

# DML Technology and Costs

## Reach (Technical) Feasibility of 100GE alternatives

SMF	10km 1310nm	40km 1310nm	10km 1550nm	40km 1550nm
10x10G DML	yes (10λ span can not be un-cooled)	yes (need new DML, RX APD or SOA)	yes (need new DML)	maybe (need new DML, RX APD or SOA)
10x10G EML	yes	yes (need RX APD or SOA)	yes	yes (need RX APD or SOA)
5x20G / 4x25G DML	yes (need new DML)	maybe (need new DML & RX SOA)	maybe (need new DML)	no
5x20G / 4x25G EML	yes (need new EML)	yes (need new EML & RX SOA)	yes	yes (need RX DC)
2x50G DQPSK ML	yes (need I/Q ML)	yes (need I/Q ML & RX DC & OA)	yes (need I/Q ML & RX DC)	yes (need I/Q ML & RX DC)
1x100G TDM ML	yes (need new ML & maybe RX DC)	yes (need new ML & RX DC & OA)	yes (need new ML & RX DC (& OA?))	yes (need new ML & RX DC (& OA?))

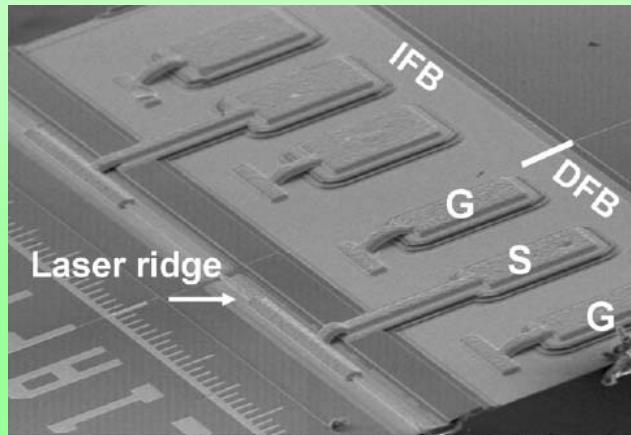
Technically feasible ?  
At which costs ?

Green shading designates alternatives under detailed study by Fiber Optic Ad Hoc contributors.

*Finisar*

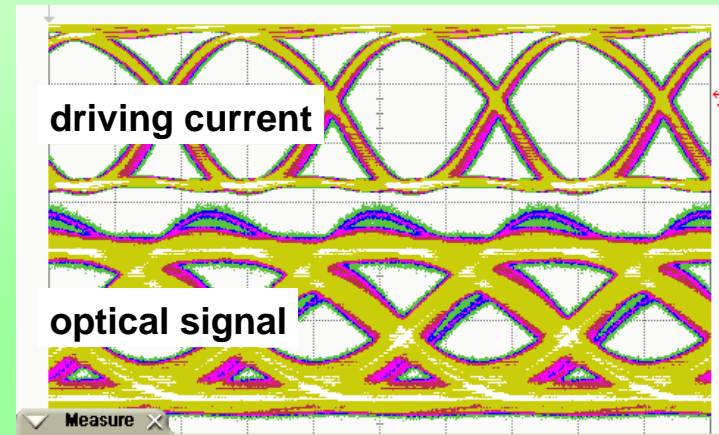
# Direct Modulation @ 40 Gbit/sec

## Directly Modulated Laser (diMoLa) ...



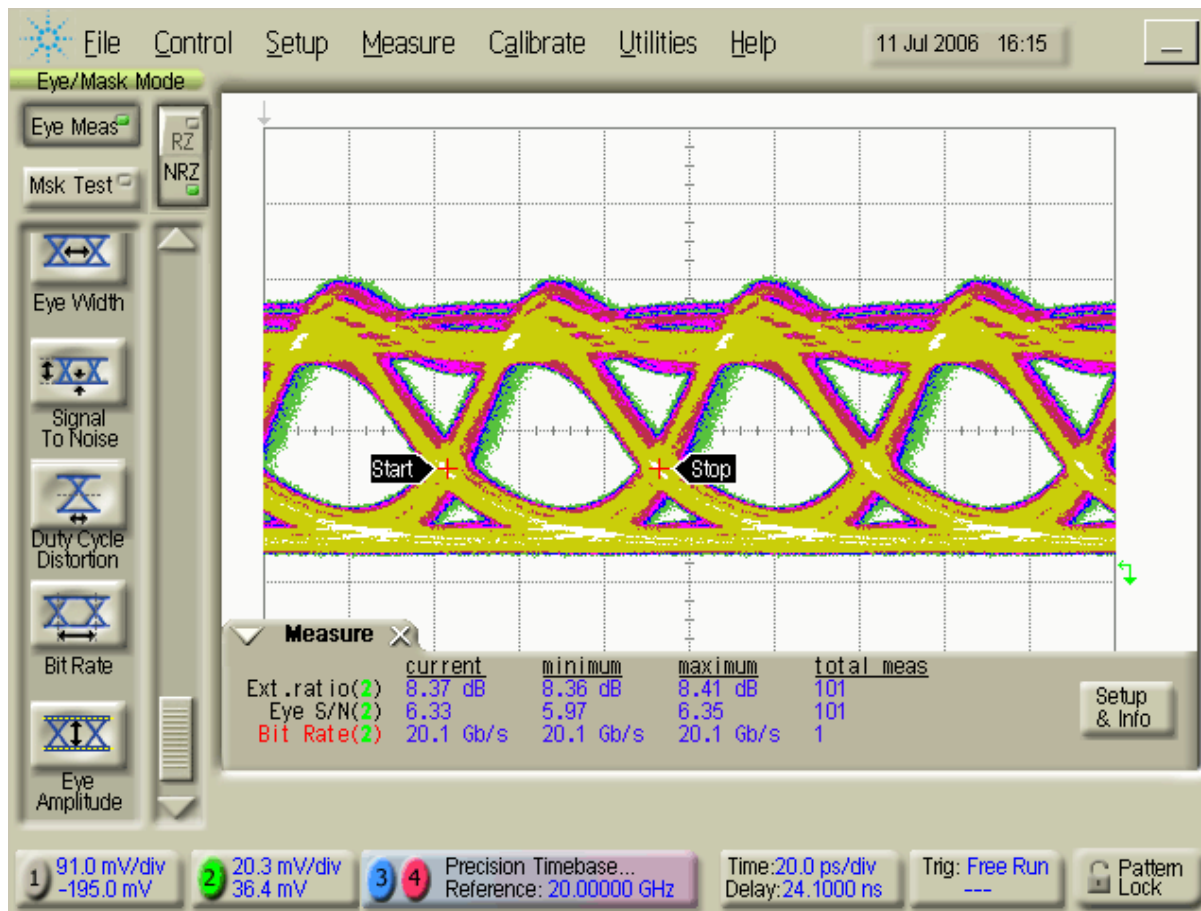
- Two section laser
- No exotic processes
- One section modulated, one cw

## ... with 40 G potential



- 70 mA driving current
- 5.3 dB extinction ratio

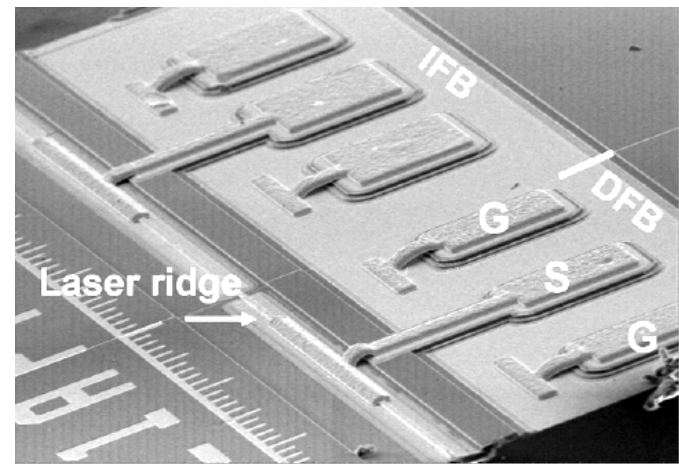
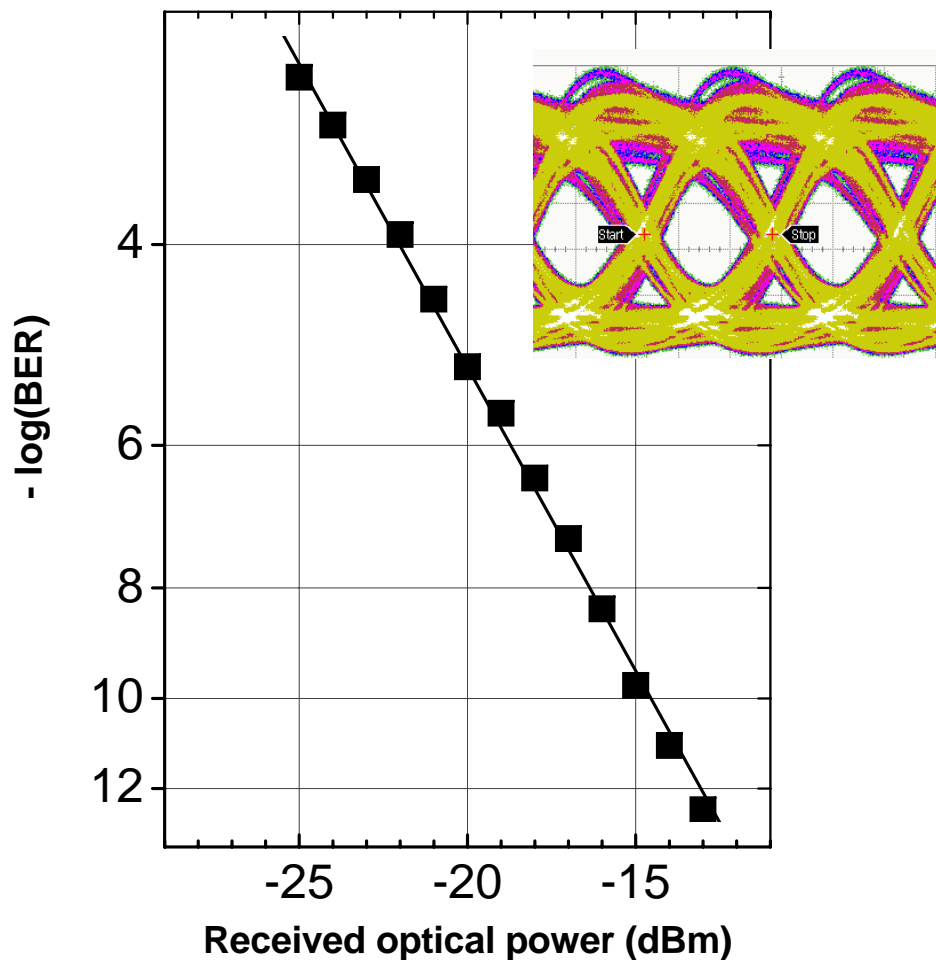
# DML: Eye diagram, 20 Gb/s NRZ ( $2^7-1$ )



**DFB: 70 mA**

**Extinction ratio: 8.4 dB**

# DML: 40 G Back to Back BER

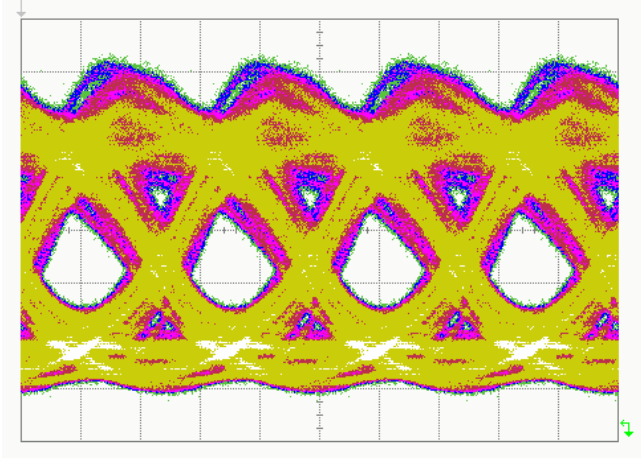


**InGaAsP MQW laser:**

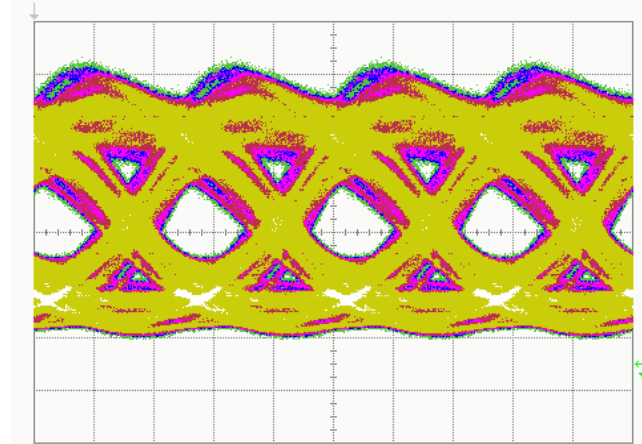
- Error free operation
- Ext. ratio: 6dB

# NRZ Eye pattern 1.55 $\mu$ m (preliminary)

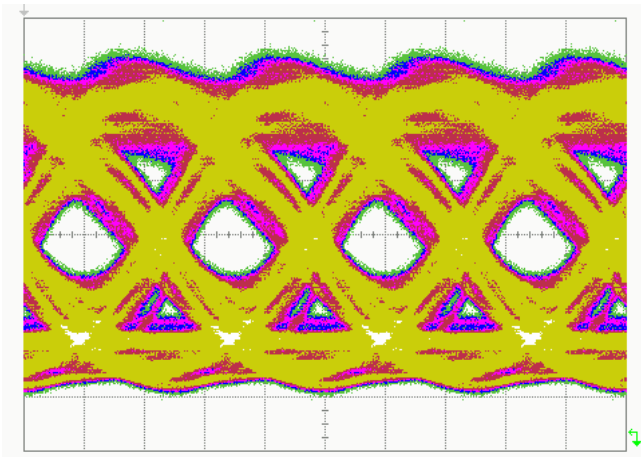
**Back to back**



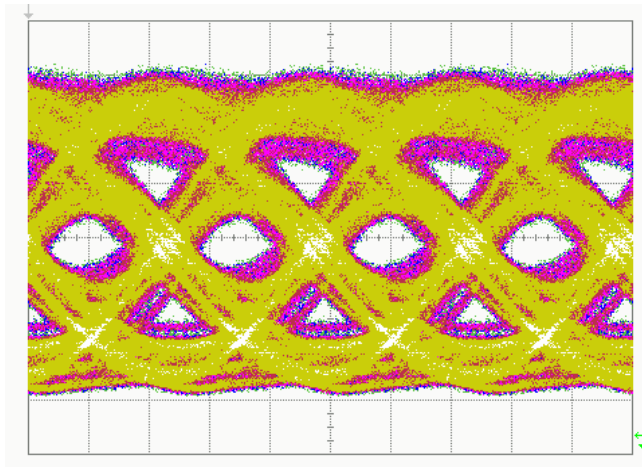
**0.5 km SSMF**



**1 km SSMF**



**2 km SSMF**



# Feasibility and costs

No show stopper expected for 40G 1300 nm 10 km operation

25G 1300nm 40km operation seems likely

Potential for uncooled operation with Al-lasers

Cost position:

optochip:	2-2.5	10 Gbit 1300nm DFB opto chip
OSA:	1-2	standard 10 Gbit cooled OSA
driver:	One additional cw current source needed	