

Fast Digital Optical Data Links for BTeV Straws (and ??) Read Out

TEC 22 Mar '01

Real Work: Bernard Dinkespiler, Jingbo Ye
ATLAS LAr calorimeter readout

Link “Constraints”

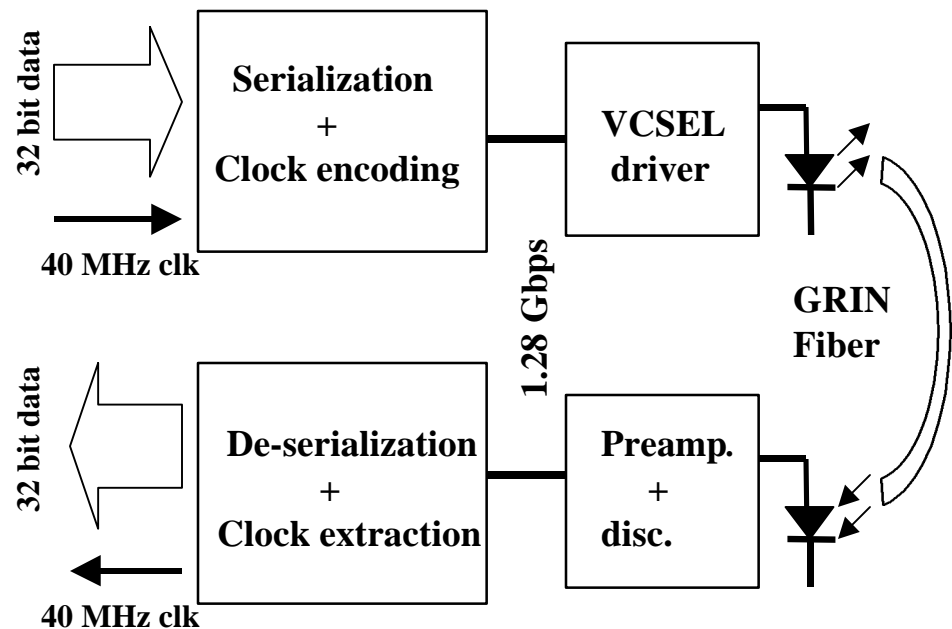
- **Data flow: 4 Bytes/hit**

1000 hits/evt

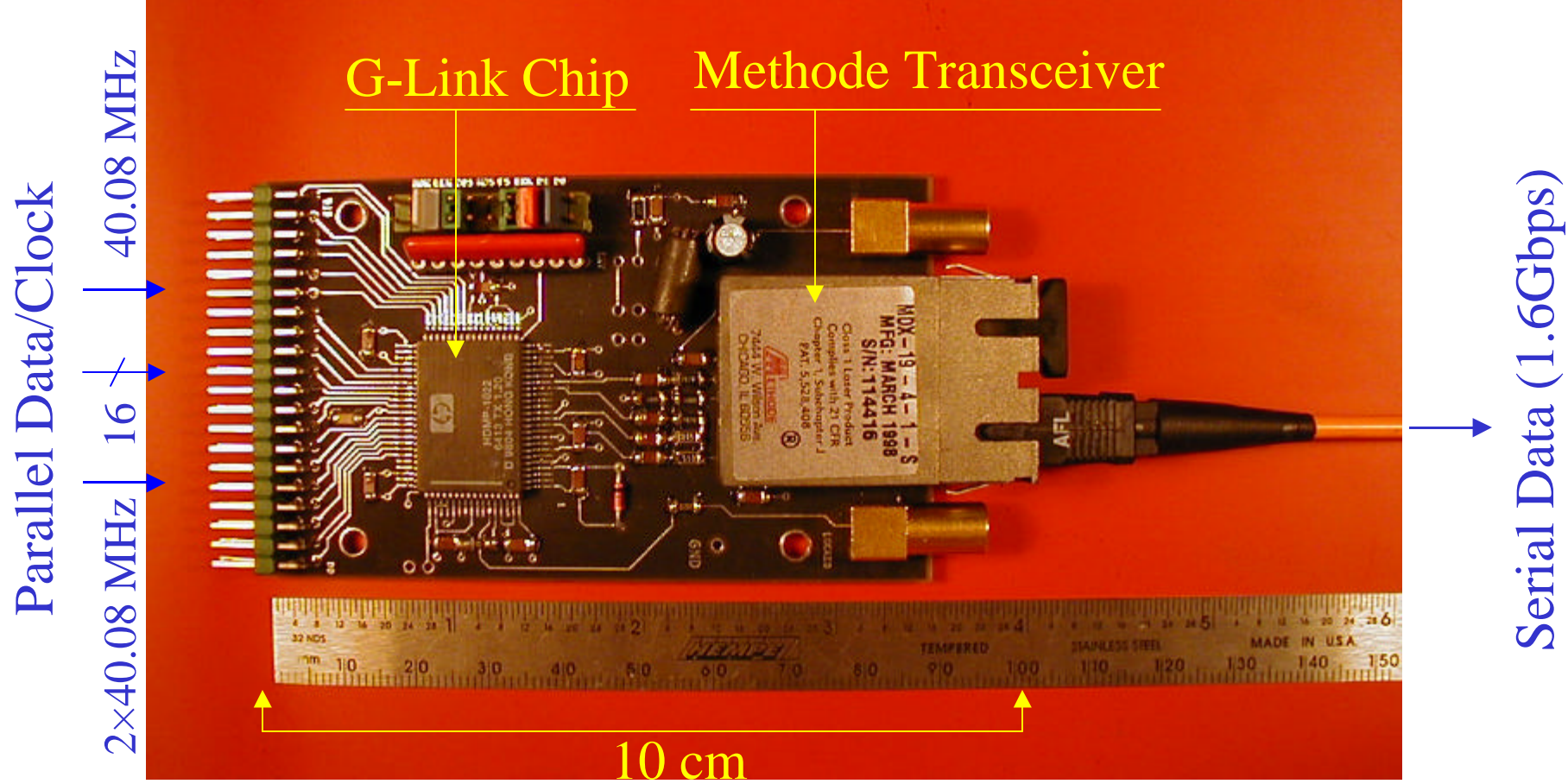
@7.6 MHz x 2 = 60 GB/s

- **1 link/DCB ?**
- **Bit error rate < ???**
- **Rad tolerant on Tx side:**
 2×10^{12} n/cm², ?? Gy (γ).

LAr Link Architecture

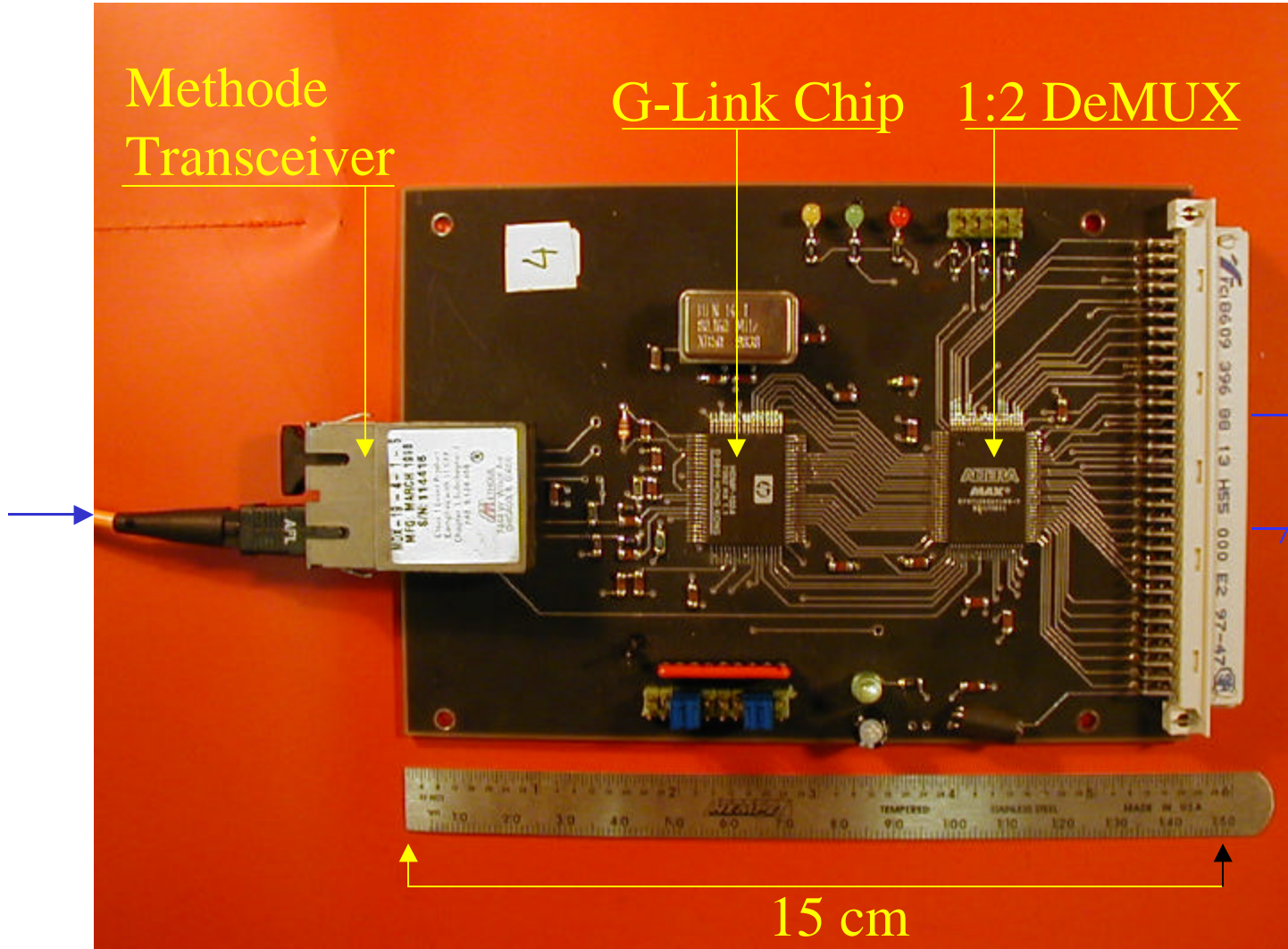


Single G-Link Transmitter Board



Single G-Link receiver Board

Serial Data (1.6Gbps)



Methode
Transceiver

G-Link Chip

1:2 DeMUX

40.08 MHz

32

Parallel Data/Clock to ROD

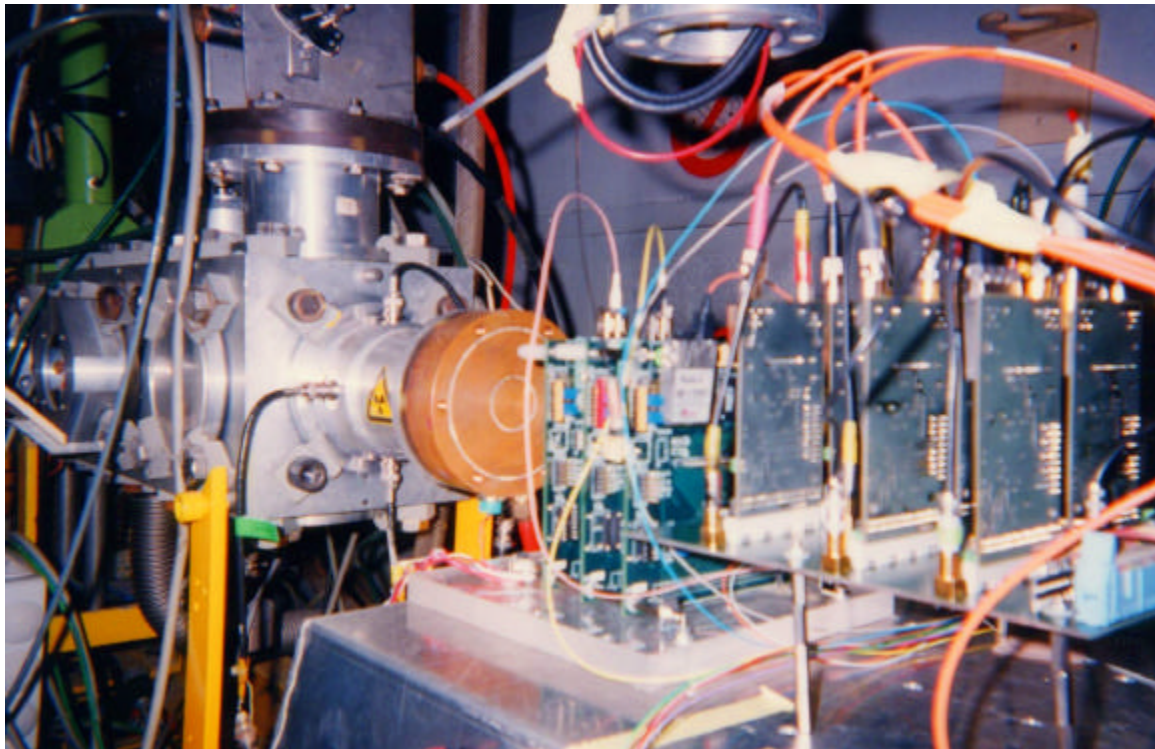
15 cm

Radiation Tests

Neutron Irradiation

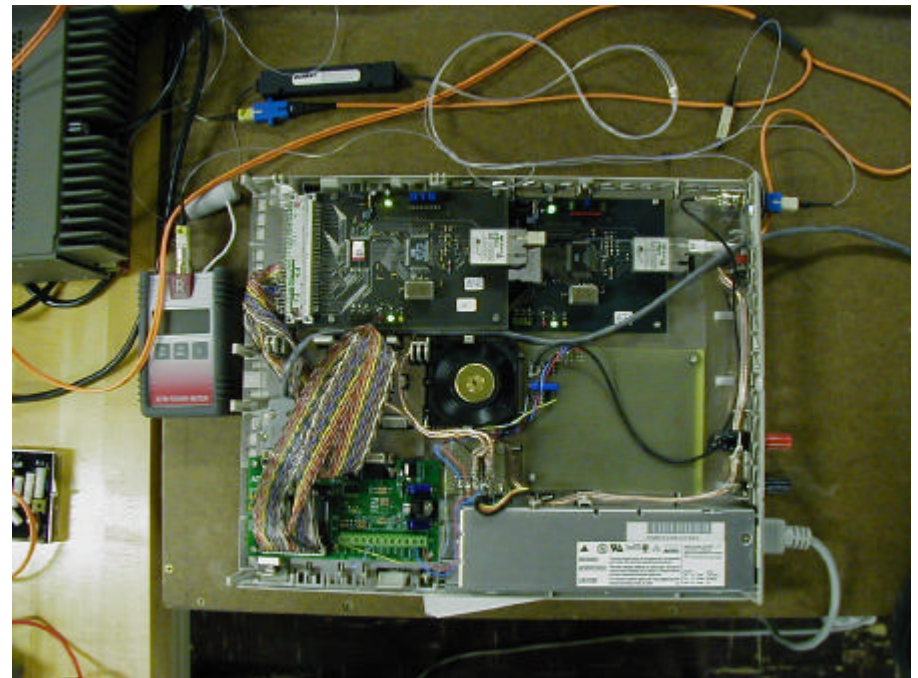
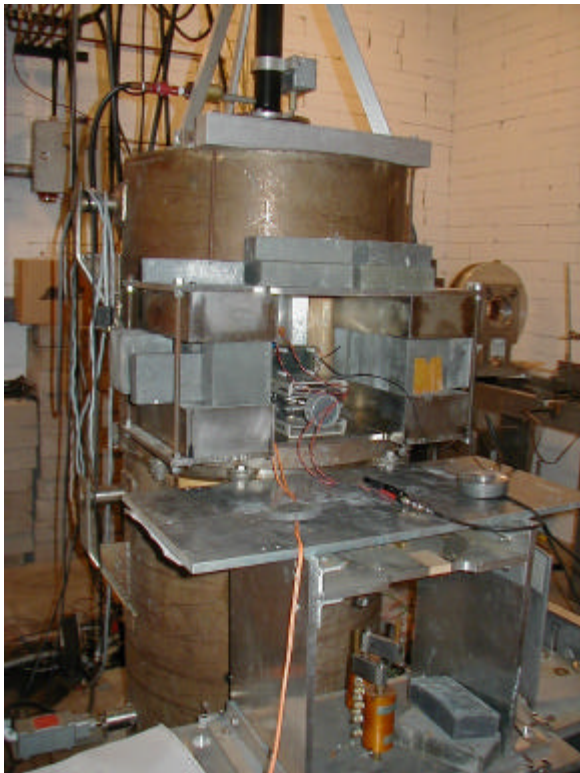
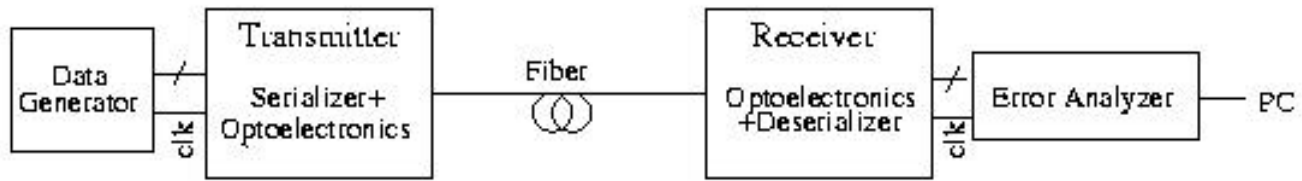
SARA/CERI (France). $d + \text{Be} \rightarrow n$. Flux $\sim 2.5 \times 10^{11} \text{ n cm}^{-2} \text{ hr}^{-1}$.
 $\langle E(n) \rangle = 6 \text{ MeV}$

Complete link survives $2 \times 10^{13} \text{ n/cm}^2$ (10 LHC years)



γ Irradiation

Co-60: $E(\gamma) = 1.17 \text{ MeV}, 1.33 \text{ MeV}$
VCSELs and fibers irradiated



ATLAS γ Tests Results

- Ge-doped 50/125 multimode graded index fiber (Plasma Optics Fibers) withstands 10 kGy dose.
- Methode transceiver (MDX19-4-1-S) survives up to 3.5 kGy dose.
- G-Link Transmitter (HDMP1022) withstands > 45.3 kGy dose.
- No SEU from γ -irradiation.