Vertical Angle Between ML and BDS

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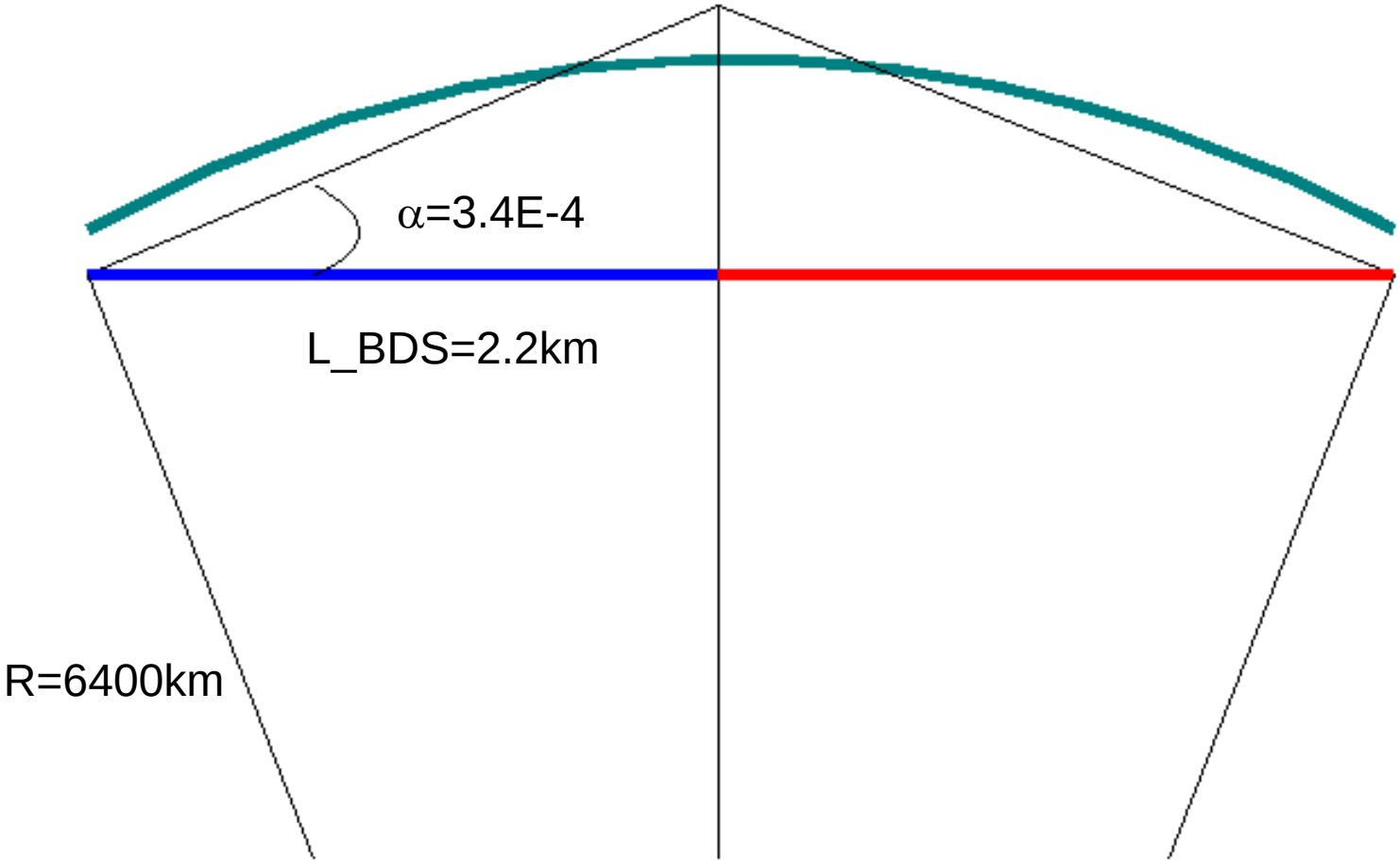
The Issue (from PT's email)

- The issue is that the MLI is currently designed to follow the curvature of the earth, and thus to have all cryomodules follow a gravitational equipotential. Meanwhile, the two sides of the BDS each have zero vertical curvature. If we do nothing, the combination of these two features would cause the e+ and e- BDS to have a vertical crossing angle with respect to each other, which is not the baseline design (the baseline has both BDS branches in the same plane, with no vertical crossing angle). I think this leaves us with two options to achieve zero vertical crossing angle:

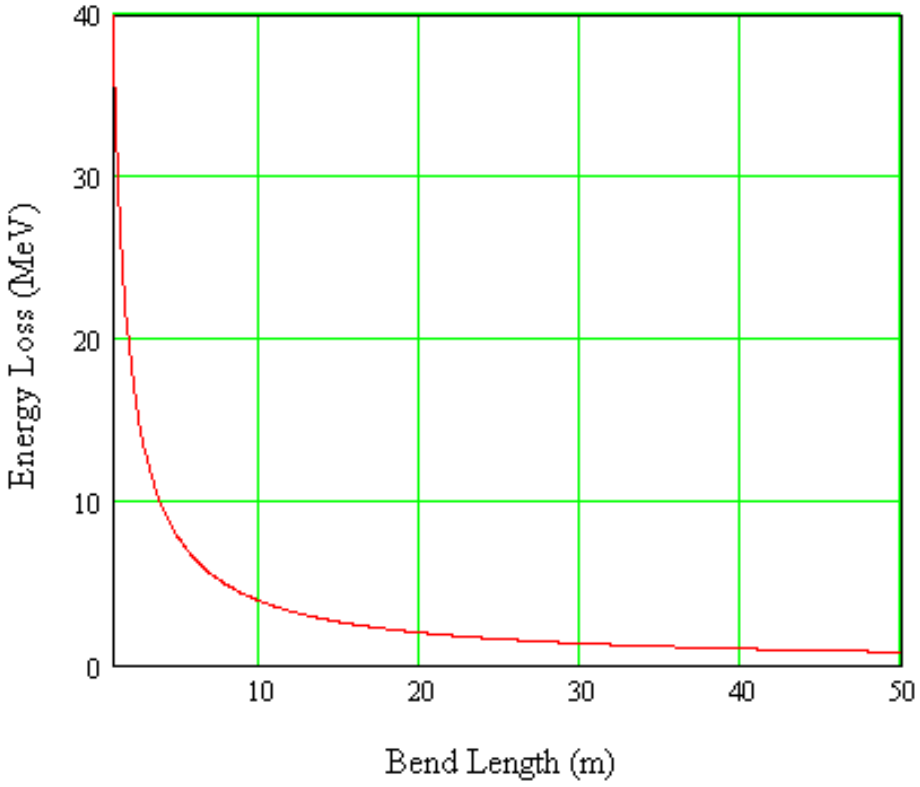
1. A vertical arc lattice between the linac and the BDS, with NC quads and bends
2. Adjusting the vertical curvature and positioning of the MLI such that the ends of the two MLIs (e+ and e-) lie in the same plane.

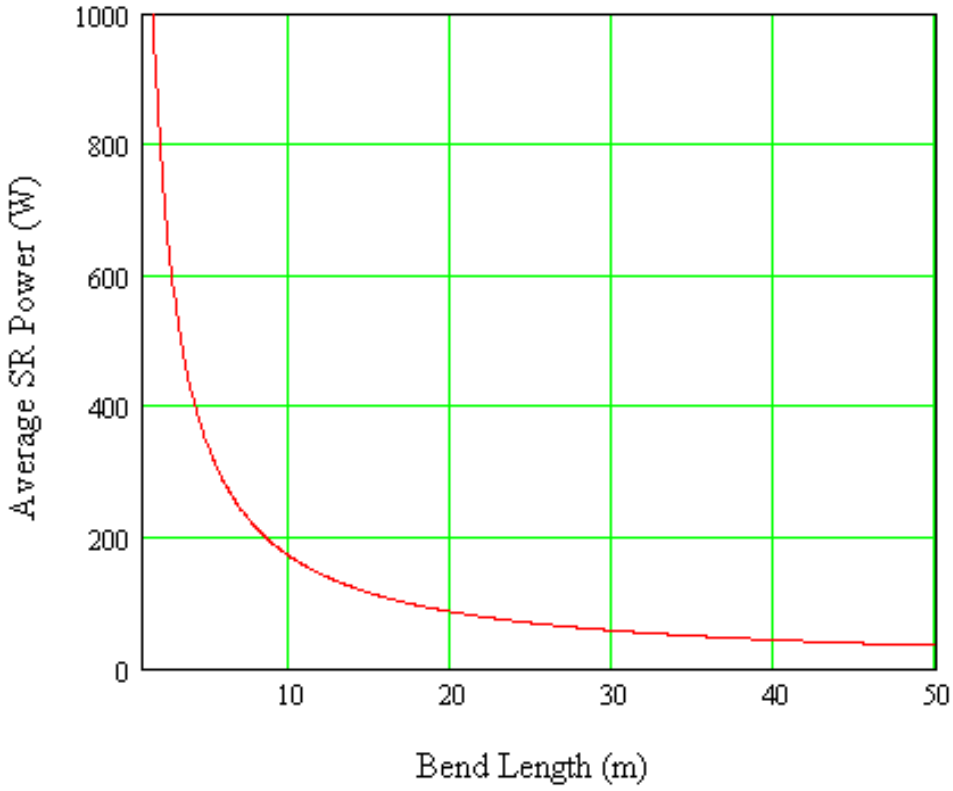
Geometry Graph



Additional Vertical Arc

- How much extra length?
- Synchrotron Radiation





Continuous Adjustment in ML

- Nominal kink between cryomodules ~2E-6
- Cryomodules in e- linac after undulator ~360
- Extra kink per cryomodule = 3.4E-4/360=~1E-6
- Change in sagitta ~1m