

Positron Source

AD&I Meeting 23/6/10

Jim Clarke

Assumptions

- 231m long undulator
- QWT
- 5Hz @ 150GeV and
- 5Hz @ 125GeV
- 10Hz total
- **1300** bunches per train
- Both beams go through undulator

Emitted Power

- Photon beam power generated by undulator:
- 102 kW from 150 GeV production beam and
- 71 kW from 125 GeV lumi beam
- **173 kW total average photon beam power**

Deposited Power

- Power deposited by photon beam in target:
- 8 kW from 150 GeV production beam and
- 6 kW from 125 GeV lumi beam
- **14 kW total average power deposited in the target**
- **If 2625 bunches then all these power numbers double**

Target

- Present design (RDR) assumed 11kW of deposited power plus ~ 10 kW due to eddy current effects.
- Therefore:
- **14kW deposited will be no problem (10Hz, 1300 bunches)**
- 28kW deposited would need to be looked at carefully but feeling is that should be manageable

What to do with extra pairs?

- Will generate pairs which need to be dumped
 - Could run all post-target systems at 10Hz and send beam to a dump
 - Only potential problem would be flux concentrator
 - Could just let pairs hit walls of OMD, linac etc
 - Extra losses to absorb, induced activity, not very elegant (few kW extra)
- Could stop photons reaching target with 5Hz photon intercept
 - Needs to handle 71kW (142kW if 2625 bunches)
 - Additional “complex” item for remote handling

Other Issue

- Low energies down undulator will emit over wider angles
 - Will need to check low power photon collimators intercept sufficiently
 - If not can reduce aperture or install more frequently

Summary

- With 1300 bunches *probably* feasible now
- With 2625 bunches need to check more carefully but general consensus is that *should* be ok
- Dumps for production beam, gamma beam, unwanted pairs need to be checked and designed in (extra space)