

# PS-Booster Ejection Correction Dipoles

## Goal

Attempt to reproduce the results in <http://wwwpsco.cern.ch/private/gm/gmdescrip/LINC-Note.pdf>

- Used the latest configuration files for **Ring 3** from Vivien for the ring
- **Matched the optics in MADX (32 bits)** to get the tunes  $Q_H = 4.17$  and  $Q_V = 5.23$
- After add a horizontal or vertical kick from one of the correction dipoles
- Compare the closed orbit with the one from the note
- Extract the geometrical relations between the kicks at the entry point and at the center of the ejection Septum, SMH15L1
- Trying to use the 2014 configuration but moving dipole correctors and septum in the position mentioned in the note

## Head-to-head Comparison

- Configuration 5: **Expected from Note**
  - center of DHZ,DVT 4L1 at=1.327-0.426 m = 0.901 m
  - center DHZ,DVT 11L1 at=1.327-0.950 m = 0.377 m
  - entrance of SMH15L1 4L1 at=1.327-0.8 m = 0.527 m

With the entrance of the septum we understood the beginning of the SMH15L1 septum blade. From the drawing (thanks to M. Houricane), the blade does not appear to be centered simmetrically w.r.t. the tank, but slightly shifted upstream, see sketch in Figure 1. We Labeled **A** the distance between the beginning of the tank and the beginning of the blade, **B** the blade length, **C** the distance between the end of the blade and the end of the tank and **X** the distance between the beginning of the blade and the center of the tank. With some simple math one can deduct that:

$$X = \frac{B + C - A}{2} \quad (1)$$

Using the values from drawing PS.CA.98411.1 of  $A=121.03$  mm,  $B=1000.24$  mm and  $C=138.21$  mm, one obtains  $X=508.706$  mm. Thus if in the configuration expected from the note one sets the SMH15L1 entrance to be at 0.527 m, this means the center of SM15L1 is at  $(0.507+0.508706)$  m = 1.015706 m.

The results of using these values and a kick of 1 mrad are summarized in Table 1.

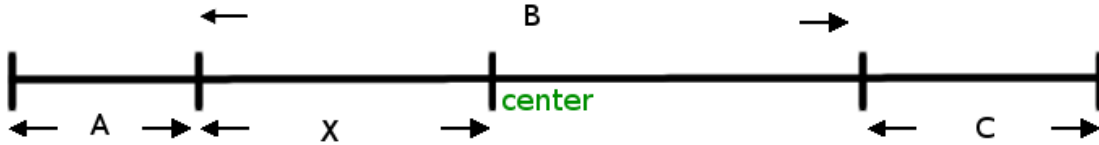


Figure 1: simplified drawing of SMH15L1. **A** is the distance between the beginning of the tank and the beginning of the blade. **B** is the blade length. **C** is the distance between the end of the blade and the end of the tank.

Table 1: Comparison for the geometrical relation between the kicks in the different PSB sections at the entrance of SMH15L1

| Kicker      | Note Value                                                              | Config. 5              |
|-------------|-------------------------------------------------------------------------|------------------------|
|             | <b>entrance of SMH15L1</b>                                              | <b>Beginning Blade</b> |
| BE3.DHZ4L1  | $\Delta X_{ES}[\text{mm}] = 0.760 \cdot \text{DHZ4L1} [\text{mrad}]$    | 0.786                  |
|             | $\Delta X'_{ES}[\text{mm}] = 0.947 \cdot \text{DHZ4L1} [\text{mrad}]$   | 0.938                  |
| BE3.DHZ11L1 | $\Delta X_{ES}[\text{mm}] = 5.615 \cdot \text{DHZ11L1} [\text{mrad}]$   | 5.572                  |
|             | $\Delta X'_{ES}[\text{mm}] = 0.104 \cdot \text{DHZ11L1} [\text{mrad}]$  | 0.105                  |
| BE3.DVT4L1  | $\Delta Y_{ES}[\text{mm}] = -2.122 \cdot \text{DVT4L1} [\text{mrad}]$   | -2.143                 |
|             | $\Delta Y'_{ES}[\text{mm}] = 0.021 \cdot \text{DVT4L1} [\text{mrad}]$   | 0.023                  |
| BE3.DVT11L1 | $\Delta Y_{ES}[\text{mm}] = 0.669 \cdot \text{DVT11L1} [\text{mrad}]$   | 0.710                  |
|             | $\Delta Y'_{ES}[\text{mm}] = -0.793 \cdot \text{DVT11L1} [\text{mrad}]$ | -0.798                 |