NA62 Collaboration Meeting in Ferrara

Update on NINO Signal cable

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LB Signal Cable Replacement

- Aim to characterise current signal cable performance in various conditions:
 - under extreme bending (no signal deterioration)
 - different terminating impedances (no reflections)
- Investigate possible signal cross-talk and pickup
- Initial Testing Setup with Pulse Generator, Oscilloscope (and Differential Probe), later studies with actual PMT and scintillating crystal (+ radioactive source) as

a signal source



2

Signal Cross talk

• Pulse at the Signal Generator $_{ch1=+25 \text{ mV}}^{ch1=+25 \text{ mV}} \Delta = 50 \text{ mV}$ $2.5 \text{ ns} \uparrow \text{ and } \downarrow \text{ time}$ 4 ns width

1 MHz rate

- Pulse after the current cable
 - 10% oscillations, scales with the amplitude, otherwise clean
 - cable terminated to resemble the actual setup

i.e.

5.1k Ω for both inputs 100 Ω across ("NINO") differential outputs



Signal Cross-talk cont.

- Cross-talk characterization
 - Signal cables tied together
 - Measured for signal amplitudes from 50 mV....4V(!) to see any effect
 - Up to Δ =2V no cross talk
- At the amplitude of 4V measured cross-talk of 3mV

i.e.

1/1000 of the amplitude, negligible !



Conclusion

- The current signal cable performs well i.e. no RF pick-up, no reflections observed, even for extreme bending. At this point it seems no coaxial or twisted pair (shielded) approach required.
- Cross-talk virtually not existing
- The most immediate solution would be to make current signal cable more flexible
- Closer investigation proves that current cable actually shielded and resembles B'ham proposed replacement, but with better shielding i.e. no unwinding shield
- Simplifies the problem, no additional studies of (NINO) mismatch input impedance required
- In principle only jacket striping problematic



Twisted pair alternative



 New grounding scheme i.e. ground connection directly between HV PCB and NINO board



BACKUP

Optimisation studies



Current Circuitry Optimisations (towards balanced solution)



• Cont...

