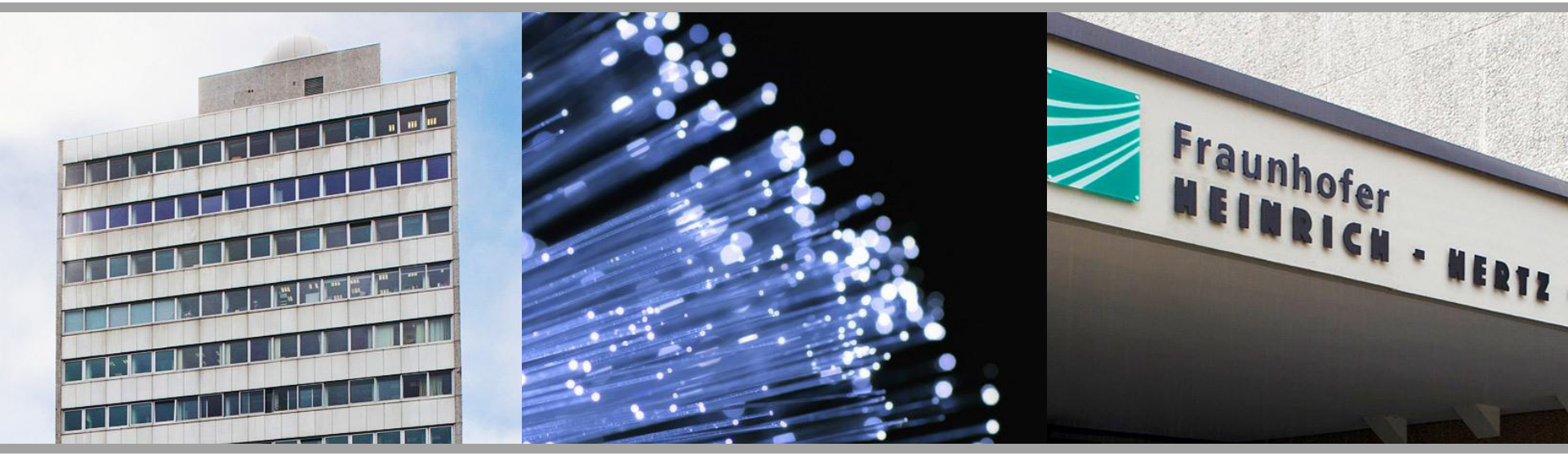
Fraunhofer
Heinrich Hertz Institute

Externally Modulated Laser for PAM at 28 GBaud

Martin Schell

Next Generation 100G Optics Study Group, July 2012



Overview

The Externally Modulated Laser (EML)

Experimental Setup

10 GBaud: PAM 8

28 GBaud: PAM 4 and PAM 8

Conclusion & Outlook

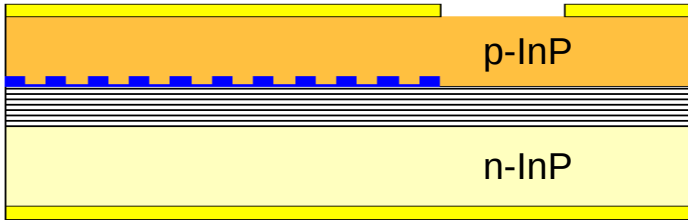
Background

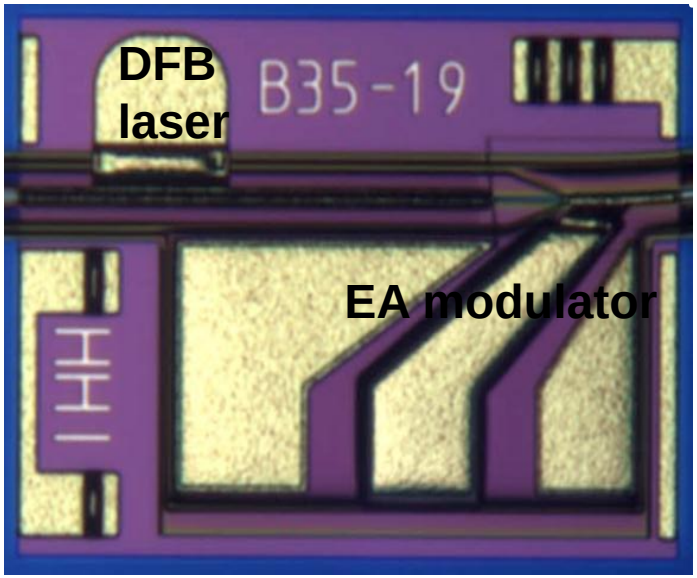
- lewis_01_0512_optx and lewis_01a_0512_optx showed PAM 8 modulation of an EML at 10 GBaud
- Here: 1st results at 28 GBaud

The EML

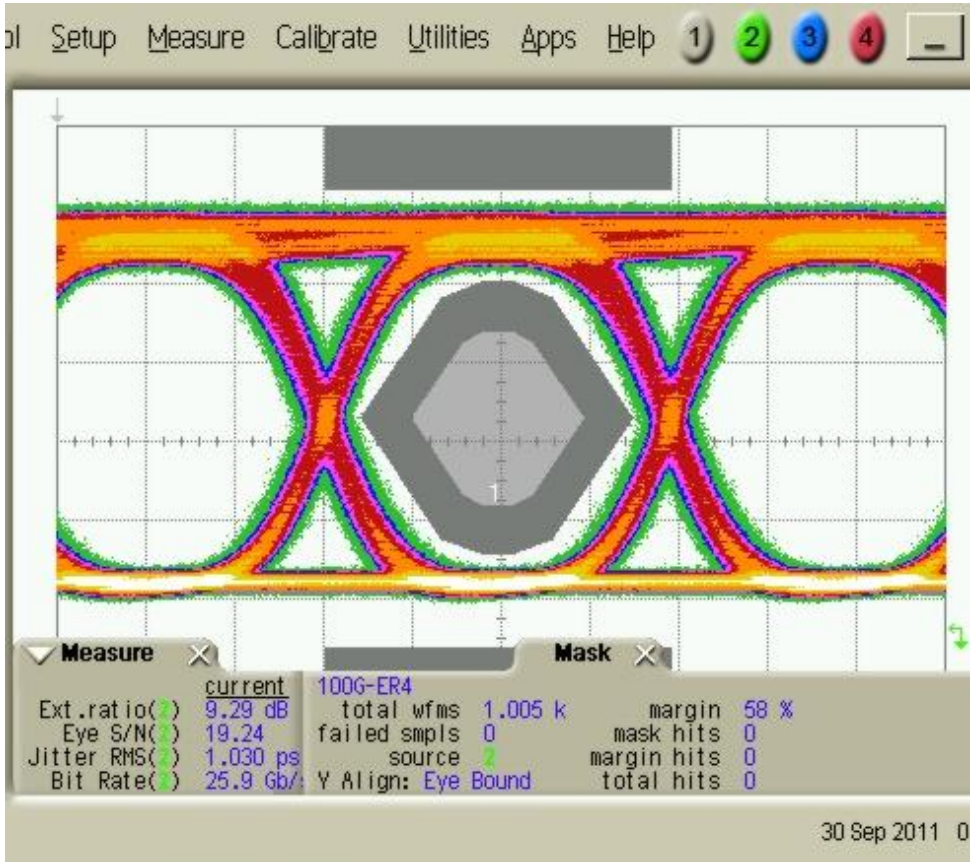
DFB

EA-modulator

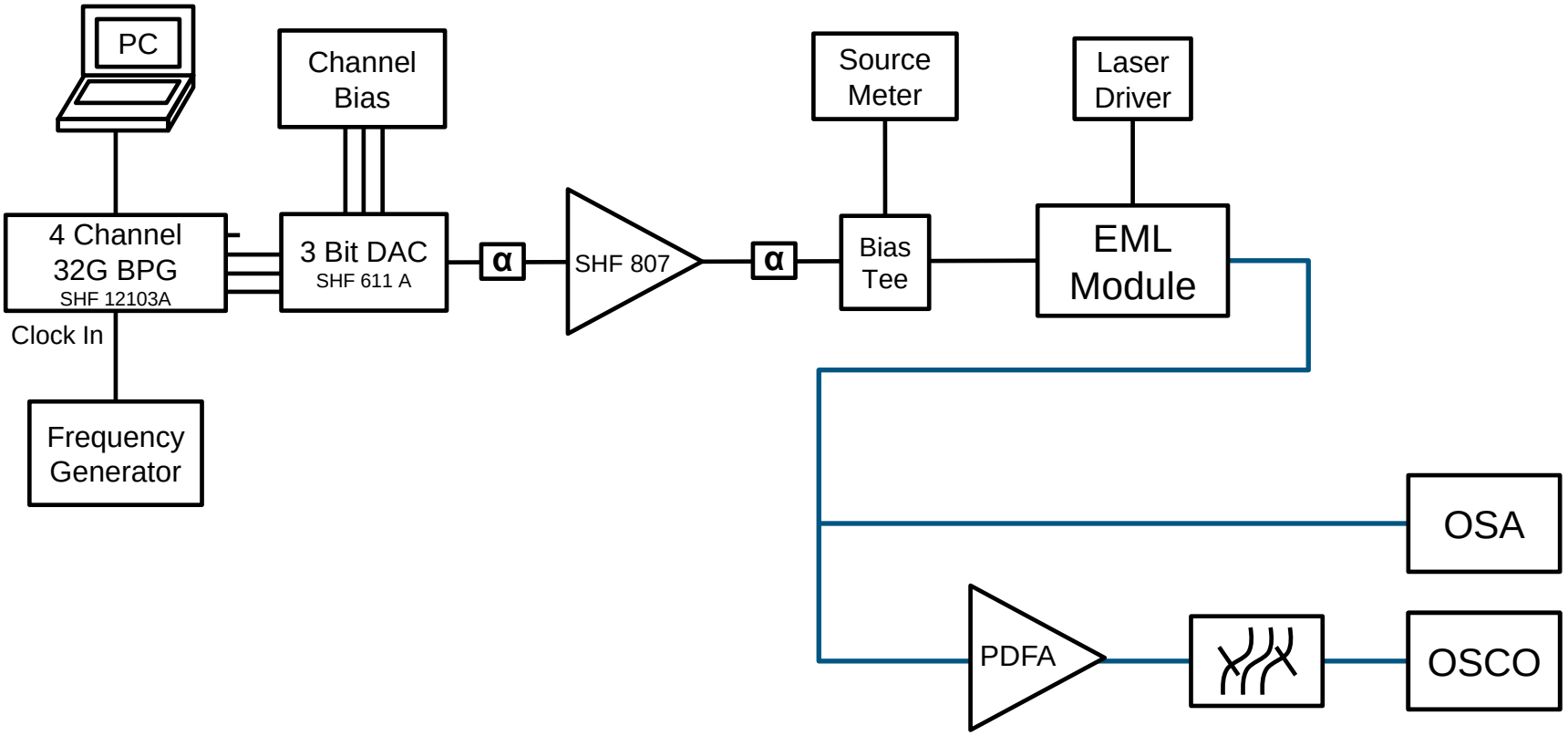




26 Gbit eye

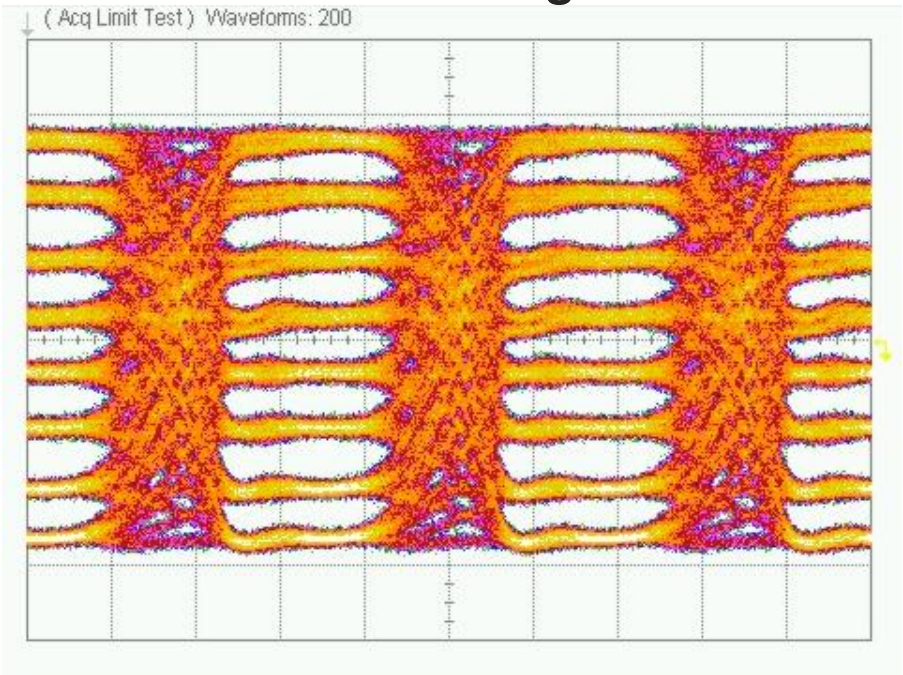


Experimental setup

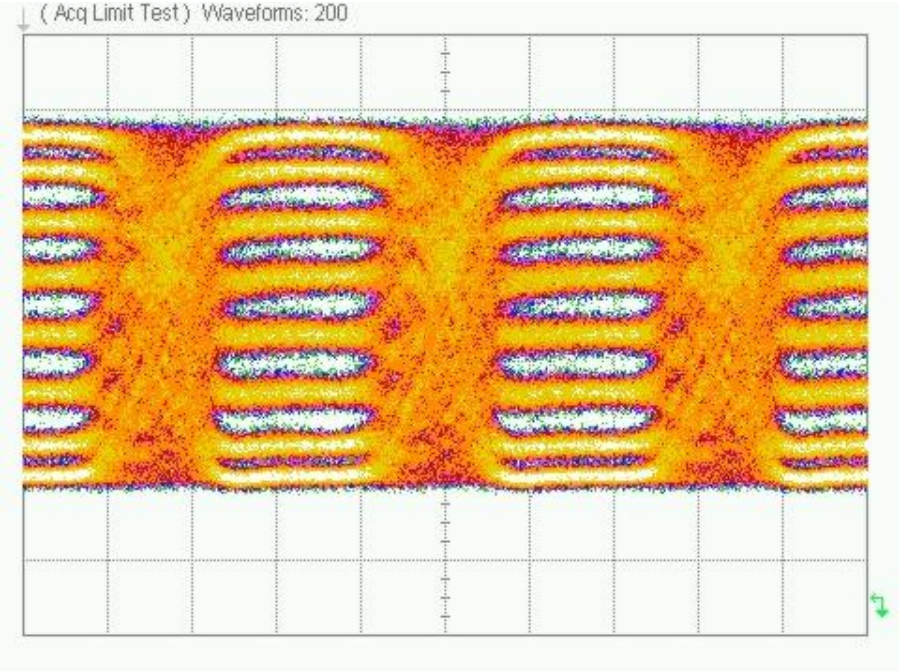


PAM-8 @ 10GBaud

electrical signal



optical signal

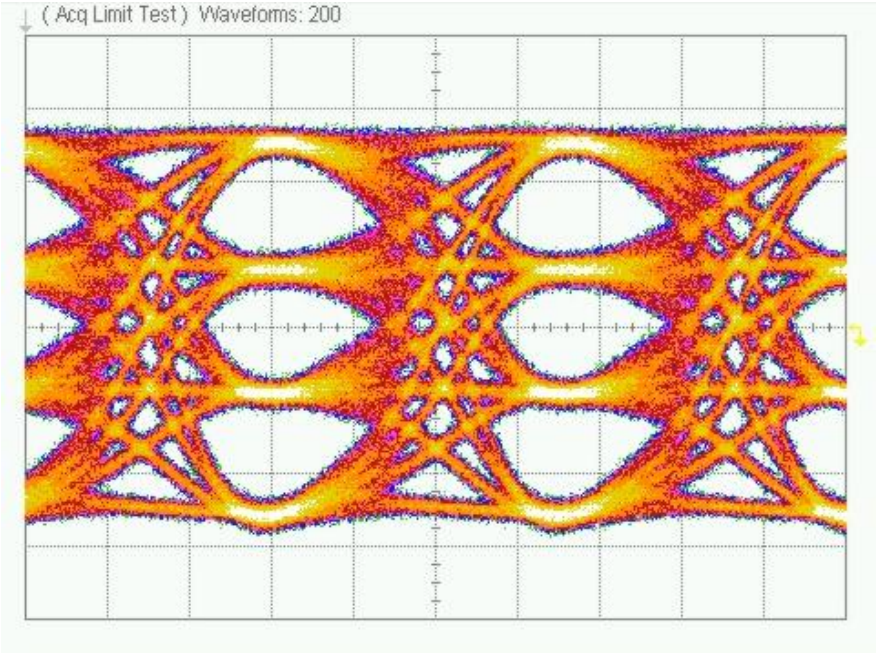


- **Nice eye opening, except for lowest and highest eye**
- **Room for improvement with electrical preemphasis**

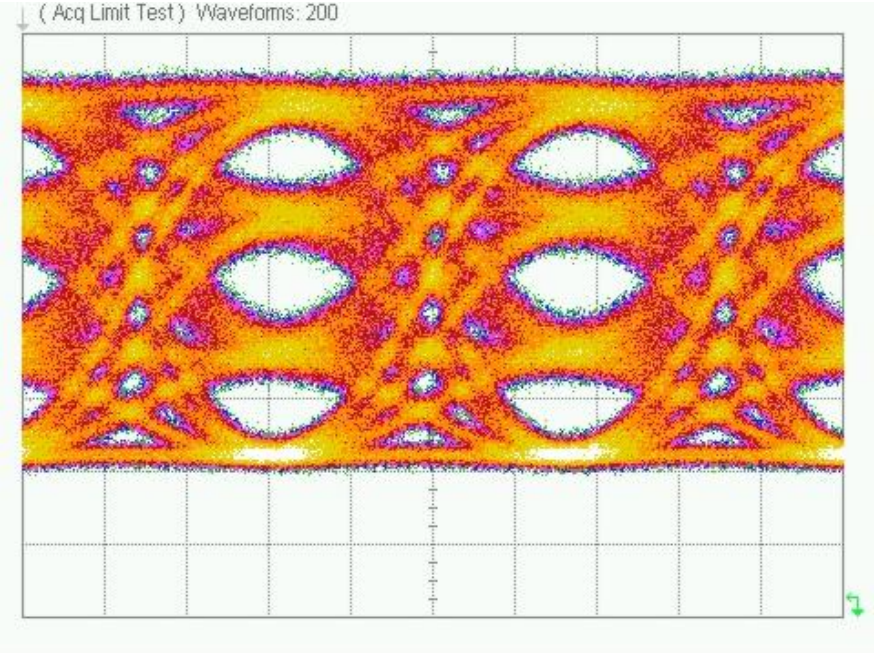
PRBS 2^{31}-1, 100mA DFB, T=45°C, 40G photodiode

PAM-4 @ 28GBaud

electrical signal



optical signal

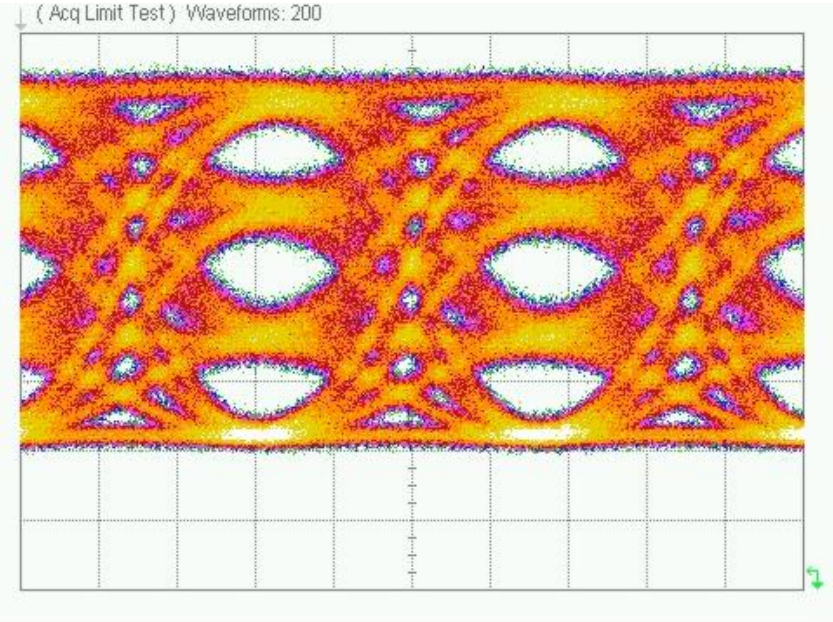


- **Nice PAM-4-signal, ER 5.7dB**
- **Room for improvement with higher bandwidth EML, electrical overshoot**

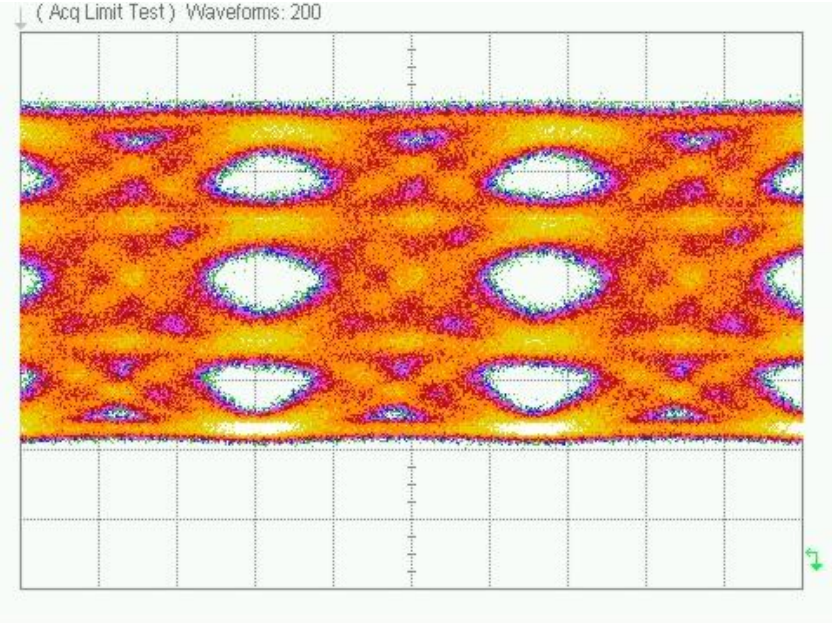
PRBS 2^{31}-1, 100mA DFB, T=45°C, 40G Photodiode

PAM4 @ 28Gbaud transmission

B-2-B



10km SSMF

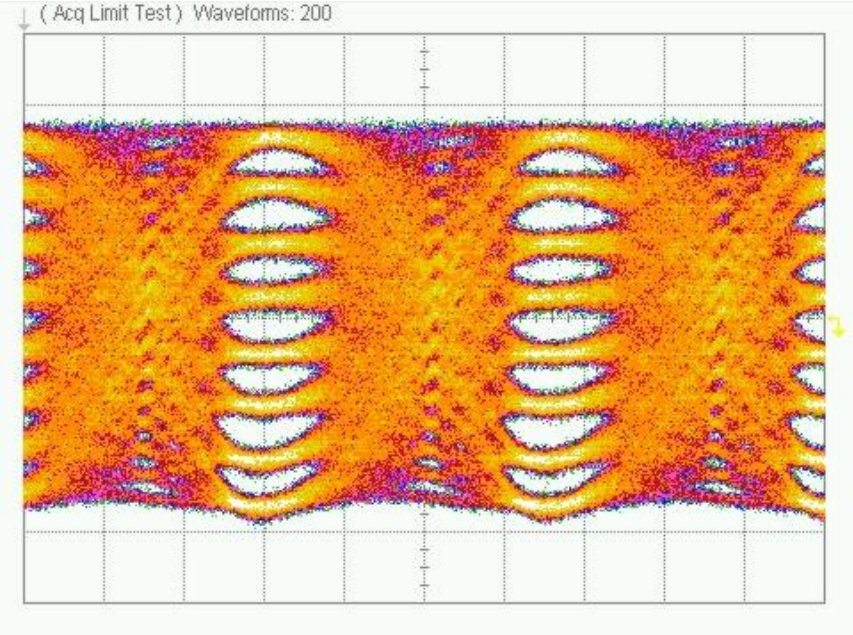


- **No significant signal degradation after 10km**

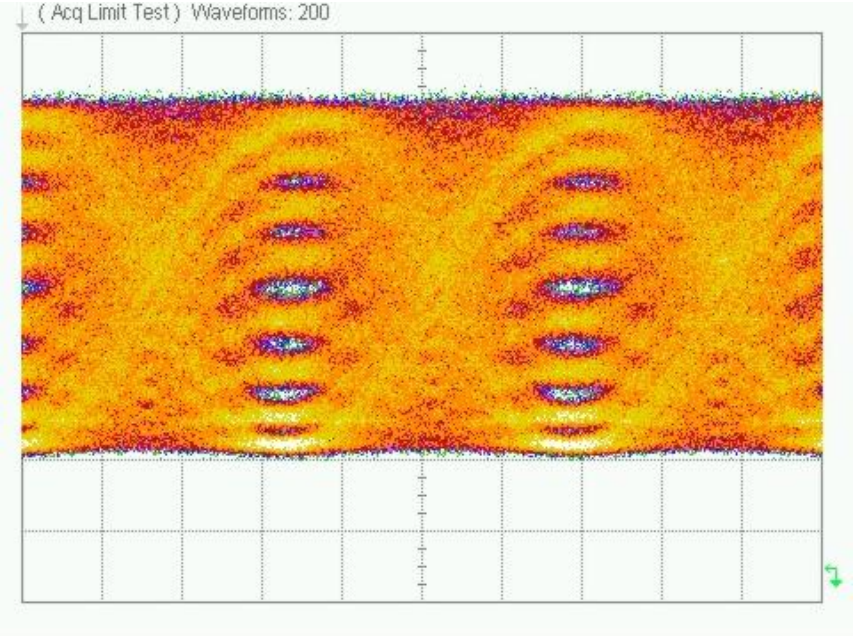
PRBS 2^{31}-1, 100mA DFB, T=45°C, 40G Photodiode

PAM-8 @ 28GBaud

electrical signal



optical signal



- **EML needs more bandwidth**
- **Predistortion and level adjustment in the driver would help**

PRBS 2^{31}-1, 100mA DFB, T=45°C, 40G Photodiode

Conclusion & Outlook

PAM4 @ 28 GBaud is possible with very simple EML

PAM8 @ 28 GBaud might become possible by incremental improvements

EML bandwidth improvement will improve performance

Improved level adjustment, predistortion in the driver will improve performance