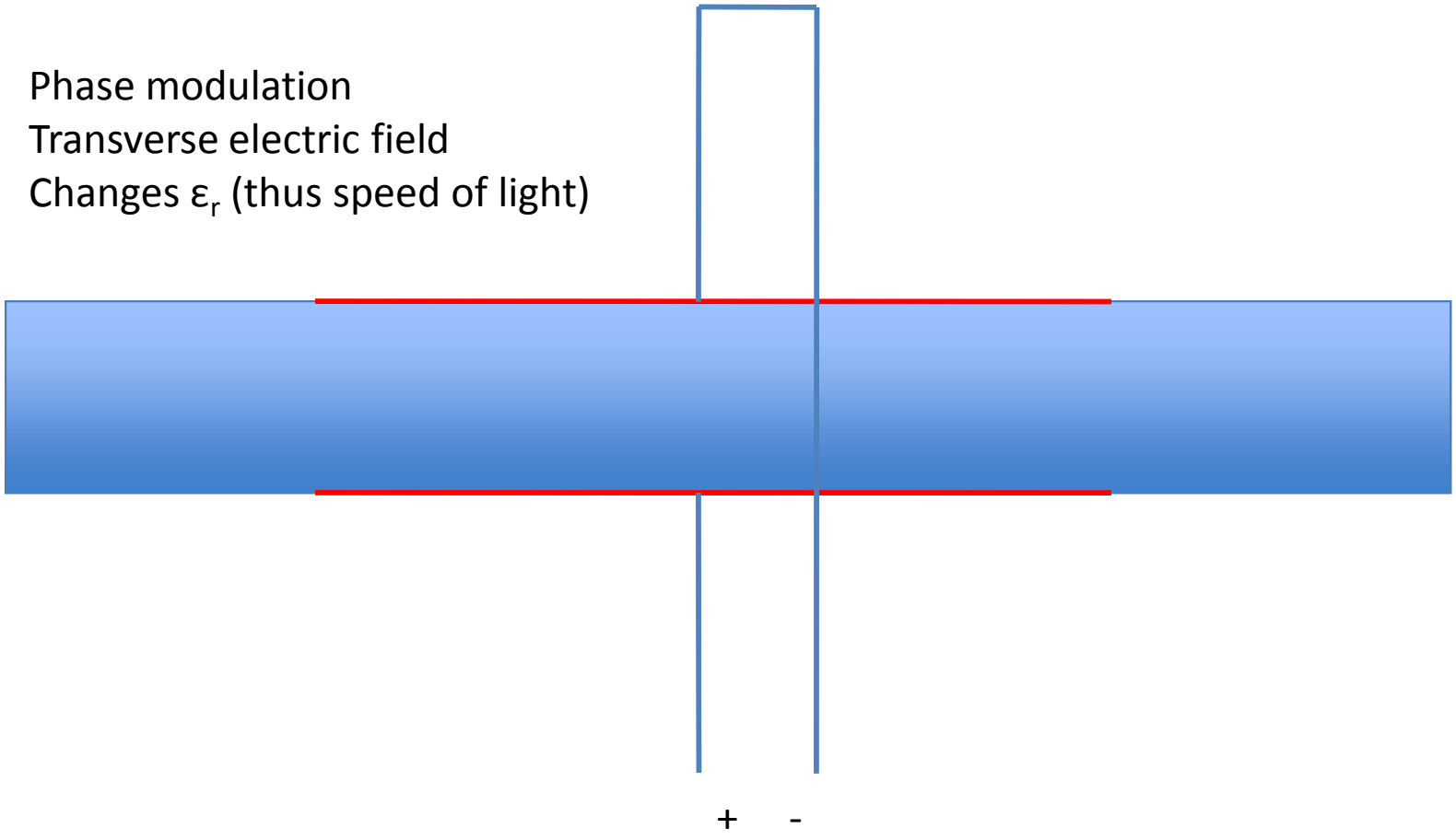
IfLink: a fast, light and rad-hard optical data connection

HvdG, Nikhef, Amsterdam

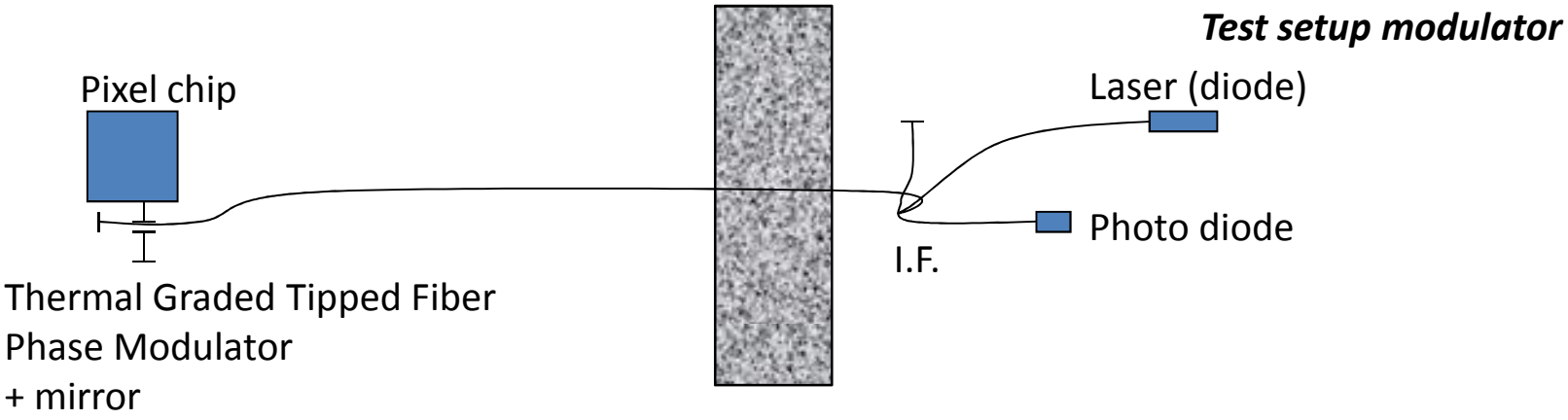
RD-51 MiniWeek, Sept 24, 2009

Phase modulation
Transverse electric field
Changes ε_r (thus speed of light)

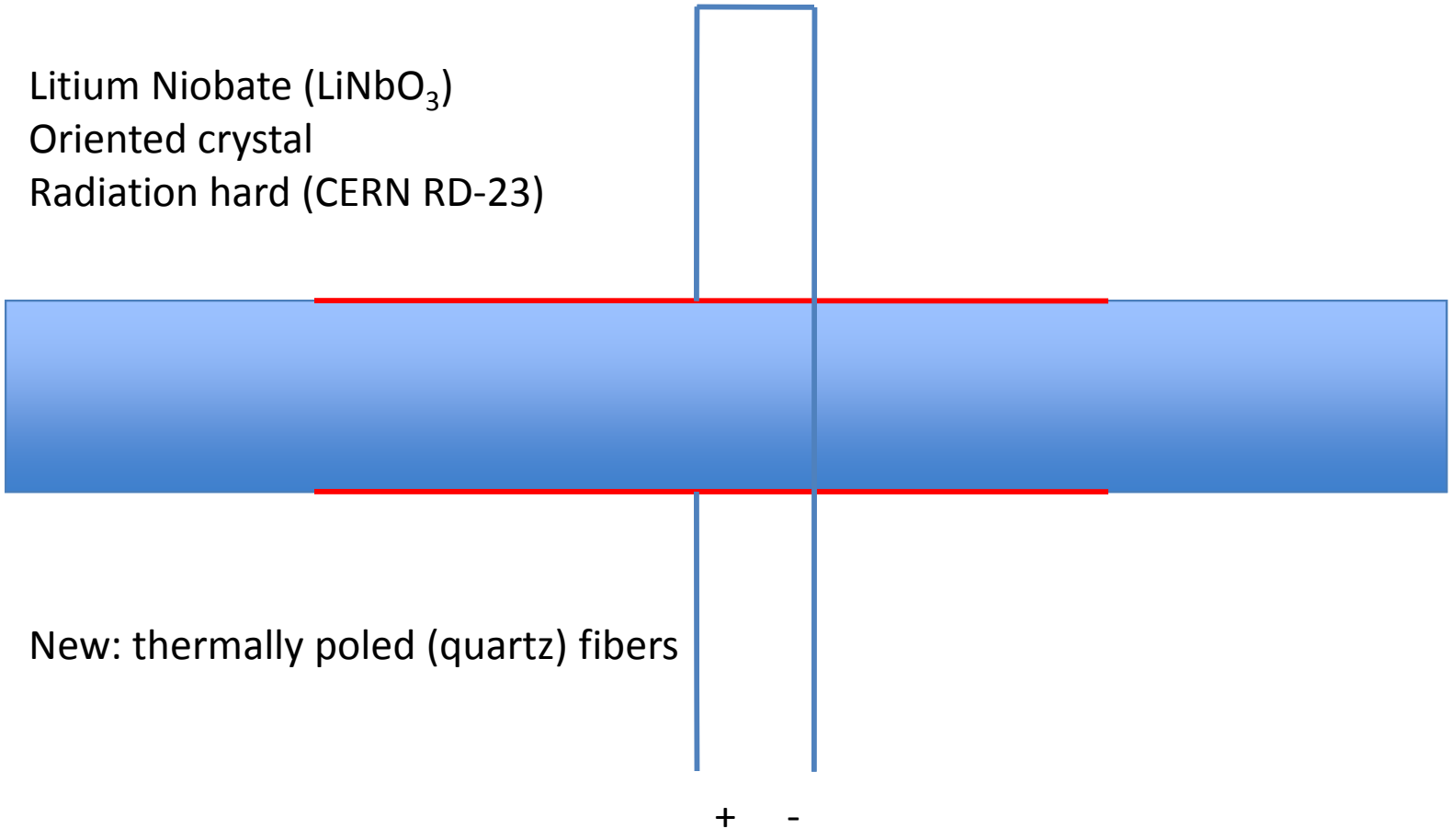


New optical link technology => Iflink

- Present VCSEL technology not sufficient rad hard (1.5 10^{15} cm^{-2} n_{eq}) for B-layer
- Alternative => **Iflink**
  - Using Pockels effect: change of ε_r by transverse E field
  - Thermally poled electro-optic active fibre (quartz)
  - => possibly sufficiently rad-hard for B-layer
    - Low modulator mass
  - TU-Delft (Neth.) and ACREO (Sweden) involved

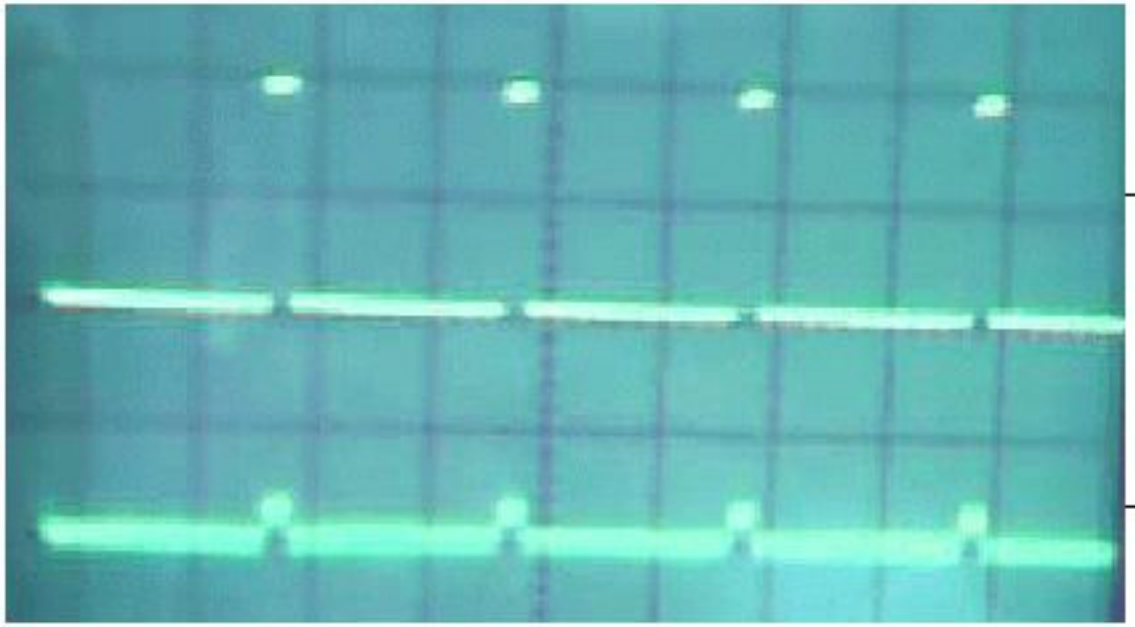


Litium Niobate ($LiNbO_3$)
Oriented crystal
Radiation hard (CERN RD-23)



New: thermally poled (quartz) fibers

Reponse of interferometer having a 30 mm length poled fibre section in each branch



Drive voltage on modulators
scale: 50 V / div

Output of interferometer
scale: 2 mV/ div

Timebase: 200 μs / div

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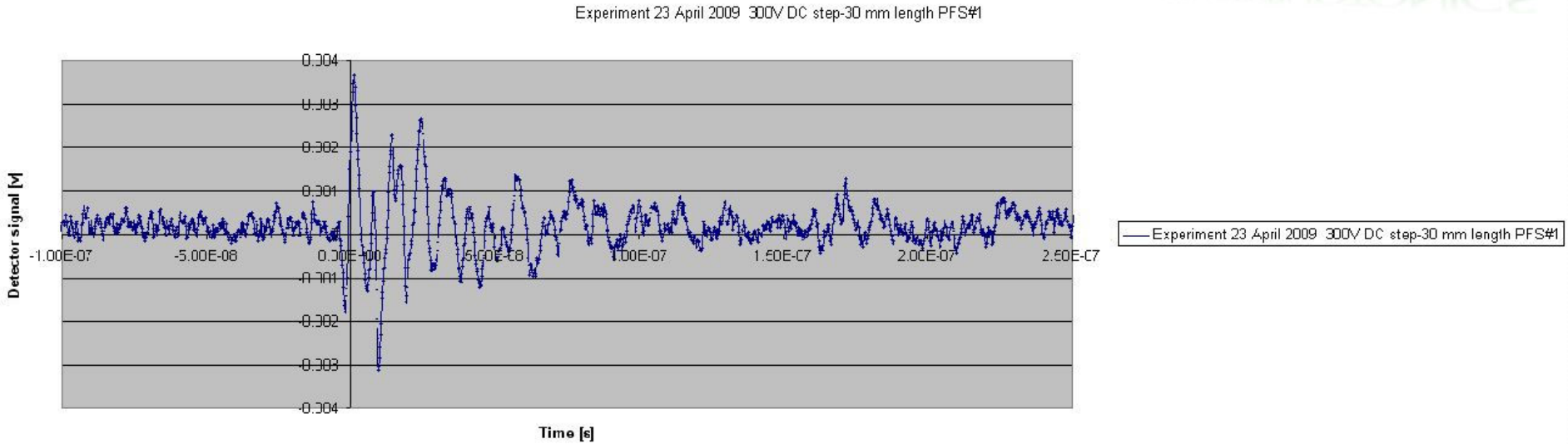
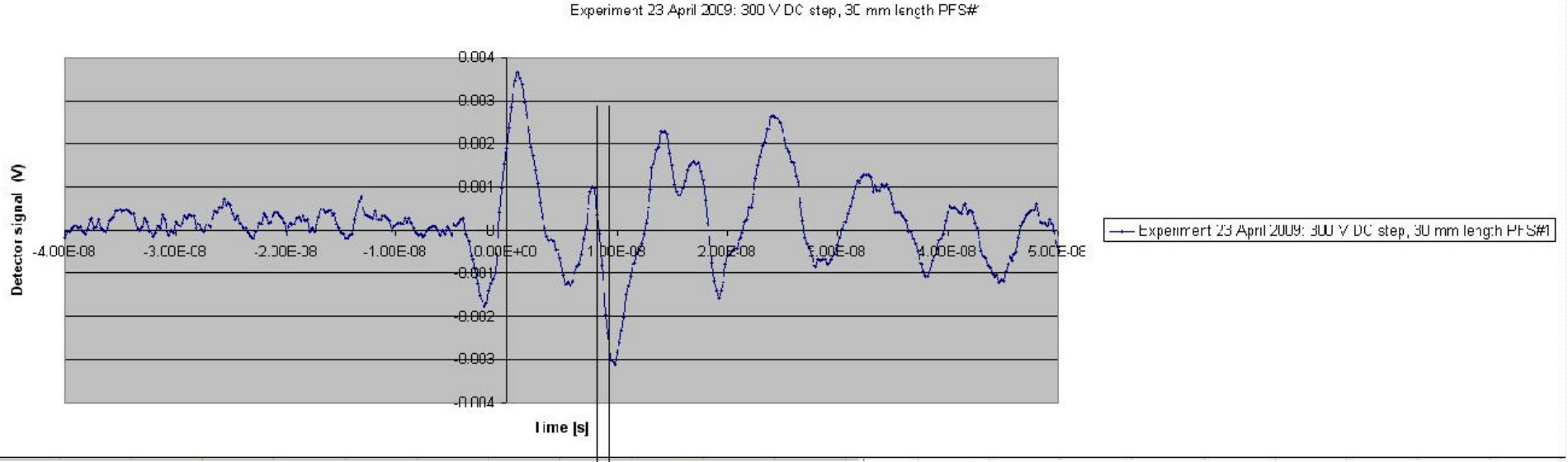
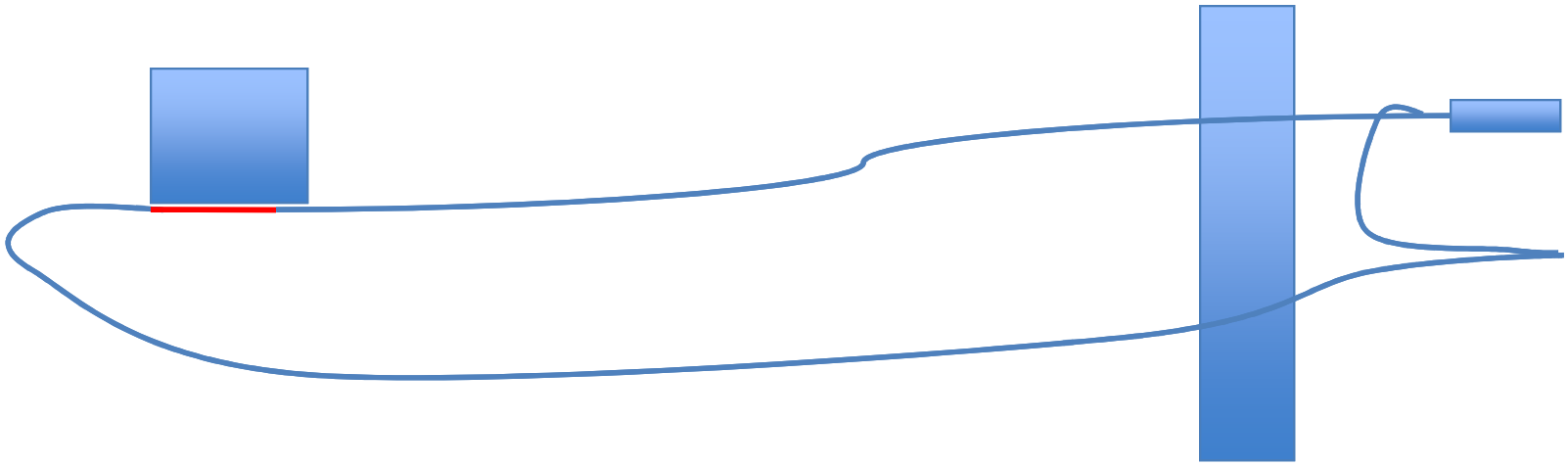




1 ns risetime (10-90%)

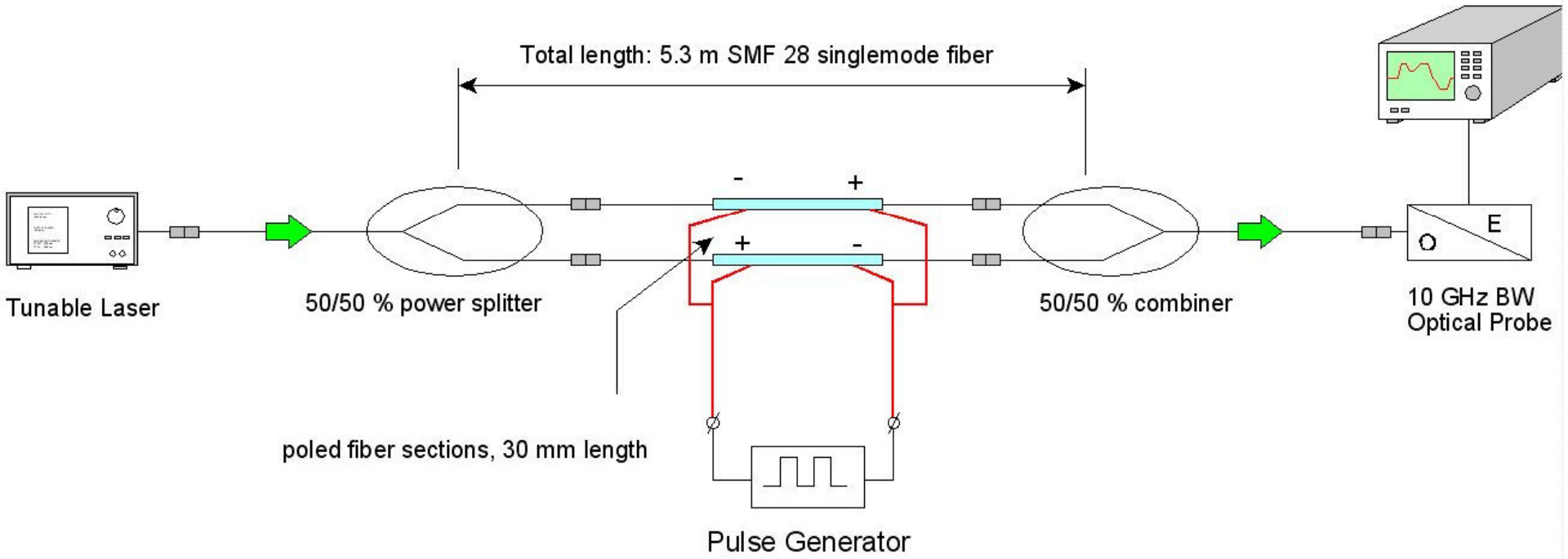
20090423/Nikhef/Interferometric response for 300V DC step with 30 mm length Poled Fibre Section [01]-M.J. van der Hoek



Very Unequal paths:
Laser wavelength shifts causes phase shift
Ultra stable laser required

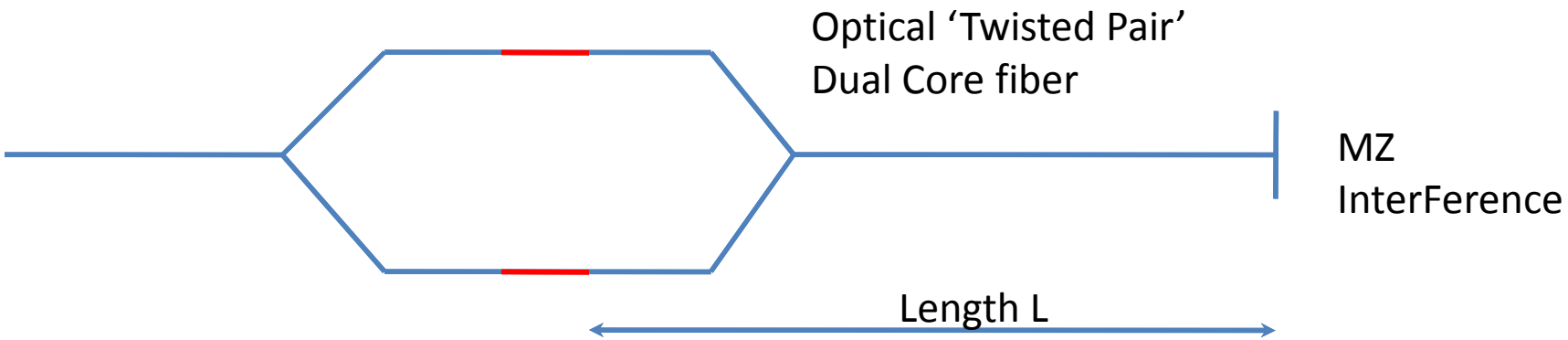
VANDERHOEKPHOTONICS

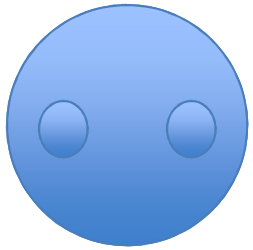
Interferometer with poled fibre sections in each branch



Path length tuning

Final try: optical ‘twisted pairs





Set-Up moved to Delft Univ. of Technology
Results expected Oct 2009:
- Phase noise as a function of length L?