CR11
Rearrangement of
Undulator Positron Source

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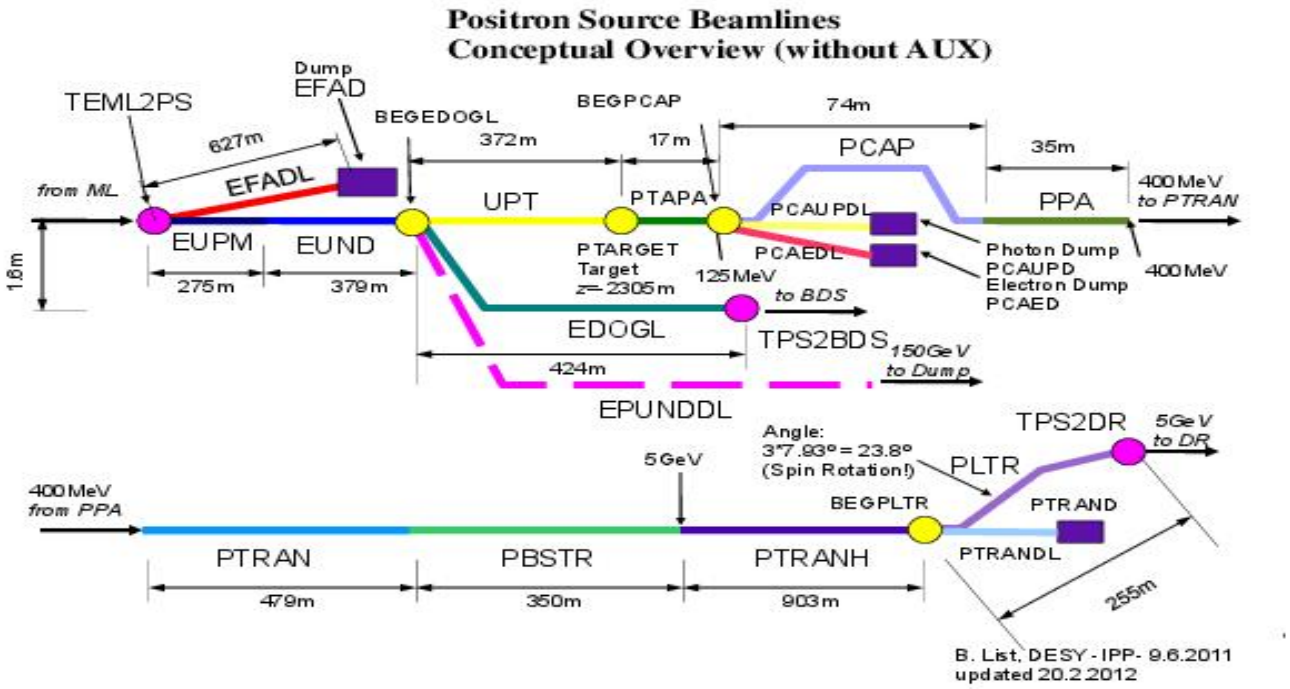
The Points

- Rearrange Undulator Positron Source for
  - Higher flexibility
  - Better performance
- Relocate PBSTR to upstream to shorten PTRAN.
- Relocate ECS (Energy Compressor Section) to upstream.
- Relocate Path Length Adjuster to downstream of ECS.

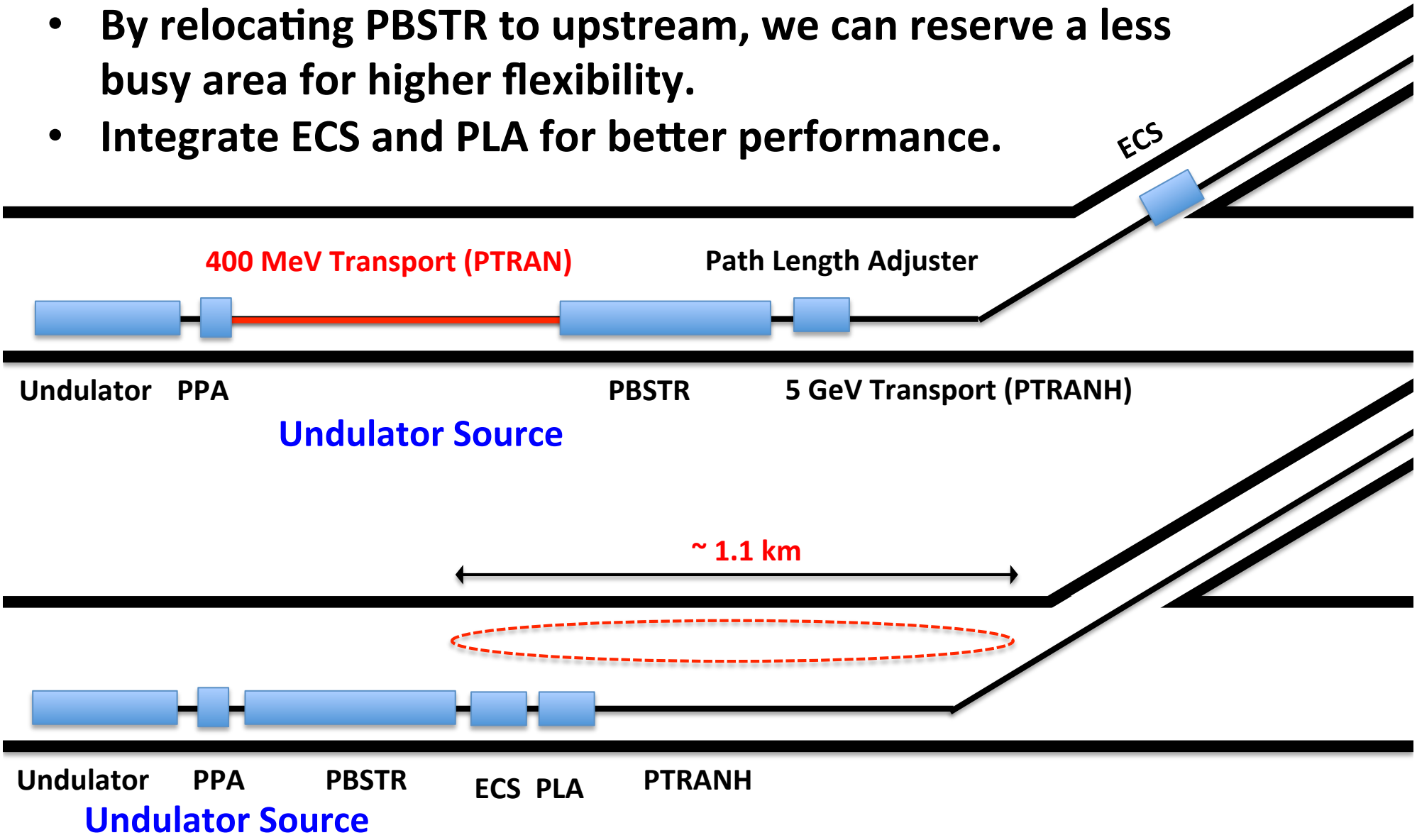


Rationale

- A long transport line (PTRAN 470m) between PPA (Positron Pre Accelerator) and PBSTR (Positron BooSTeR) at 500 MeV can be omitted by moving PBSTR to upstream.
- ECS is moved to downstream of PBSTR.
- Path Length Adjuster is moved to downstream of ECS.
- By relocating them, a) PTRAN (500 MeV) is omitted, b) PTRANH (5 GeV) is increased, but the energy spread there is decreased to 0.75% which suppresses chromatic effects.
- In the current configuration, PLA (chicanes) is followed by ECS (chicanes + RF). In this case, momentum compaction by PLA and ECS has to be matched to RF. PLA and ECS is fully coupled.
- Changing the order of ECS and PLA, ECS and PLA can be decoupled. The operation is simplified.
- An additional one RF module for PBSTR for operational margin.

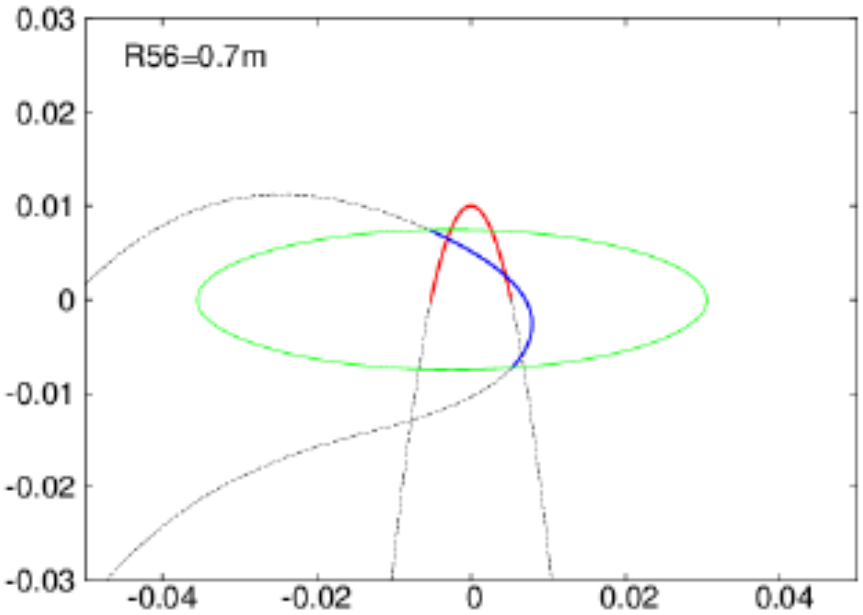
Relocation of PBSTR

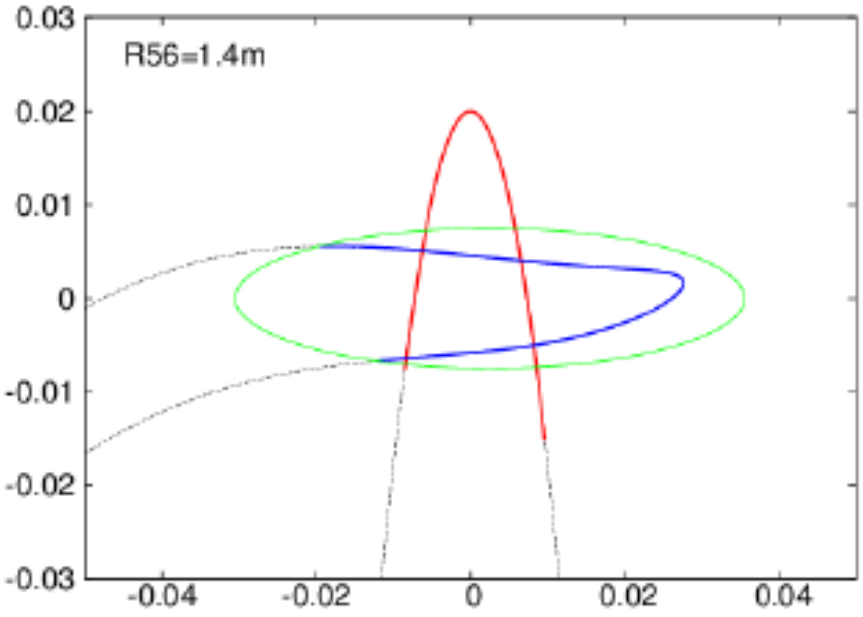
- By relocating PBSTR to upstream, we can reserve a less busy area for higher flexibility.
- Integrate ECS and PLA for better performance.



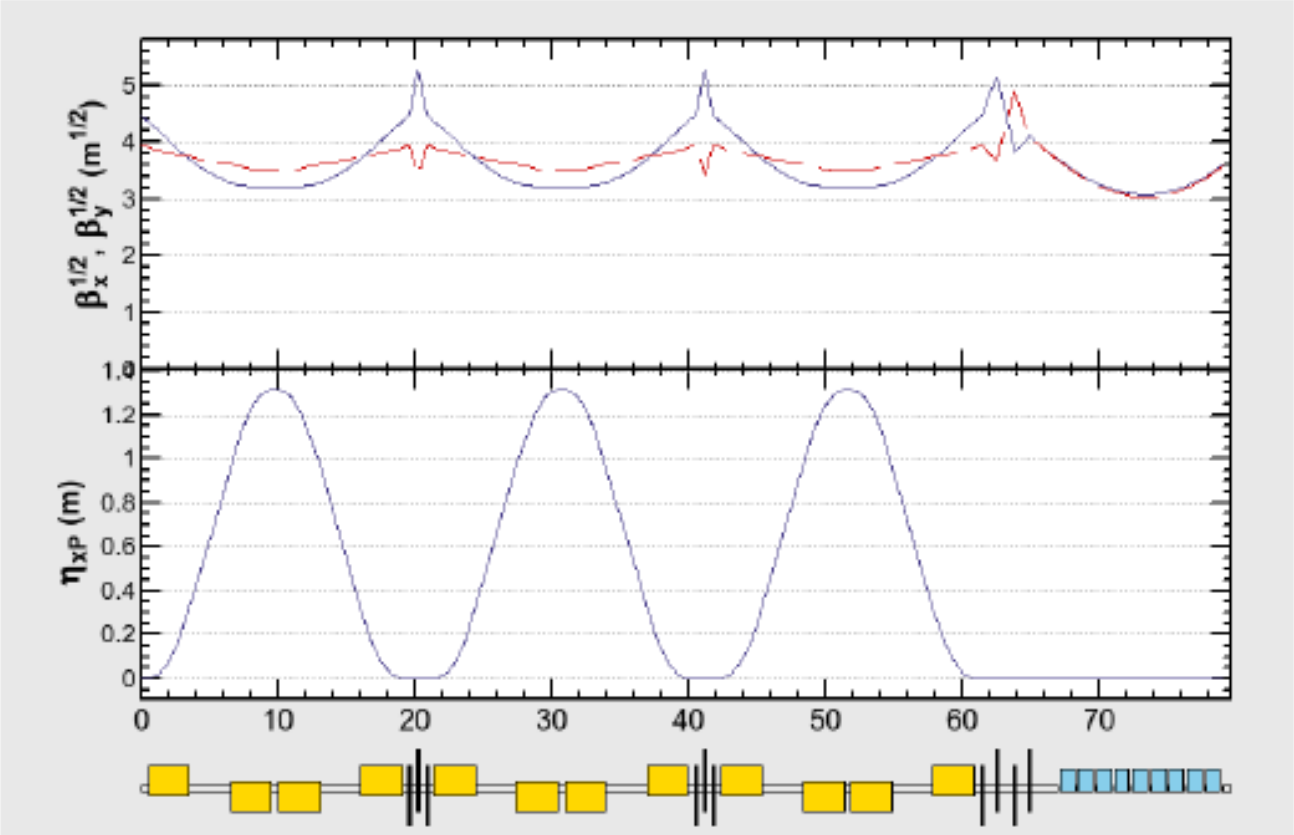
R_{56} of ECS

- 1.4 m R_{56} of ECS gives a better phase space matching to DR acceptance comparing to 0.7 m (TDR).





Beam Optics for Energy Compressor with R56=1.4m



Bending System

B = 1.2 T

3 chicanes

R56 = 1.4m

RF voltage

9 x 9cell cavity

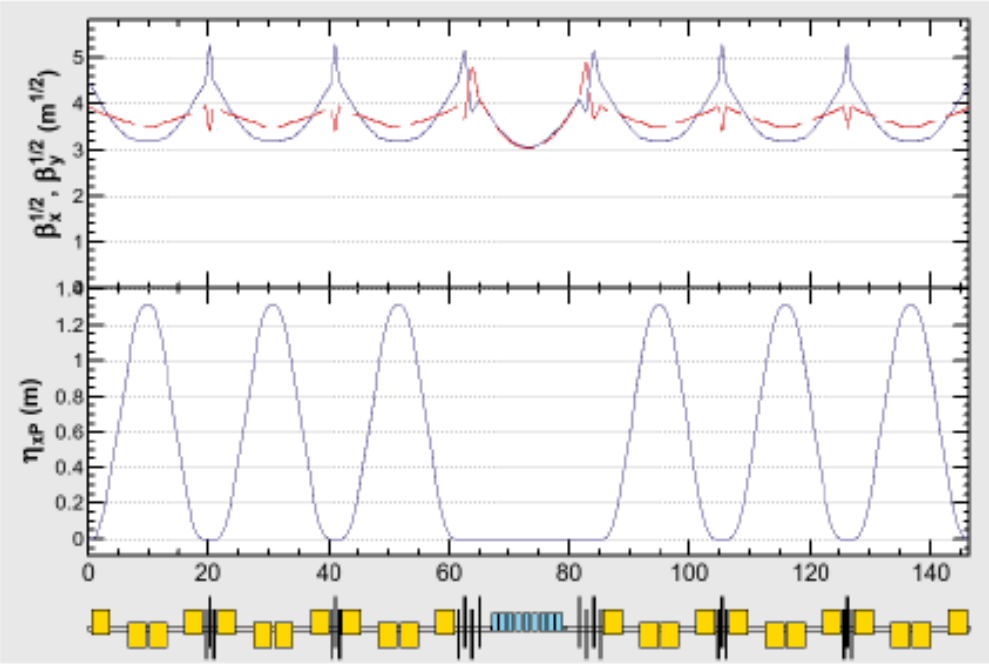
（Type A module）

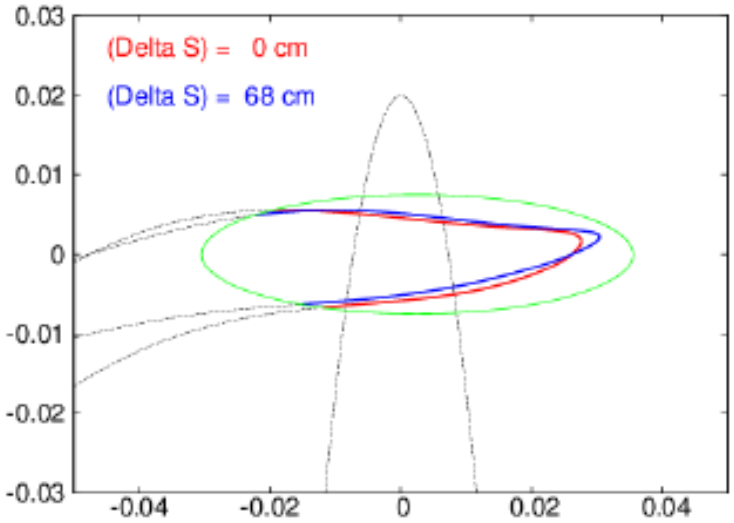
V = 131 MV

Path Length Adjuster

Path length adjuster is required in the positron source beamline in order to adjust the collision timing.

When we put the same chicane of energy compressor just after energy compressor, the path length will be able to change by 68cm by 3 chicanes.





When the path length adjuster put after energy compressor, the longitudinal phase space is not change so much.

Cost Estimate

- **Cost impact by the CFS modification can be estimated once CFS group fix the design.**
- **Number of components is increased:**
  - **An additional RF module of PBSTR for operational margin.**
- **Number of components is decreased:**
  - **Quads because the beam energy is increased to 5 GeV.**
- **Cost impact on the components is summarized as ……**

Summary

- **Rearrangement on Undulator positron source is proposed.**
  - **Relocate PBSTR to upstream.**
  - **Add one RF module to PBSTR as a margin.**
  - **Move ECS to downstream of PBSTR.**
  - **R_{56} of ECS is 1.4m instead of 0.7m.**
  - **Move PLA to PLTR.**