

Turn-around after DR?

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Conclusion:

We should have a turn-around after the damping of each beam, unless stable extraction from DR is guaranteed.

Pro:

Turn-around after extraction from the damping ring is essential to reduce bunch to bunch position and angle jitter at IP, since feed-forward to reduce bunch to bunch jitter is impossible in a straight beam line. Having possibility of the feed-forward will help for achieving our luminosity goal.

A major source of bunch to bunch jitter is expected to be strength jitter of extraction kicker of the damping ring. The required stability of the kicker without the feed-forward will be about 0.42 micro-radian or 0.07% of the nominal kick angle (as described in TESLA-TDR), while experimentally confirmed stability so far is about 0.3% or larger.[1]

Con:

To have turn-around, additional beam lines and tunnels will be needed, depending on DR and Linac layout. The additional beam line and tunnel lengths for some layout choices are summarized and explained in the following two slides. The cost will be from 0 to 1 km/beam additional tunnel and from 0 to 3.5 km/beam additional beam line for the assumed choices in the slides.

Note:

This choice should not discourage the studies for stabilization of kickers, because (a) feed-forward will not perfectly correct the jitter, (b) the smaller the beam jitter the more luminosity we can expect.

The turn-around should be before the bunch compressor, which increases the momentum spread.

References:

Input from WG1:

- It will help to reduce beam jitter by feed-forward
- In particular bunch-to-bunch jitter
- Strongly recommended

[1] Presentations by T.Naito, G.Gollin and H.Weise in the kicker session of WG3b.

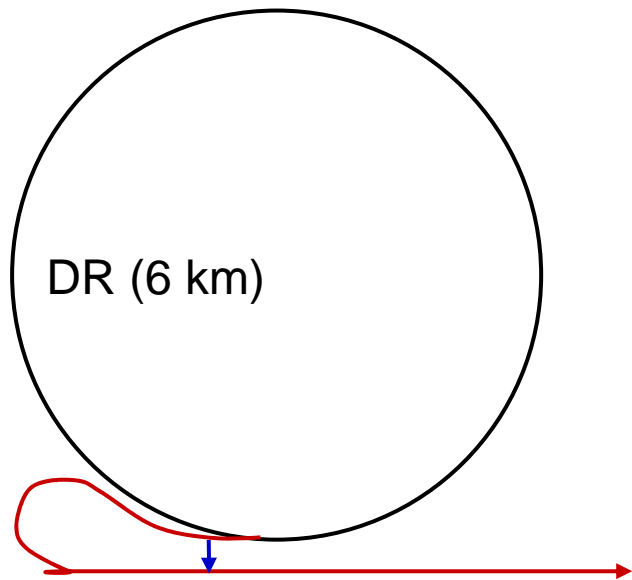
<http://alcp2005.colorado.edu:8080/alcp2005/program/accelerator/WG3b/Presentations/KickersAndInstrumentation/>

Additional Cost for turn-around

DR Layout		Tunnel	Beam Line
Downstream of Linac		0	0
Dogbone, Upstream		0	~1 km
Circular (6 km), Upstream	A	~1km	~1 km
	B	0	~3.5 km*

* DR circumference/2 + 0.5 km, assuming the speed of the feed-forward signal is speed of light.

Case A



Case B

