



# Loss Maps Validation

Frederik Van der Veken *on behalf of the collimation and MP teams*

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# LHC Ion Cycle in 2023

|                                   | E [GeV]  | $\beta^*_{1/5}$ [m] | $\beta^*_2$ [m] | $\beta^*_8$ [m]    | X 1 [ $\mu$ rad]<br>V | X 5 [ $\mu$ rad]<br>H | X 2 [ $\mu$ rad]<br>V | X 8 [ $\mu$ rad]<br>H   |
|-----------------------------------|----------|---------------------|-----------------|--------------------|-----------------------|-----------------------|-----------------------|-------------------------|
| <b>Injection</b>                  | 450      | 11                  | 10              | 10                 | 170                   | 170                   | 170                   | -170                    |
| <b>Ramp</b>                       | 450-6800 | 11 $\rightarrow$ 2  | 10              | 10 $\rightarrow$ 2 | 170                   | 170                   | 170                   | -170 $\rightarrow$ -135 |
| <b>Flat Top</b>                   | 6800     | 0.5                 | 0.5             | 1.5                | 170                   | 170                   | 170                   | -135                    |
| <b>Tune Change</b>                | 6800     | 0.5                 | 0.5             | 1.5                | 170                   | 170                   | 170                   | -135                    |
| <b>Physics</b> (pos polarity IP2) | 6800     | 0.5                 | 0.5             | 1.5                | 170                   | 170                   | 170                   | -135                    |
| <b>Physics</b> (neg polarity IP2) | 6800     | 0.5                 | 0.5             | 1.5                | 170                   | 170                   | -170                  | -135                    |

*See presentation by R. Bruce for more detail*

# Loss Maps Matrix: Ions

| 450 GeV |           | 6.8 Z TeV |            |    |                               |                               |
|---------|-----------|-----------|------------|----|-------------------------------|-------------------------------|
|         | Injection |           | Top Energy |    |                               |                               |
|         | Prot. IN  | Prot. OUT | FT         | QC | Physics positive polarity IP2 | Physics negative polarity IP2 |
| B1H     | ✓         | ✓         | ✓          | ✓  | ✓                             | ✓                             |
| B1V     | ✓         | ✓         | ✓          | ✓  | ✓                             | ✓                             |
| B2H     | ✓         | ✓         | ✓          | ✓  | ✓                             | ✓                             |
| B2V     | ✓         | ✓         | ✓          | ✓  | ✓                             | ✓                             |
| +dp/p   | ✓         | ✓         | ✓          |    | ✓                             | ✓                             |
| -dp/p   | ✓         | ✓         | ✓          |    | ✓                             | ✓                             |
| ASD     | ✓         | ✓         |            |    | ✓                             | ✓                             |

# Other configurations

- **PP reference run**
  - Equivalent to ion run but with protons (for experiments), hence at  $82/208 * 6.8\text{TeV} = 2.68\text{ TeV}$
- **Van der Meer scan**
  - As usual but no crossing change in ATLAS
- **PP nominal**
  - Not a validation, for internal reference
- **Collisions at injection**
  - Full set of loss maps, already performed and validated (this morning)
- **High beta run**
  - no extra loss maps needed

# Loss Maps Matrix: PP ref

|       | 450 GeV   |           | 2.68 TeV   |    |            |
|-------|-----------|-----------|------------|----|------------|
|       | Injection |           | Top Energy |    |            |
|       | Prot. IN  | Prot. OUT | FT         | QC | Collisions |
| B1H   | ✓         | ✓         | ✓          | ✓  | ✓          |
| B1V   | ✓         | ✓         | ✓          | ✓  | ✓          |
| B2H   | ✓         | ✓         | ✓          | ✓  | ✓          |
| B2V   | ✓         | ✓         | ✓          | ✓  | ✓          |
| +dp/p | ✓         | ✓         | ✓          |    | ✓          |
| -dp/p | ✓         | ✓         | ✓          |    | ✓          |
| ASD   |           |           |            |    | ✓          |

# Loss Maps Matrix: VdM

|       | 450 GeV   |           | 6.8 TeV    |    |            |
|-------|-----------|-----------|------------|----|------------|
|       | Injection |           | Top Energy |    |            |
|       | Prot. IN  | Prot. OUT | FT         | QC | Collisions |
| B1H   | ✓         | ✓         | ✓          | ✓  | ✓          |
| B1V   | ✓         | ✓         | ✓          | ✓  | ✓          |
| B2H   | ✓         | ✓         | ✓          | ✓  | ✓          |
| B2V   | ✓         | ✓         | ✓          | ✓  | ✓          |
| +dp/p | ✓         | ✓         |            |    | ✓          |
| -dp/p | ✓         | ✓         |            |    | ✓          |
| ASD   |           |           |            |    | ✓          |





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