Science & Technology Facilities Council

# Positron Source AD & I Report

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# Explore Parameters …

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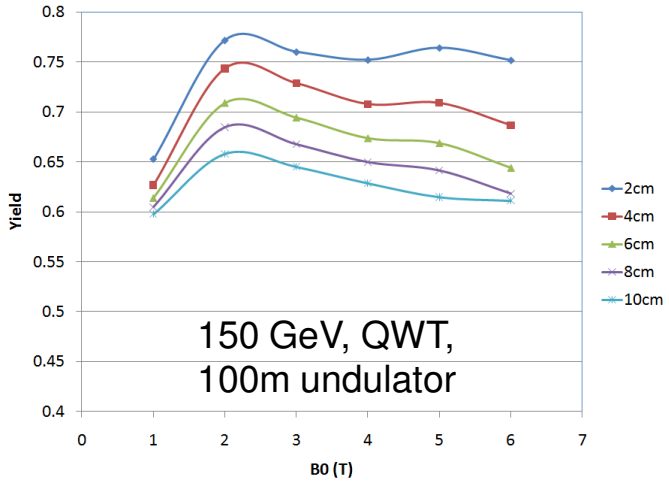
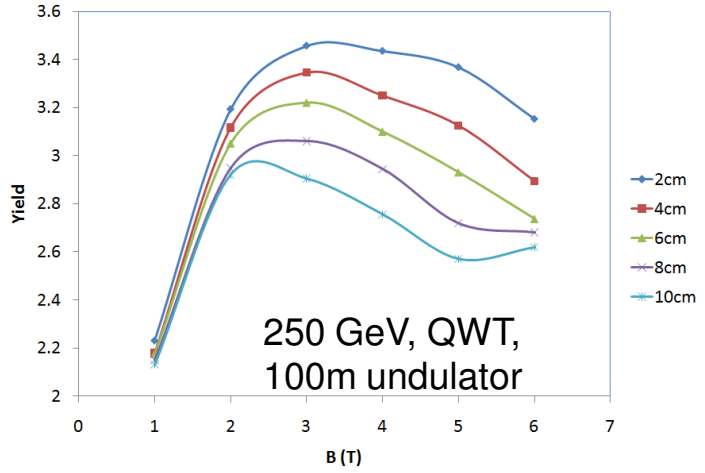
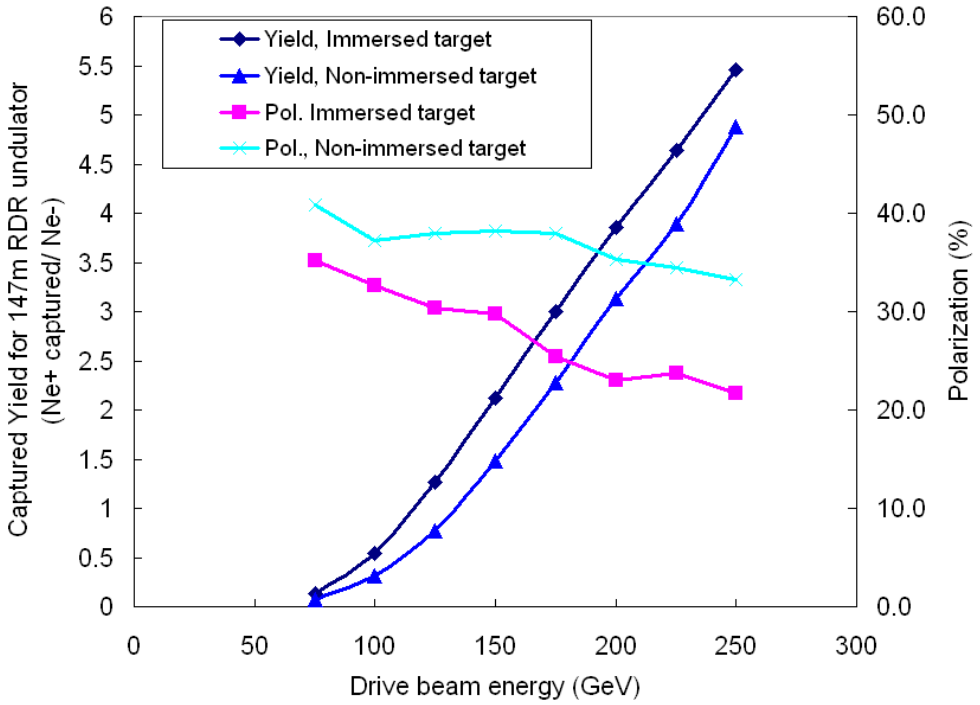
- 0.4 rad length Ti target & QWT
- Yield at 125MeV with DR acceptance
- Assume B = 1T (conservative)
- For yield of 1.5 @ 150GeV need ~230m undulator
- For yield of 2.0 @ 250GeV need ~100m undulator



# Low Energy Running

- Plot shows RDR case vs E
- Need new plots for SB2009 cases but plot suggests yield drops by ~x2 between 150 GeV and 125 GeV
- **What yield is needed below 150 GeV?**
- **Guidance needed !**

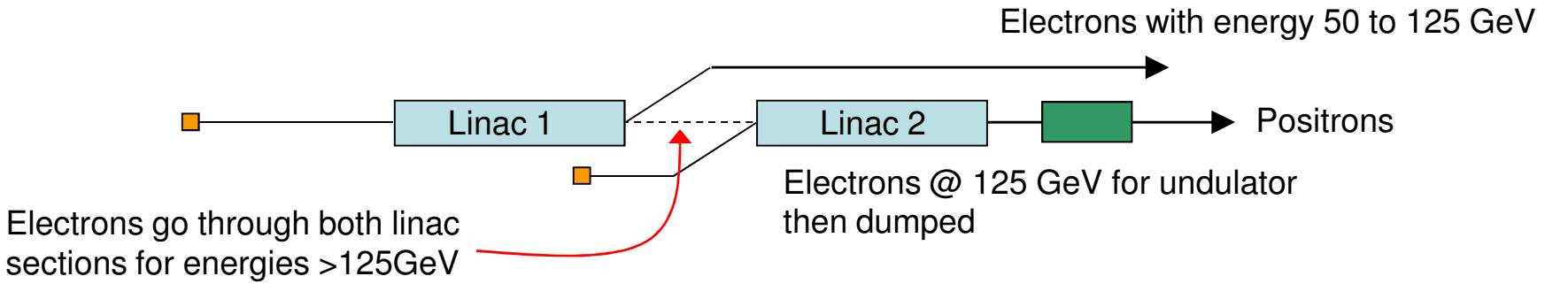


# Low Electron Energy Operation

- For calibration purposes (Z-pole) the auxiliary source will be able to provide intensity at the few % level
- At some energy below 150 GeV the ILC could operate in a **pulse sharing mode**
  - Positrons are generated at high energy but at half rep rate
  - Electrons are transported at the low energy to the IP at half rep rate
  - This option gives half the number of bunches at the IP
  - **Initial studies reported this week suggest may be practical to transport low & high energy beams through linac but definitely not ideal!**
  - **Separation of two beams not clear – where to dump high E beam, low E beam bypass around und?**

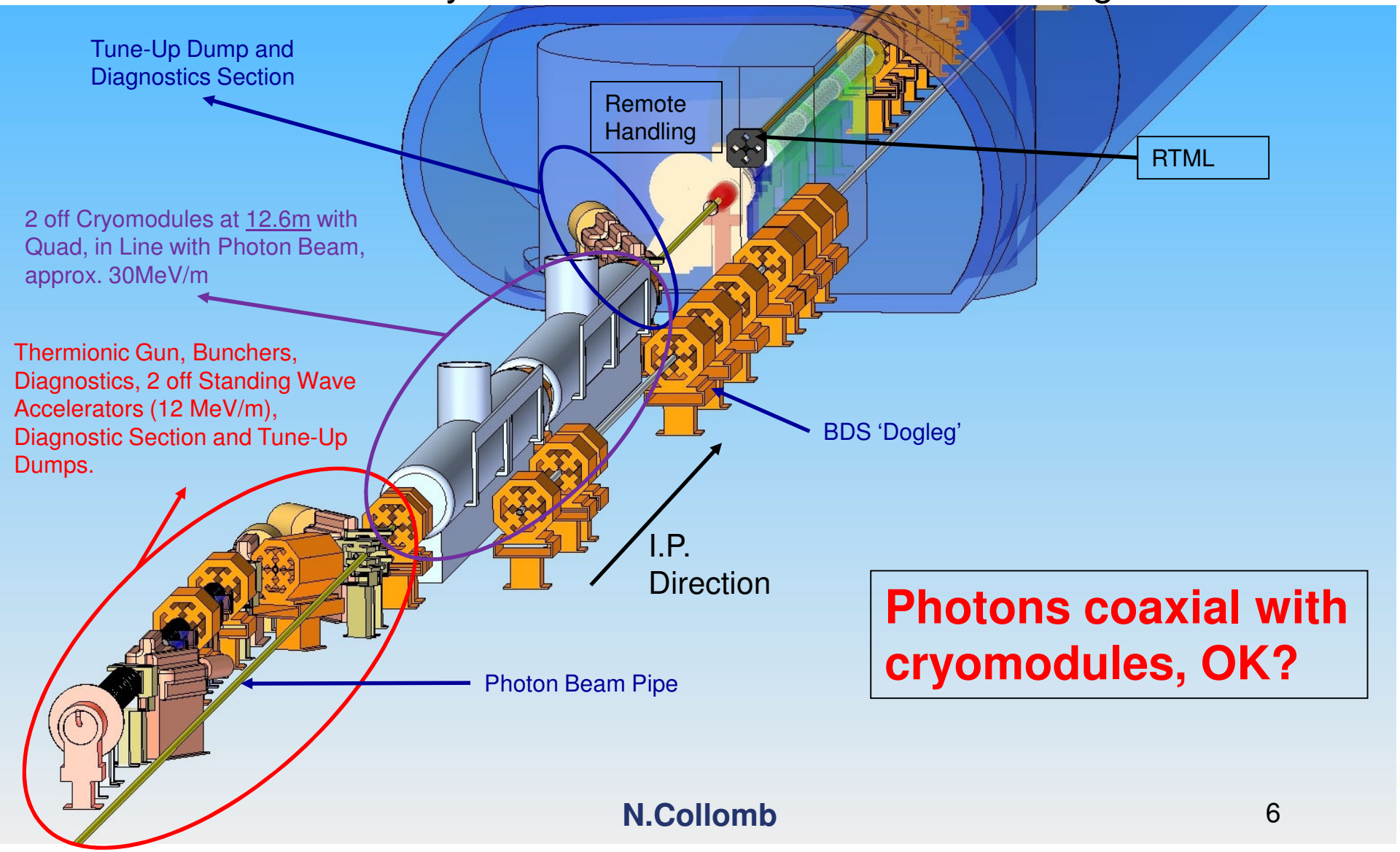
# Low Electron Energy Operation

- Alternatively, an undulator of length sufficient for 125 GeV operation could be installed
- Then a second injector could be installed at the 125 GeV point in the linac and a bypass line
  - **This would allow one beam to generate positrons at 125 GeV and a second beam (covering 50 to 125GeV) could be transported to the BDS**
  - **No loss in luminosity at any energy**



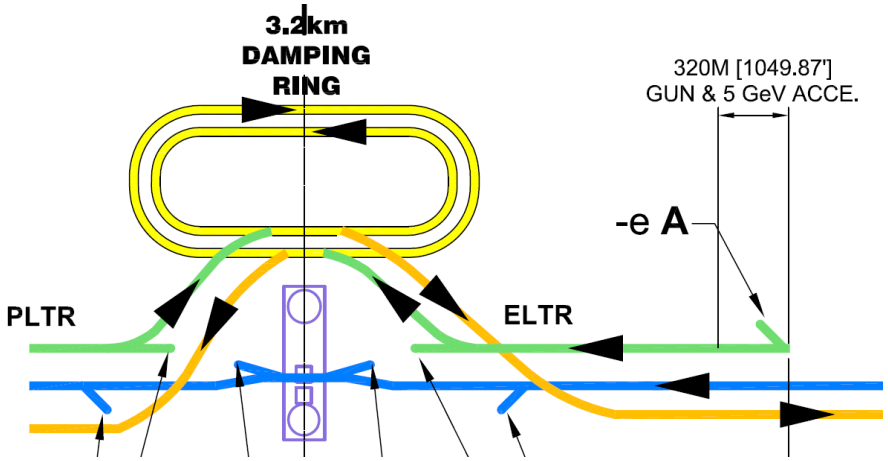
# Positron Source – AD&I

3 D Layout Positron Source 'AUX Source' region.




**Photons coaxial with cryomodules, OK?**

# AD&I Wrap up : electron source




2 minor issues:

1. Length of allocated electron source space

Tunnel ~ 2 km but need only ~ 500m

2. Length of eLTR due to required offset

Need to review / extend lattice file

Time needed for resolution:
~ 1 month.