Imbalance of currents on Q8.L4.B1

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## Q8L4 in HL-LHC

<table>
<thead>
<tr>
<th>Optics</th>
<th>Q8.L4B1</th>
<th>Q8.L4B2</th>
<th>Ratio</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>LHC 2017 Inj. A</td>
<td>3.5393%</td>
<td>6.429%</td>
<td>0.55055</td>
<td>Not OK</td>
</tr>
<tr>
<td>LHC 2017 Inj. B and 2018</td>
<td>3.6616%</td>
<td>6.429%</td>
<td>0.56957</td>
<td>OK</td>
</tr>
<tr>
<td>HL-LHC 1.4-1.5</td>
<td>3.6738%</td>
<td>6.364%</td>
<td>0.57725</td>
<td>OK</td>
</tr>
</tbody>
</table>

**Strength Prescriptions:**
- minimum current >3%
- 0.5<ratio<2

Prescription not very accurate due to circuits actual parameters.

HL optics more conservative than LHC optics 2018.
Voltage prediction

Expected voltages from imposed currents can be predicted fairly well:
- by taking into account interaction between currents
- and solving more realistic circuits (e.g. 2-in-1 with 2 inductances 5 resistances and 2 voltage source).

"Diodes" are indeed in parallel, but coarsely modeled as a constant voltage drop.
They determine the voltage at low current or negative $\frac{dI}{dT}$ and are important because we are often optimal when $V\sim0$.

Q6 L5 normal cycle

\[
\begin{align*}
L1 &= 21.1 \text{ mH} \\
L2 &= 21.3 \text{ mH} \\
R1 &= 236 \text{ $\mu$\Omega} \\
R2 &= 203 \text{ $\mu$\Omega} \\
R3 &= 202 \text{ $\mu$\Omega} \\
D1 &= 22.8 \text{ mV} \\
D2 &= 0.9 \text{ mV}
\end{align*}
\]