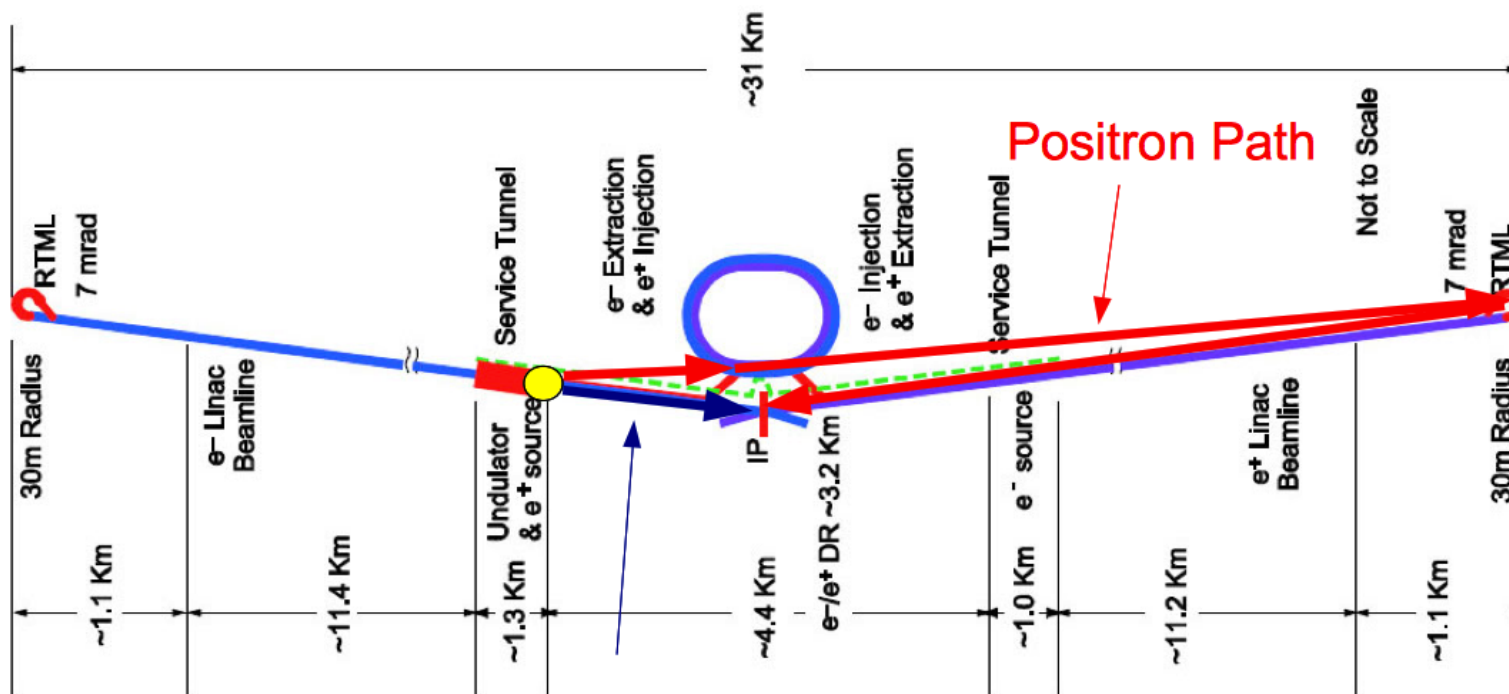


Global Timing: Updated Numbers

Benno List
DESY –IPP–
AD&I Webex meeting 1.2.2012

Reminder

- **The Constraint:**
The positron bunch that is created by an electron bunch should fill exactly the RF bucket in the Damping Ring that is vacated by the colliding positron bunch.
- **Time of positron from target to IP** minus **time of electron from target to IP** must be a multiple of the Damping Ring Circumference!



Changes

Last report in AD&I meeting 12.10.2011:

Tunnel was 172.7m too short (345.4m round trip)

Changes since then (tunnel length):

- New Transfer line geometry: -0.05m
- New RTML lattice: +34.3m
- Machine protection and collimation section: +83m
- Additional 12 ML cryomodules: +154.3 m
- Additional 3 RTML cryomodules: + 38.0m
- New Cryomodule dimensions:
+23.4m (ML), +1.4m (RTML)
- More Cryoboxes: +57.5m (ML), +5m (RTML)



Reasons for Changes

- Transfer line geometry: Decision at DESY BTR
- RTML lattice: Updated following DESY BTR
- Protection and Collimation section: Was mistakenly taken out of BDS lattice by me. My mistake, sorry
- Additional 12 ML cryomodules: SCRF BTR decision
- Additional 3 RTML cryomodules: New calculation based on lower gradients (gradient spread subtracted for RTML)
- Cryomodule length:
RDR: 12652mm, Interim report: 12679.6mm; difference unclear
- More cryoboxes:
 - **RDR assumed standard cryo string of 12 cryomodules, powered by 4 klystrons**
 - **Now use string with 9 CMs, powered by 2 klystrons, upgradeable to 3 klystrons**



My New Numbers (Round Trip)

	New	Old (12.10.11)
PLTR	289.2	159.3
DR injection to z=0	112.6	108.5
- BDS: branch-off to IP	-386.1	-252.0
Total delay up to z=0	15.7	15.8
DR z=0 to extraction	107.5	108.5
RTML, total	16124.5	15648.1
Main Linac	11012.8	10777.5
MPSCOL	83.0	---
BDS	2252.6	2253.5
Sum	29596.1	28803.5
DR Circumference	3238.681	3238.762
9*DR	29148.1	29148.9
Mismatch	-448.0	345.4



Accuracy of this Estimate

- Main Linac numbers are my estimate, awaiting confirmation from experts. But accurate to <100m
- RTML awaits final lattice after ML length is fixed. Accurate to <10m
- Positron source lattice for new geometry not yet final. Accurate to <10m



Summary

- Currently, the RTML+ML+BDS loop is 448m too long, i.e. Main Linac and/or BDS need to be shortened by 224m (or elongated by 1395m)
- Biggest change was inclusion of 15 new cryomodules (192.3m in total) in/after SCRF-BTR
- Changes in length reflect that the overall length calculation becomes more accurate