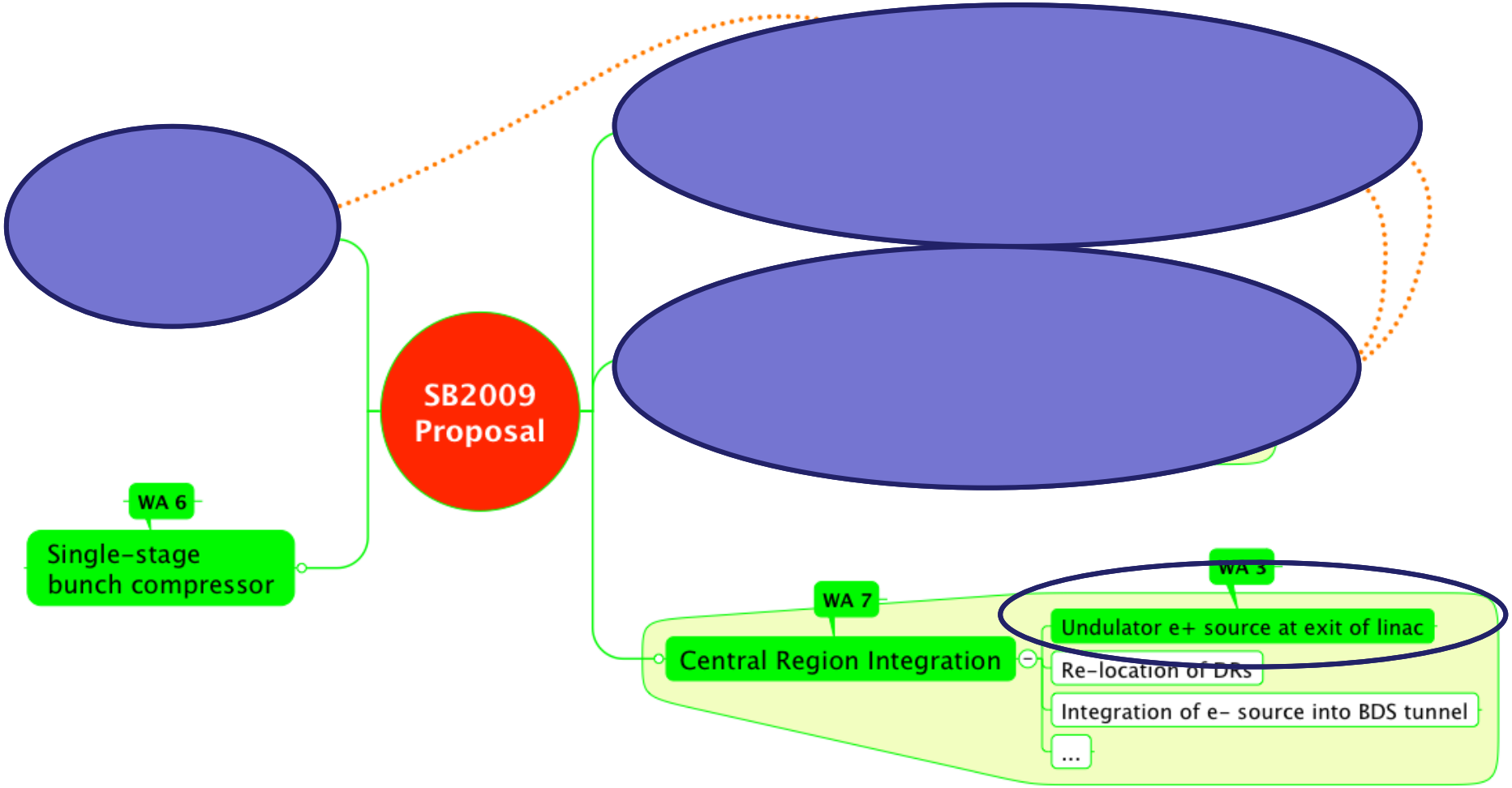
TLCC Themes


SB2009 Proposal
WA 6
Single-stage bunch compressor
WA 7
Central Region Integration
WA 3
Undulator e+ source at exit of linac
Re-location of DRs
Integration of e- source into BDS tunnel
...

Positron Source Re-Location

- A **relocation of the positron source systems** from the nominal 150 GeV point of the electron Main Linac **to the exit of the electron Main Linac (≤250 GeV** depending on physics scenario), and **integrated into the beginning of the Beam Delivery System**.

- The **new baseline proposal includes** a description of a possible low energy operating scheme. The scheme (**10 Hz running, alternate pulse**) is consistent with the RDR.

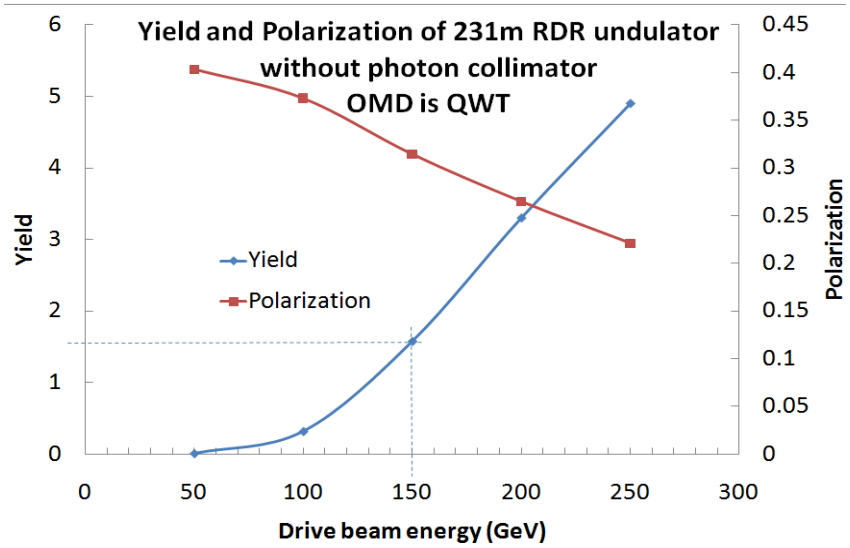
- The **positron yield is ≥ 1.5 over this energy range** and enables operation with the RDR parameters or the 'Reduced Beam Parameter Set.'

Rationale (Benefits)

- **Consolidation of all sources in ‘central region’ campus area**
- **All high radiation sources now contained in this area**
- **Combined machine protection systems for narrow bandwidth systems (BDS and e+ source)**
- **All energy acceptance ‘bottlenecks’ are now located in central region**
  - Entire SCRF linac now has large acceptance
- **There is a large energy overhead to drive the source**
  - risk mitigation during early commissioning years
- **At >300 GeV CM there is >1.5 yield margin**
  - constrained at some point due to target power handling

The Down Side

- **Ecm ≤ 250 GeV requires additional measures to maintain yield**



- **Proposed 10Hz alternate pulse scheme (150/125) (*see later*)**

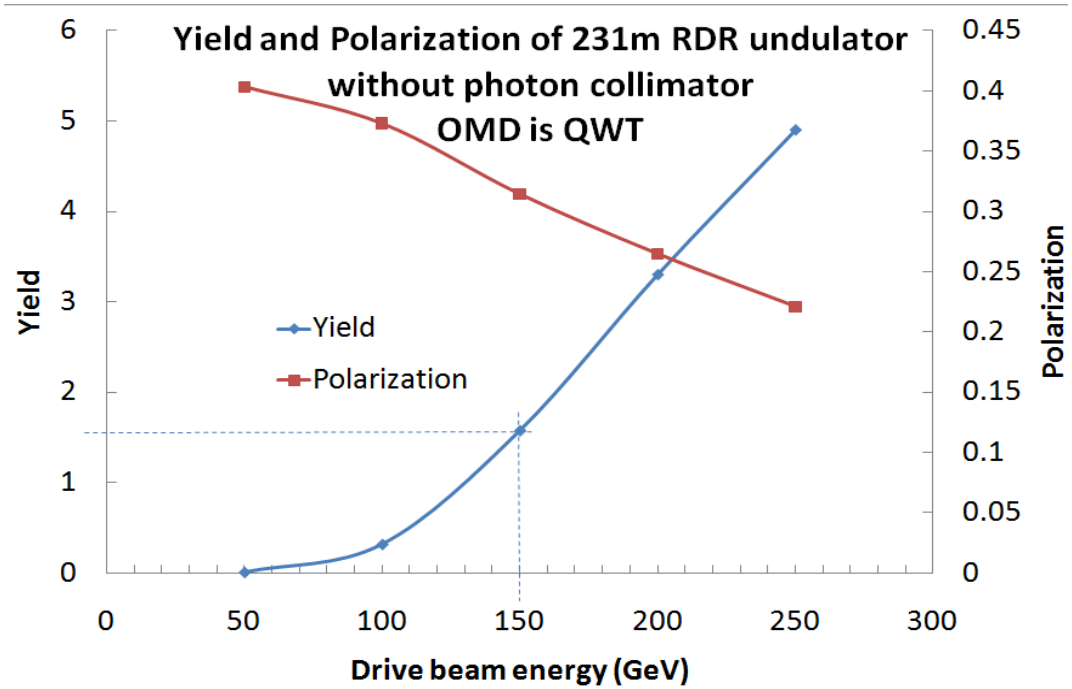
- **While not necessarily an elegant solution, it appears technically tractable**
  - small cost incursion (mostly) for DR
  - other possibilities being considered (high-field short-period undulator tech. R&D)

“10 Hz” Alternate Pulse Mode

- **Damping Ring – solution OK**
  - Requires reduction in damping time by ×2
  - Additional wiggler and RF (cost)
  - Additional photon stops (minor cost)
  - e+ ring 50% duty cycle requires special (LLRF) attention (15% additional RF power for control)
- **(Electron) Main Linac**
  - Alternate energy pulsing (150/125 GeV)
  - No additional AC power or cryo required
  - Different approach for KCS/RDR and DRFS
- **Linac exit (source/BDS)**
  - Pulsed corrector magnets to correct ~mm of beam offset for 150 GeV beam
  - Additional extraction line for e+ production pulse
  - Dealing with unwanted photon pulse (to do)

CFS requirements evaluated and included in cost increment

Physics Impact: Polarisation



- **Reduction from ~30% to 20% due to 'shorter undulator' scenario**
- **Reducing B field (const. L) will restore 30%**

Cost Impact

- **Approx. Cost of 10Hz Alt. +0.6 %**
- **Approx. Cost of moving source -0.6 %**
- **Net cost ±0.0%**

- **Primary motivation for this proposal is not cost.**

- **Note high-field short-period undulator would be more cost effective**

TLCC-4 Proposal Document

- **Authored by PMs**
- **Scope points from slides 2**
- **More detailed description of technical scope**
  - DR and HLRF parameters
  - Component count tables
- **Issues**
  - More detailed layout of source area
  - More detailed evaluation of DR LLRF solution (possible R&D items)
- **Physics impact (short summary) ??**
  - polarisation ??
- **Cost Summary**

To be submitted to Director by end of next week