

Grounding at P4

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Present:

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1) Introduction (J. Pedersen)

- Pulsed power systems are the most problematic
- Delta-Star transformers configuration means that 18 kV 3-phase supply has an ‘artificial’ neutral.
- Earth fault detected on 5% SC current
- LEP Earthing:
 - Reinforced earth bar along klystron gallery. Use of vacuum chamber in tunnel (cryostats in LHC)
 - Kickers used copper ‘carpet’ on floor. Grid in all surface buildings connected down to earth point below.
 - HV cables (3-phase) twisted to annul 50 Hz
 - Normally a few volts seen between ground and surface grounds

2) LEP RF details (H. Frischholz)

- Earth bar passed through HV bunkers, connected to steel in concrete floor every 2 m
- Should have separate ground for each group of 4 klystrons, connected to bunker ground.
- HV cables only earthed at tunnel end. Power converter end floating. – **Safety issues – need for special measures?**
- A big improvement for LEP was in using fibre link between bunkers and controls racks, dispensing with external trigger to thyatron (crowbar) – relying only on auto triggering on dI/dt . All interlocks directly to PC MCB or thyristors

3) Outstanding Questions

- Effects of items such as Ion pumps, RF drive cables, waveguides – making ground loops
- Possibility of/need for special ground cable on top of QRL

4) Actions

- Prepare layout for study and eventual simulations by J Pedersen’s group.

E. Ciapala, 4th July 2003