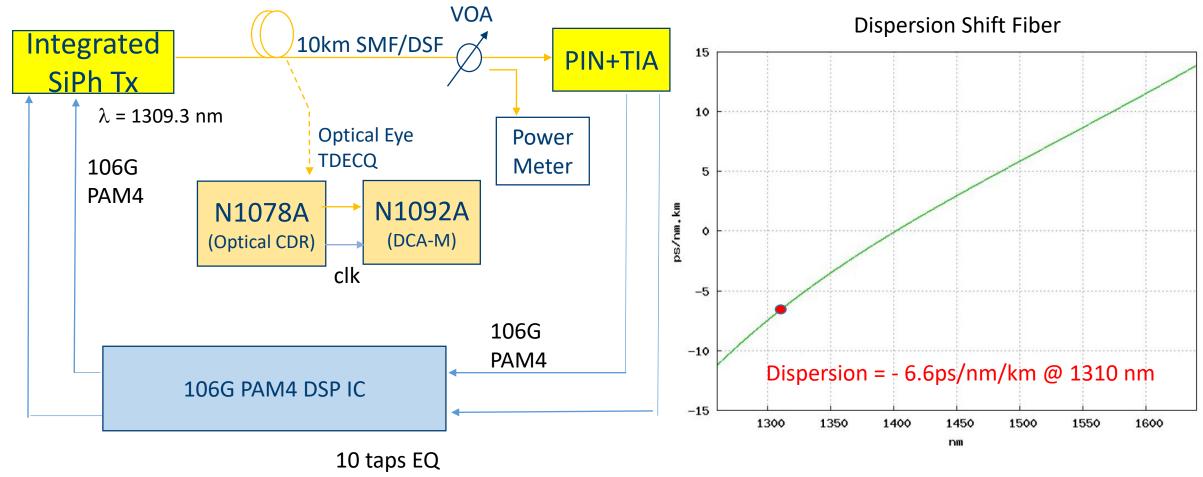
# Dispersion Penalty Measurement Using Silicon Photonics Tx

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## Overview

- 400G-LR4 on CWDM wavelength grid might have excessively high dispersion penalty under the corner case of dispersion conditions for 2 outer channels (- 59 ps/nm for L0 and 33 ps/nm for L3).
- We showed (in Sept. 2018) dispersion penalty measurements using chirped Tx ( $\alpha$  = +/- 0.7)
  - Excessively high penalty with -ve chirp in -ve fiber dispersion region
  - 2.2 dB penalty with +ve chirp in +ve fiber dispersion region
- This presentation will show the dispersion penalty measurements using SiPh MZI based Tx.

**Measurement Setup** 



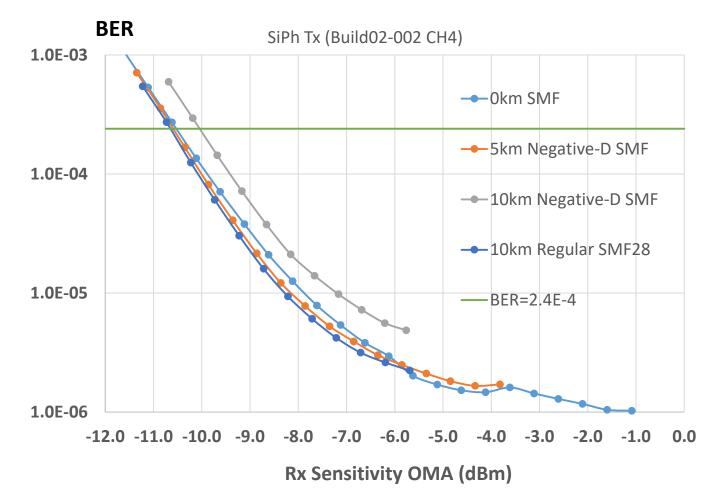
10km DSF  $\Rightarrow$  worst case –ve dispersion

### **Tx Characteristics**

Eye/Mask		KEYSIGHT File		easure To	ols Apps	Help	Auto Scale	Single Clea	
	Eye Meas	Waveform							
Extinction Ratio	as	<b>V</b> 531.6840 UI	Channe		SSPRQ	Patter		TDECQ[1A]	
	Mask Test					750 µW 580 µW			
Jitter	JSA/CRE				0				
XX							0 UI 0.45	51 UI 📙 📙 0.551 UI	1 UI
OMA at Crossing		Results 🕟				(≫) ₽			
	PAM	Measurement		Current	Minimum	Maximum	Count		
XªX		TDECQ	F1	1.51 dB	1.50 dB	1.52 dB	10		
	$\models$	Ceq	F1	0.01 dB	0.01 dB	0.01 dB	284		
VECP		TDECQ	1A	1.69 dB	1.69 dB	1.72 dB	10		
TX1	User	Outer OMA	14	492.0 µW	491.2 µW	492.8 µW	284		
		Outer ER	14	3.821 dB	3.810 dB	3.822 dB	284		
Average Power		RLM (802.3 A_120D)	F1	0.879	0.867	0.885	284		
		RLM (802.3 CL_94)	F1	0.960	0.953	0.964	284		
		Average Power	1A	-2.35 dBm	-2.35 dBm	-2.34 dBm	284		
More (1/4)		X Details Limits	Setup						Annotations
138.0 µW/ 327.16 µW			CDR 125000 GBd			7imebase 2.5020 UI Pos: 531.6840 UI	Acquisition Full Pattern: On 10.98999771 pts/UI	Frame Trigger Src:Front Panel 53.125000 GBd	Paltern Math Signals

ER = 3.8 dB SECQ =1.6 dB

#### **BER Measurements**



- 0.7 dB penalty with 10km of DSF (dispersion = -66 ps/nm)
- Negligible penalty with 10km of standard SMF

## Conclusions

- Measured dispersion penalty using SiPh MZI based Tx @ 106 Gb/s from BER tests
  - 0.7 dB penalty with 66 ps/nm total dispersion
- Expect the dispersion penalty to be manageable for SiPh MZI based Tx for CWDM wavelength grid, supporting 400G-LR4 baseline.