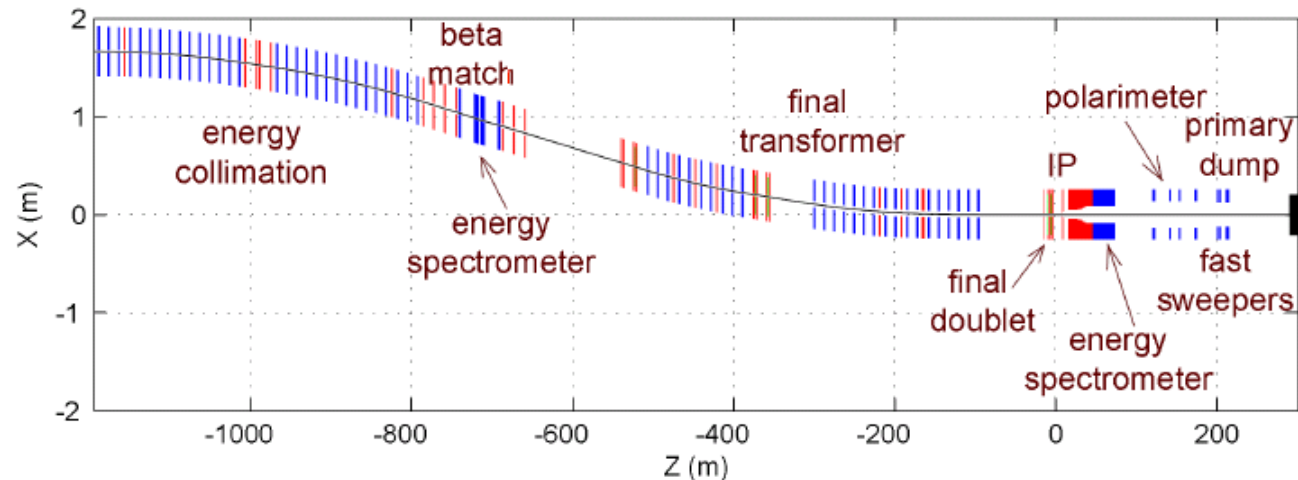
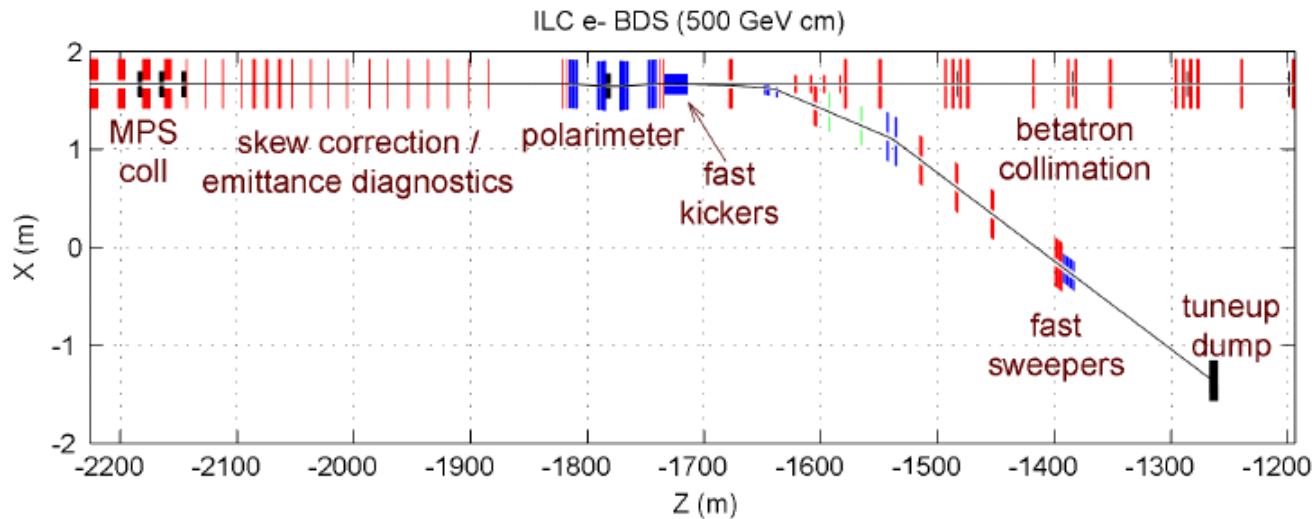


# *Vertical bend system for ILC BDS*

Toshiyuki OKUGI, KEK  
2017/ 06/ 26  
AWLC2017, SLAC

# Overview of BDS (Beam Delivery System)

*BDS is the beamline after main linac.*

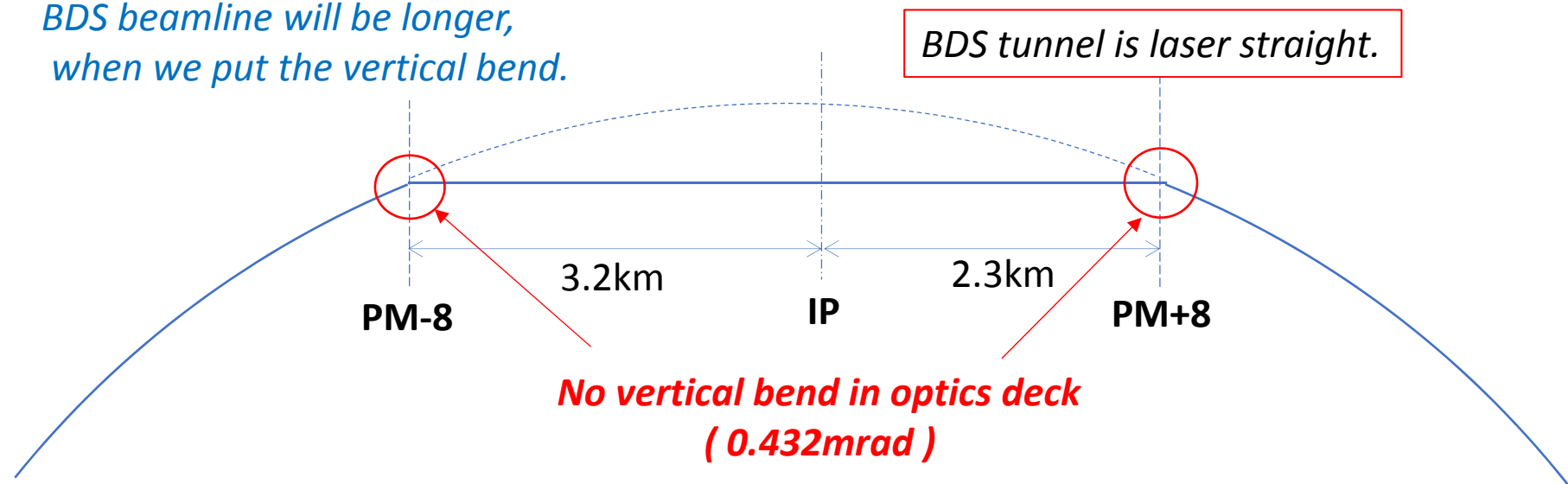


*BDS consists of*

- beam diagnostic section.
- collimator system.
- **final focus beam line.**
- beam extraction line.

# Requirement of vertical bend at entrance of BDS

*BDS beamline will be longer,  
when we put the vertical bend.*



## ILC vertical reference line

*Main linac section ; along earth curvature*

*BDS beamline ; along laser straight*

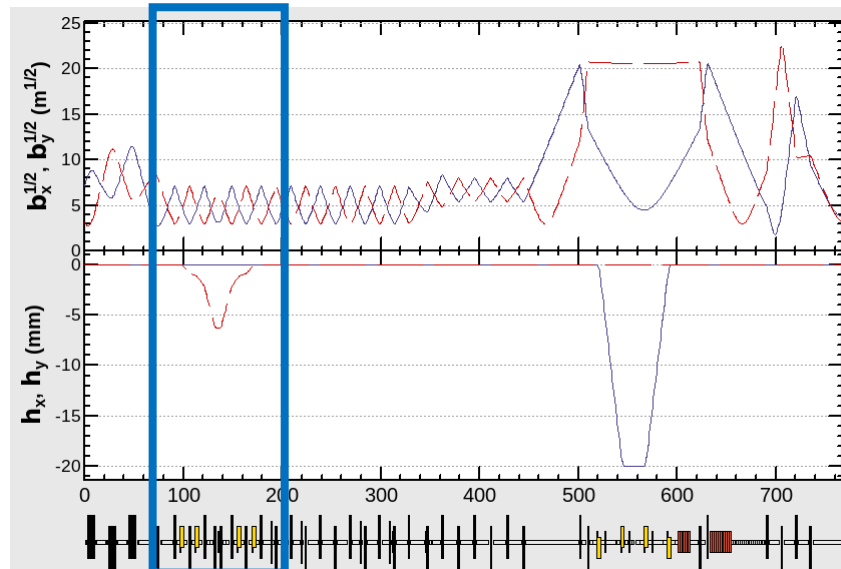
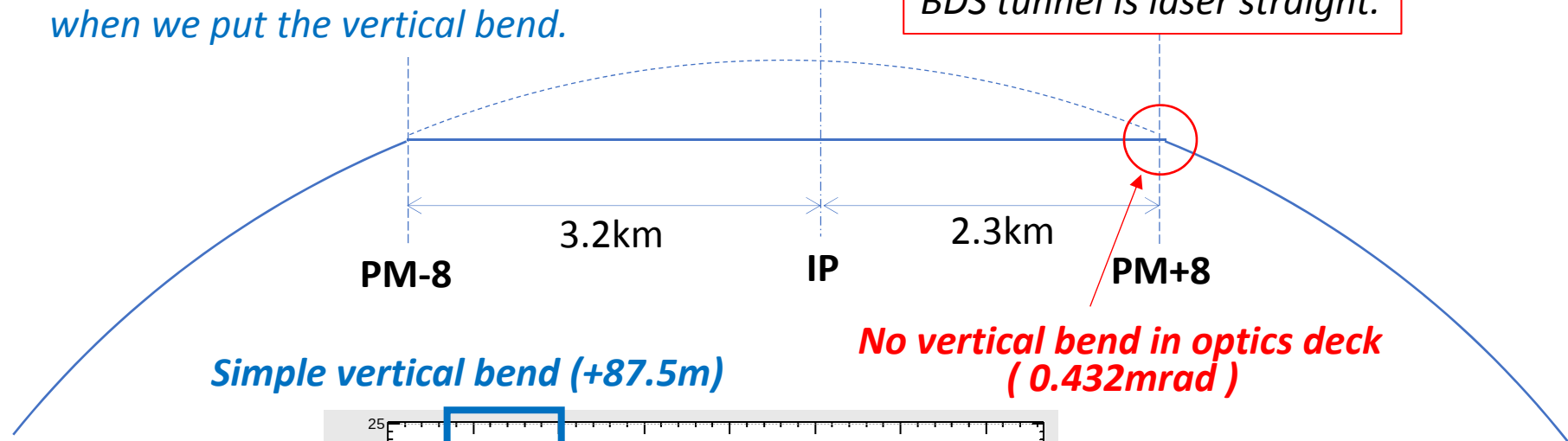
*We need to bend at the entrance of BDS section  
by 0.432mrad in vertical direction.*

***But, there are no vertical bend system in present optics deck.***

# Design of vertical bend at entrance of BDS

*BDS beamline will be longer,  
when we put the vertical bend.*

*BDS tunnel is laser straight.*

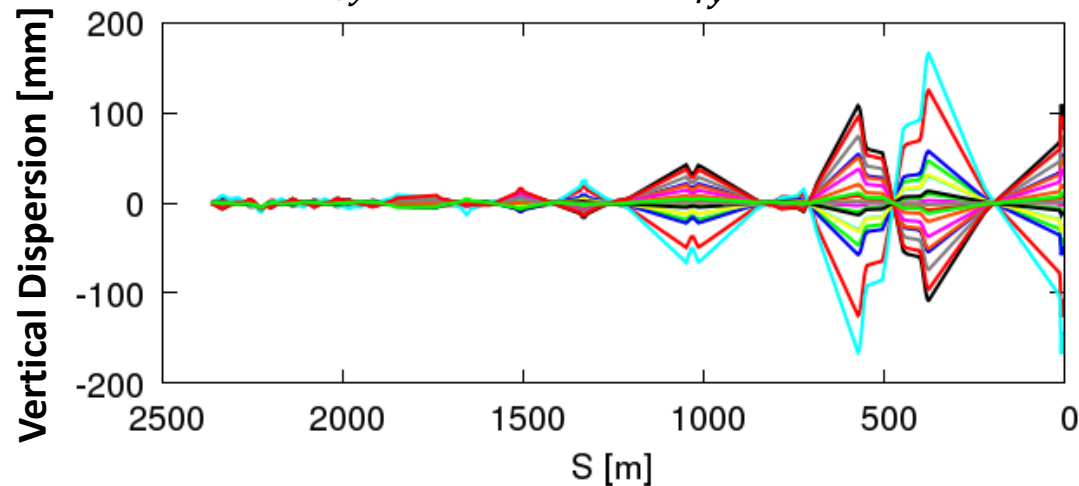


**The vertical bending section was designed in between MPS and skew quadrupole section.  
The optics was designed to smoothly connected to FODO cell of skew quadrupole section.  
The vertical emittance growth, generated by the bending system is less than 1%.**

# Another benefit of vertical bend at entrance of BDS

*Input parameter of vertical dispersion at the entrance of BDS beamline*

$$\sigma_{\eta_y} = 1\text{mm}, \quad \sigma_{\eta'_y} = 0.1\text{mrad}$$

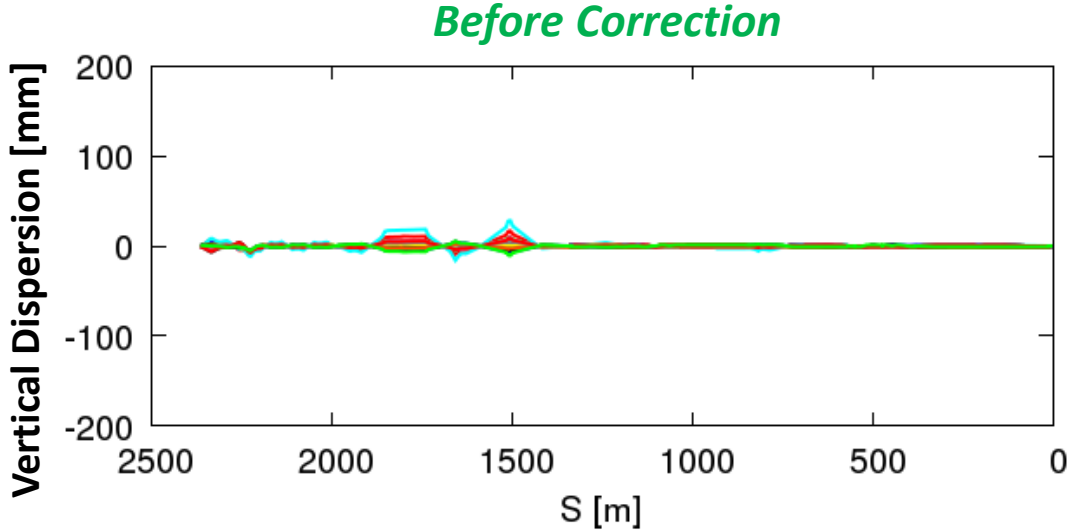
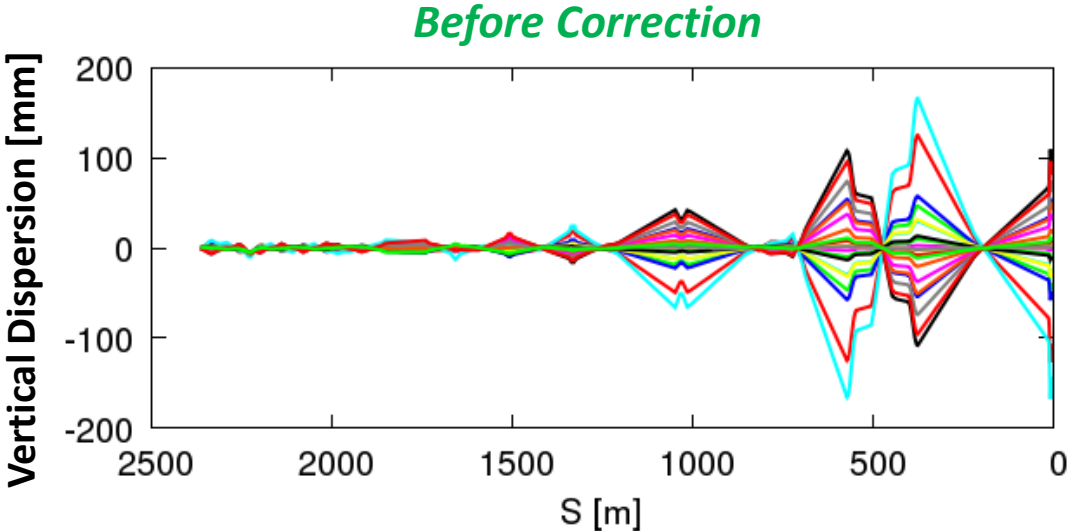


*The huge vertical dispersion is generated at ILC Final Focus beamline, when the small residual incoming dispersion exists as well as ATF2 FF beamline.*

*We must prepare the dispersion correction system.*

*The vertical bend system is appropriate to correct the vertical dispersion.*

# Vertical dispersion correction for Final Focus beamline



*The incoming vertical dispersion can be correction by using the vertical bend system.*

## **Summary**

*The ILC vertical reference orbit is along the earth curvature in ML, and laser straight in BDS.*

*Therefore, the vertical bend system at the entrance of BDS beamline was designed.*

*By utilizing the vertical bend system, we can correct the vertical dispersion of FF beamline*