Alignment and Polarity of the R₅₆ Compensation Chicanes

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There will be seven (7) R_{56} Compensation Chicanes (R56CC) in the LCLS-II accelerator. The plan at present is that each R56CC will consist of four (4) Damping Ring dipoles (0.788D11.50; drawing number SA-237-005-02). Each bend has magnet poles whose flat central part is 8.76 inches long by ~2.9 inches wide. The center-to-center Z-separation of the bends (poles) will be 55 cm. In order to minimize the distance between the Z-centerline of the poles and the beam trajectory through the chicane, for all allowed values of the total chicane offset (0-10 mm), all four (4) bends will be installed with their centers aligned along a straight line that is shifted 5 mm horizontally (in the bend direction) from the chicane OFF trajectory. The horizontal Beam Stay Clear (BSC) for these bends has been adjusted to take account of this 5 mm shift. Figure 1 illustrates the layout of one chicane.



Figure 1: R56CC plan view (to scale). Solid black vertical lines show the Z-extent of the bend magnet cores. Red boxes represent the flat central part of the bend poles. The solid blue curve shows the beam trajectory for the maximum offset (10 mm); the dashed blue line shows the beam trajectory for chicane OFF. The horizontal dotted black lines show the centerlines of the dipoles ... note that they are all offset at dX = -5 mm (in the bend direction). Beam moves from left to right here.



Figure 2: Notional R56CC vacuum chamber (green lines). Input and output ports are centered on the beam axis; the central box-like chamber is centered on the bend poles. Actual vacuum pipe ID and chamber width for each R56CC will be determined from BSC values.