td>123</td>
</tr>
<tr>
<td>TCL6</td>
<td>19</td>
<td>41</td>
</tr>
<tr>
<td>TCTV6</td>
<td>0.5</td>
<td>0.6</td>
</tr>
</tbody>
</table>

*Updated to v1.5*
Energy deposition in TCLX4

Layout of the collimators region before Q4-assembly

Power in the TCLX4 tank: 25 W

Information provided to EN-MME for thermomechanical considerations.

12.5 cm from the front face
TCLMs: masks design for Q4, Q5 and Q6

TCLMs geometry:

- Cylinder of inermet surround the beam pipe.
- No material in the middle.
- TCLM4: 1 m length and $\Phi_0 = 14$ cm.
- TCLM5/6: 1 m length and $\Phi_0 = 10$ cm.
- 1 mm copper inner pipe.

<table>
<thead>
<tr>
<th>mask</th>
<th>total power [W @ 7.5$L_0$]</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCLM4</td>
<td>30 (5% B2)</td>
</tr>
<tr>
<td>TCLM5</td>
<td>12 (20% B2)</td>
</tr>
<tr>
<td>TCLM6</td>
<td>2.3 (5% B2)</td>
</tr>
</tbody>
</table>

Horizontal crossing, HL-LHCv1.3

following BS design and orientation of the downstream magnets
Effect of the B2-mask: Q4-assembly

Peak dose profile in the inner coils (L_{int} = 3000 fb^{-1})
Summary and conclusions

- All the values for the power deposition are given for ultimate conditions, i.e., 7.5 Lo. They scale with luminosity not with life-time.

Collimators

- The power deposition in the TCLX4, including the tank around the collimator, for the latest version of the HL-LHC optics has been provided to EN-MME team for thermomechanical studies.

Masks

- FLUKA model and specs of the TCLMs have been shown.
- There are evidences that justify the presence of the mask covering B2 in cells 4 and 5.