6.4Tb/s CPU / Transceiver MCM

Chris Cole, Finisar

Team A: Shu Namiki, AIST, Tomohiro Kudoh, Univ. of Tokyo, Christian Koos, KIT, Chris Cole, Finisar

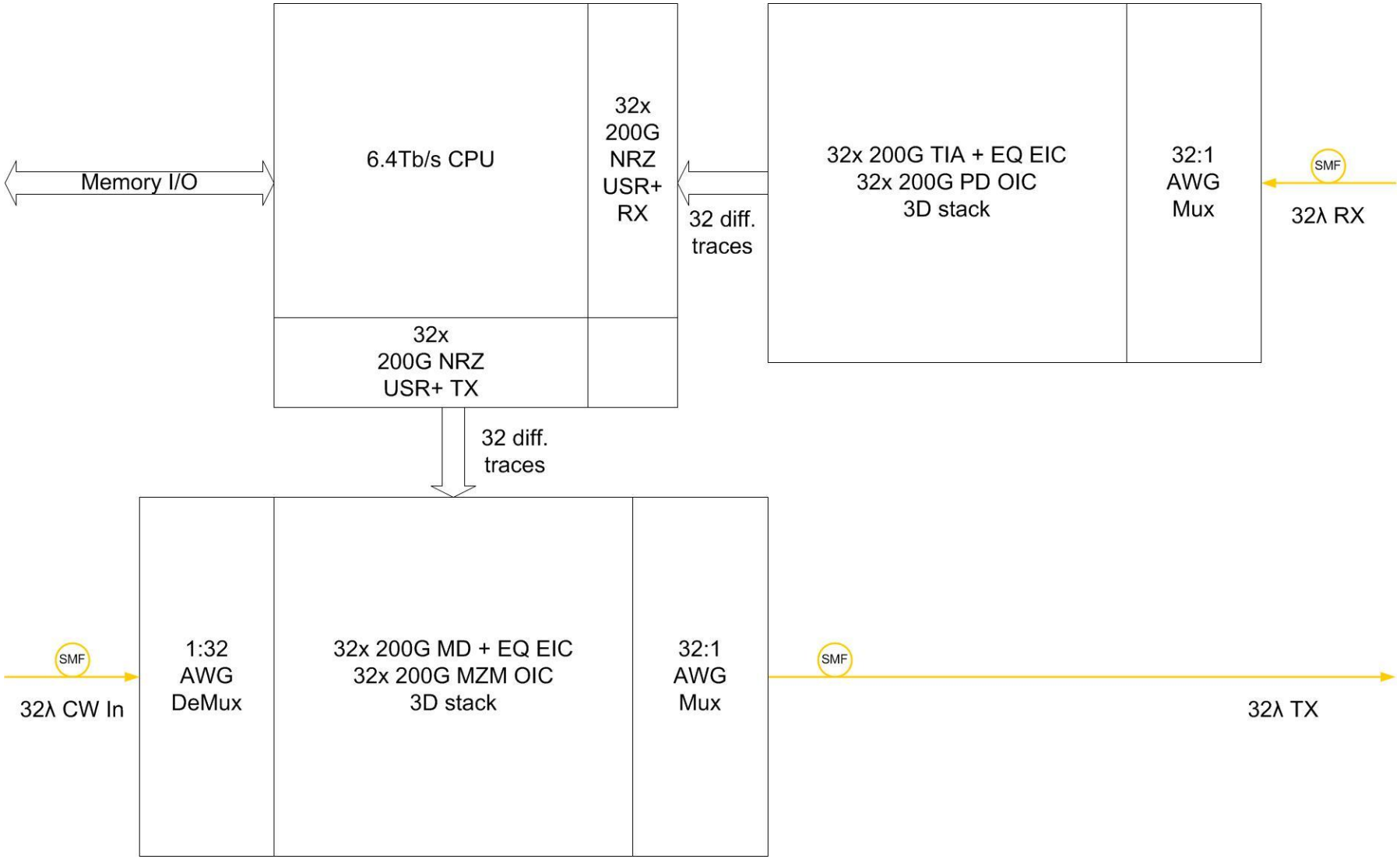
Will Optical Switching Drive Data Center Design in 2028?

OFC 2018 Workshop

San Diego, CA

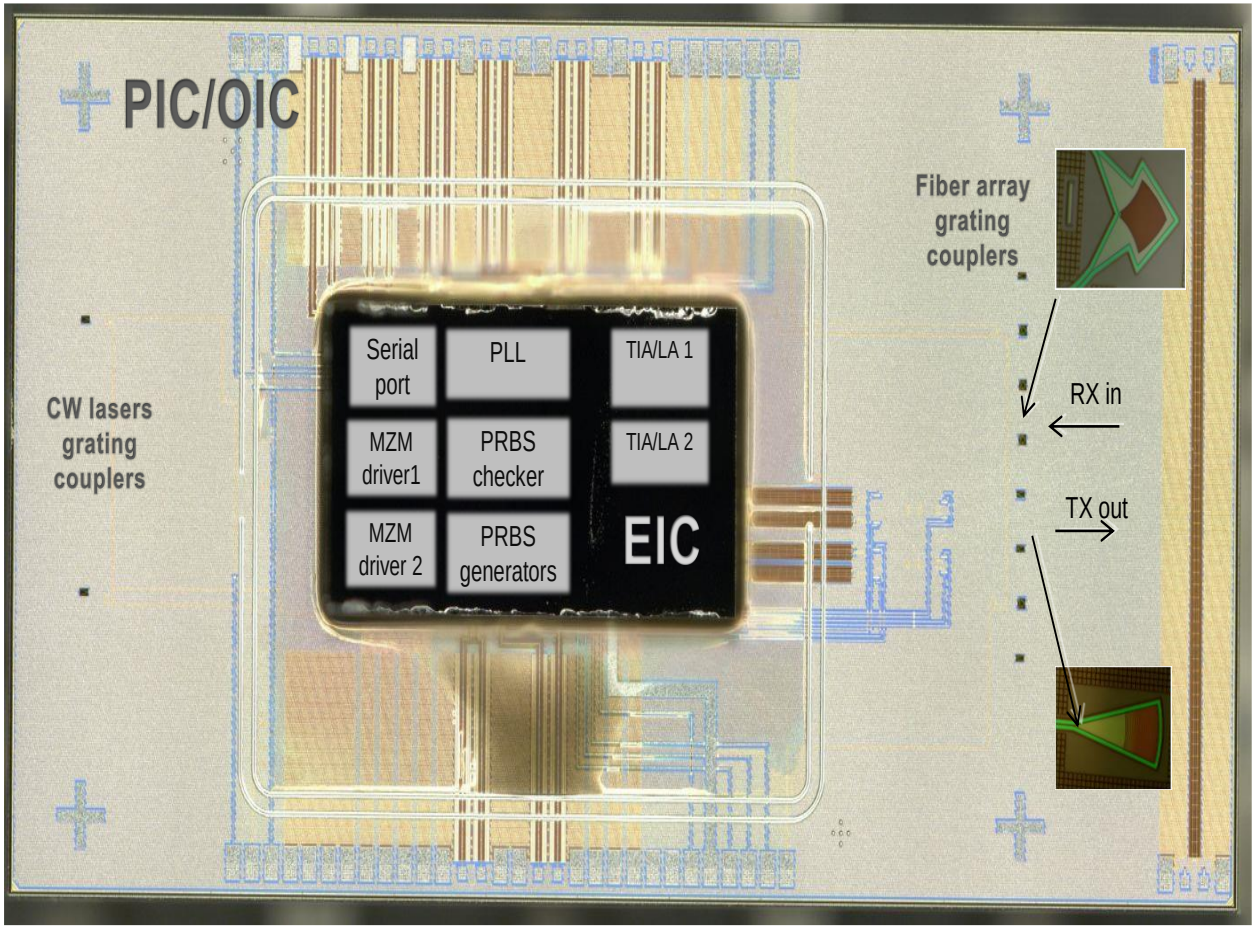
March 11, 2018

6.4Tb/s CPU / Transceiver MCM Block Diagram



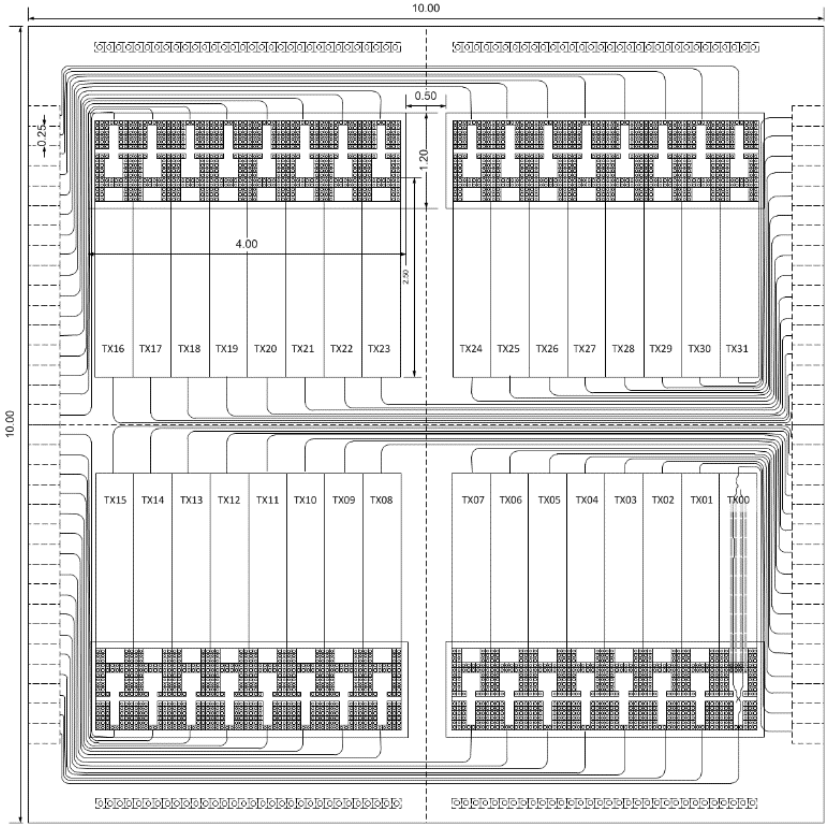
Ex. Finisar 100Gb/s 2x 50G NRZ Transceiver

- 2x 50G MD
- 2x 50G MZM
- 2x 50G TIA
- 2x 50G PD
- Test circuits
- JLT 2015

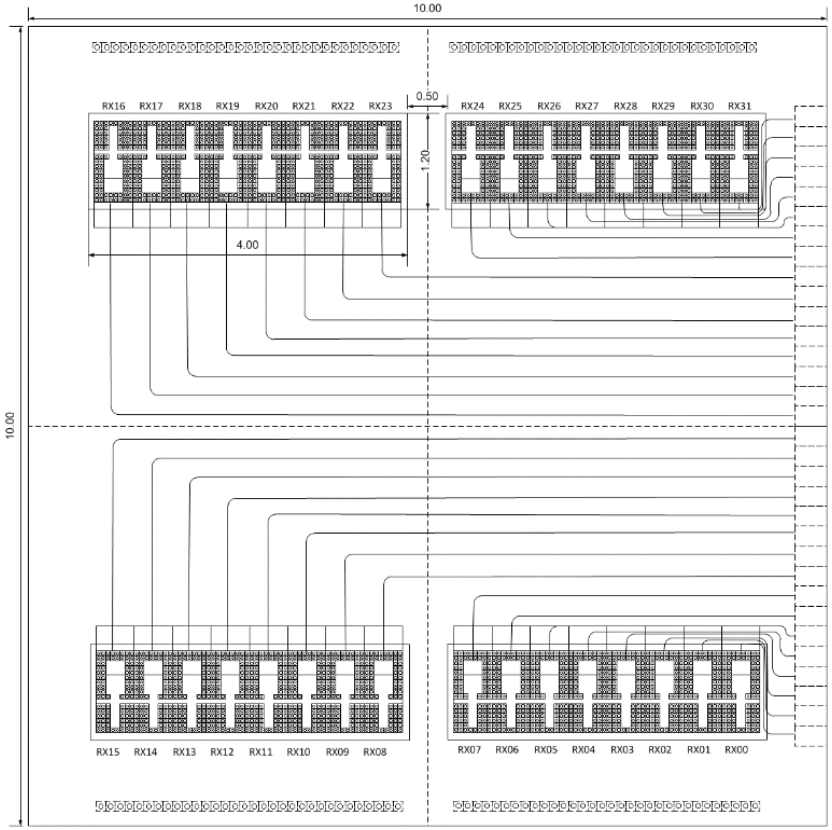


6.4Tb/s Transceiver TX & RX OICs

6.4Tb/s SiPIC TX OIC



6.4Tb/s SiPIC RX OIC



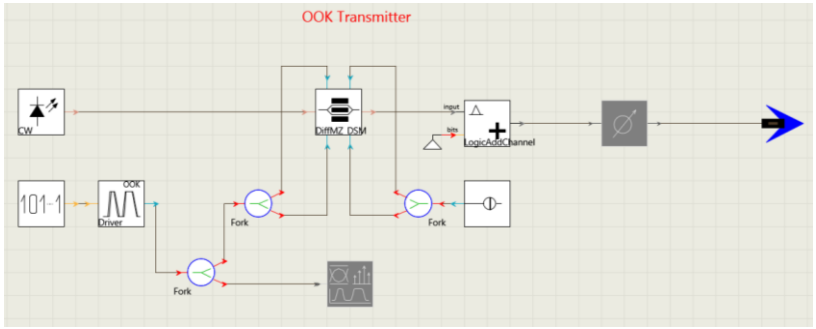
Designs in released ST PDK

Transceiver Power

200G NRZ	Power (mW)
USR+ TX	400
USR+ RX	1000
MD TX	400
TIA RX	200
Total	2000
pJ/bit (2018)	10
pJ/bit (2028)	5

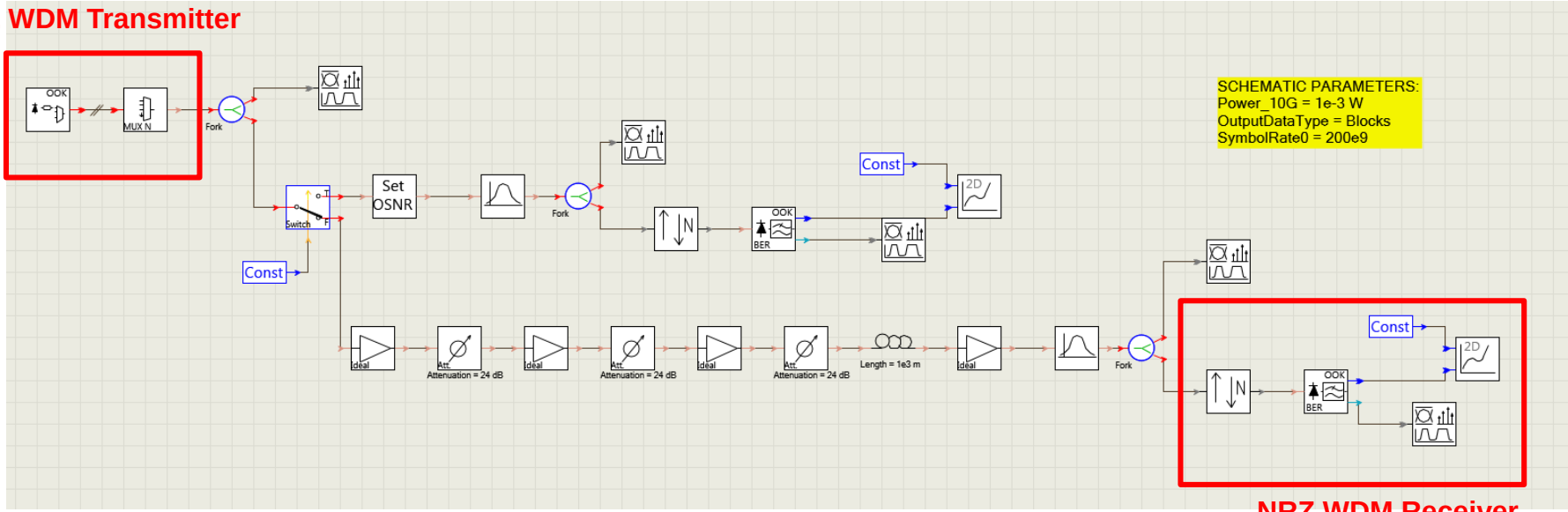
Power estimates based on TX and RX SiPIC IC designs in released ST PDK.

Optical Link VPI Simulation Setup



32 × 200 Gb/s WDM NRZ system built with VPIphotonics 9.8:

NRZ WDM Transmitter

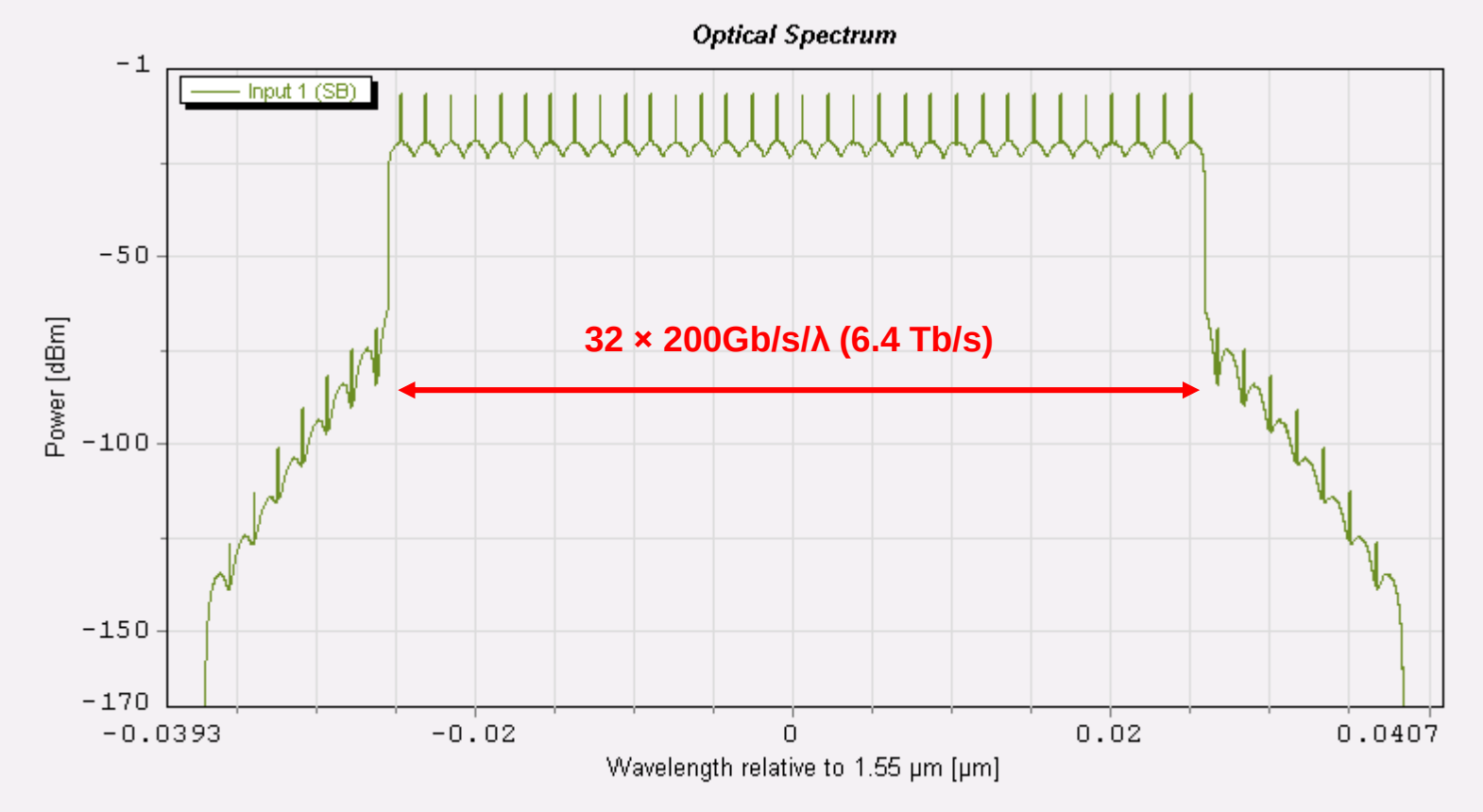


NRZ WDM Receiver

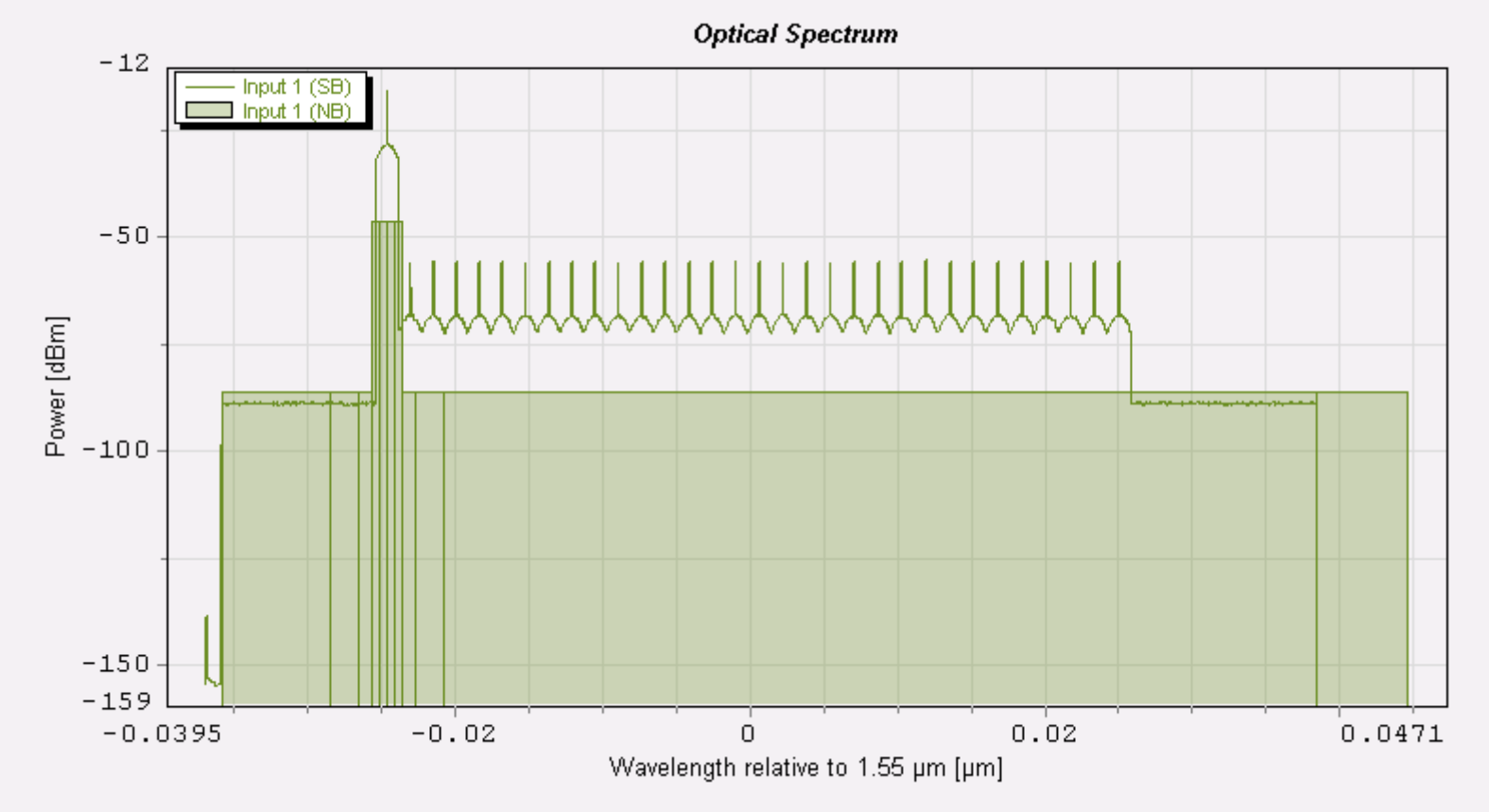
VPI Simulation Parameters

Parameters	Values
Bit Rate	200 Gb/s/λ
Modulation Formats	NRZ
Operation Wavelength	1526 nm – 1576 nm (32 WDM Channels)
Channel Spacing	200 GHz
AWG, MUX/DMUX Filter Shape & BW	Gaussian, 200 GHz
AWG, MUX/DMUX Insertion Loss	5 dB
EDFA Output Power	17 dBm
EDFA Noise Figure	5 dB
Switch Loss	24 dB / 3 stages
DSF Length	1 km
DSF Loss @ 1550 nm	0.275 dB/km
DSF Dispersion Parameter @ 1550 nm	0 ps/nm/km
DSF Dispersion Slope	0.07 ps/(nm^2·km)

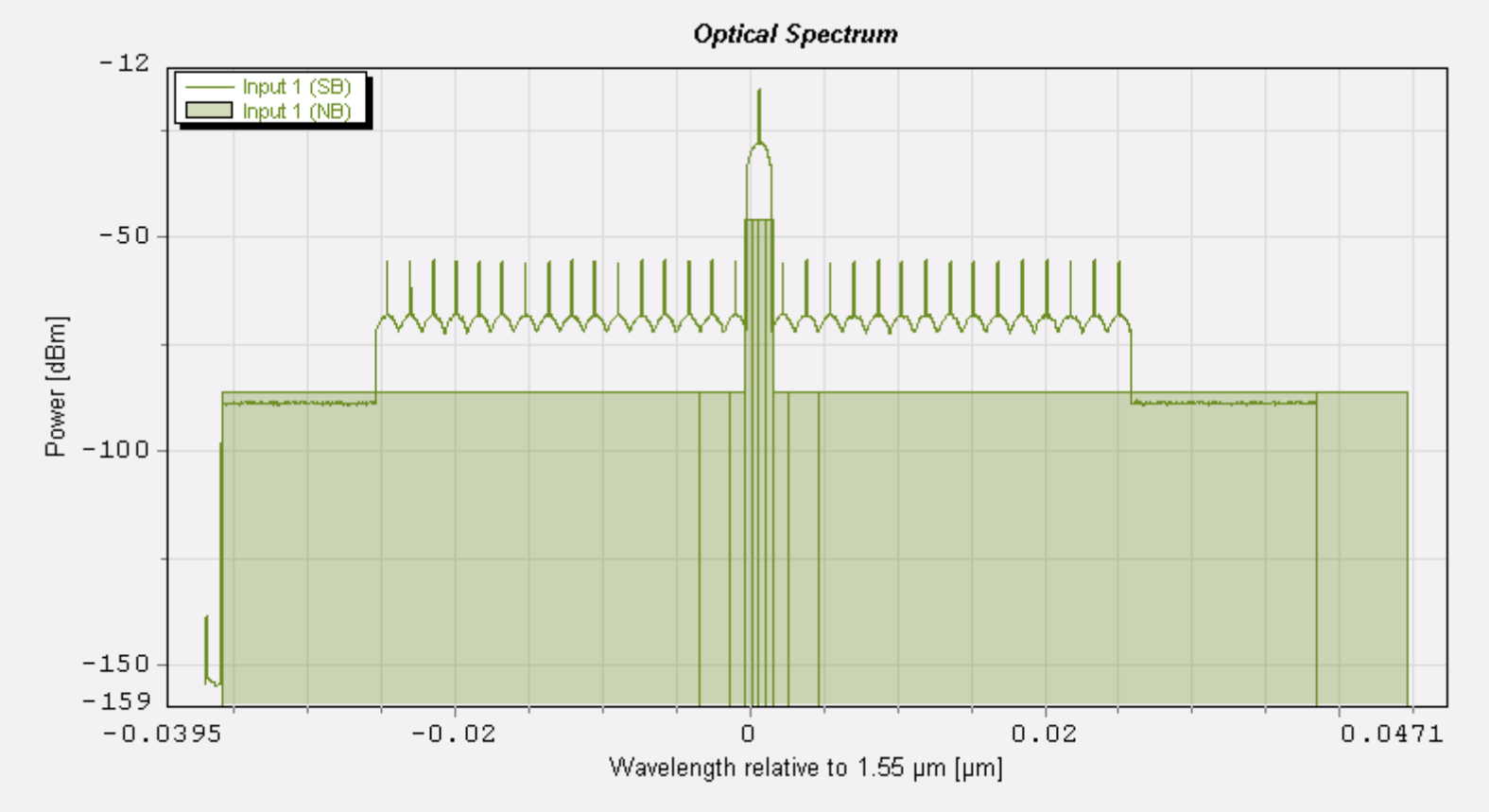
ITU-T C-band Grid



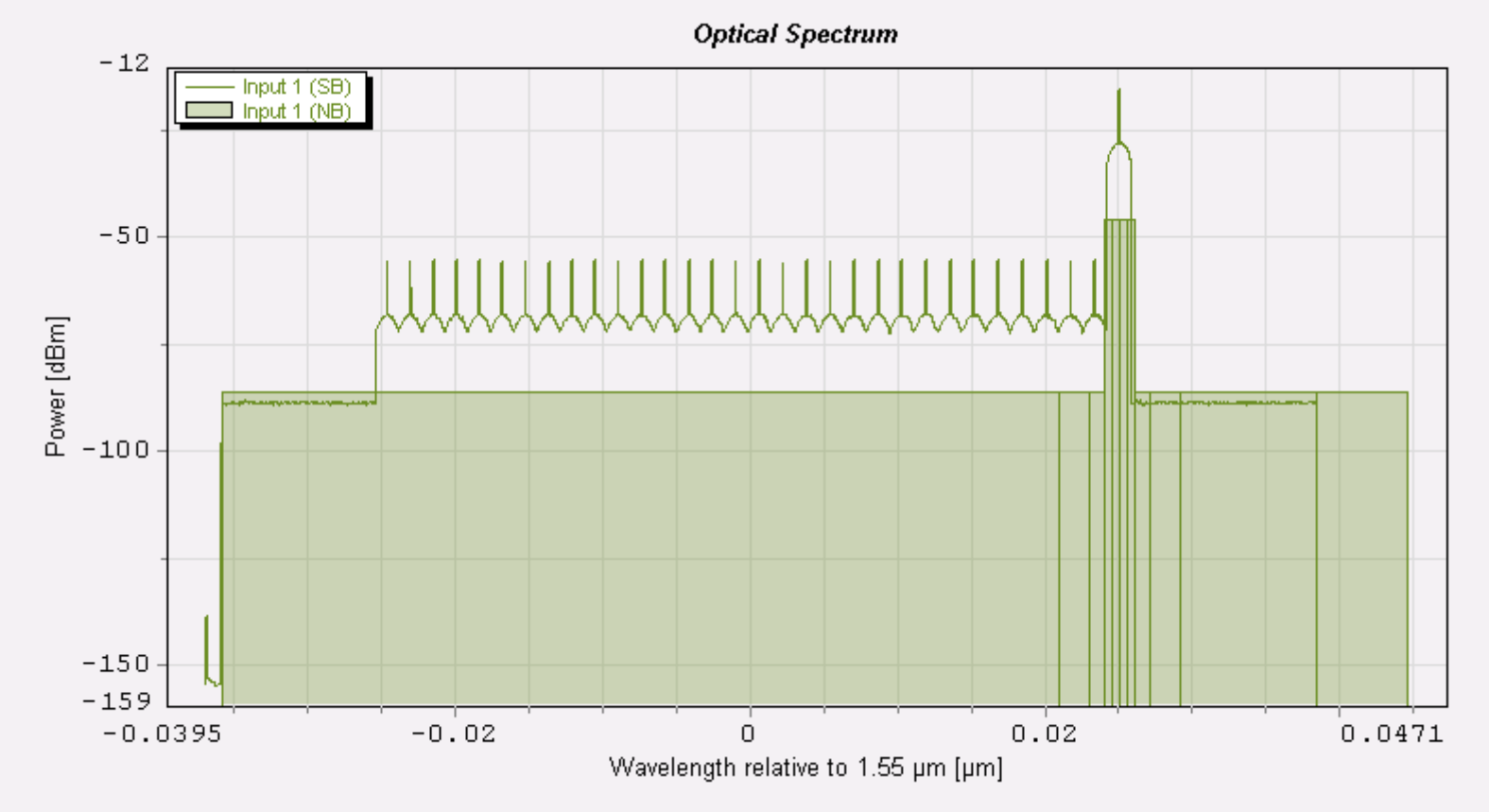
ITU-T C-Band Channel 64: 1526 nm



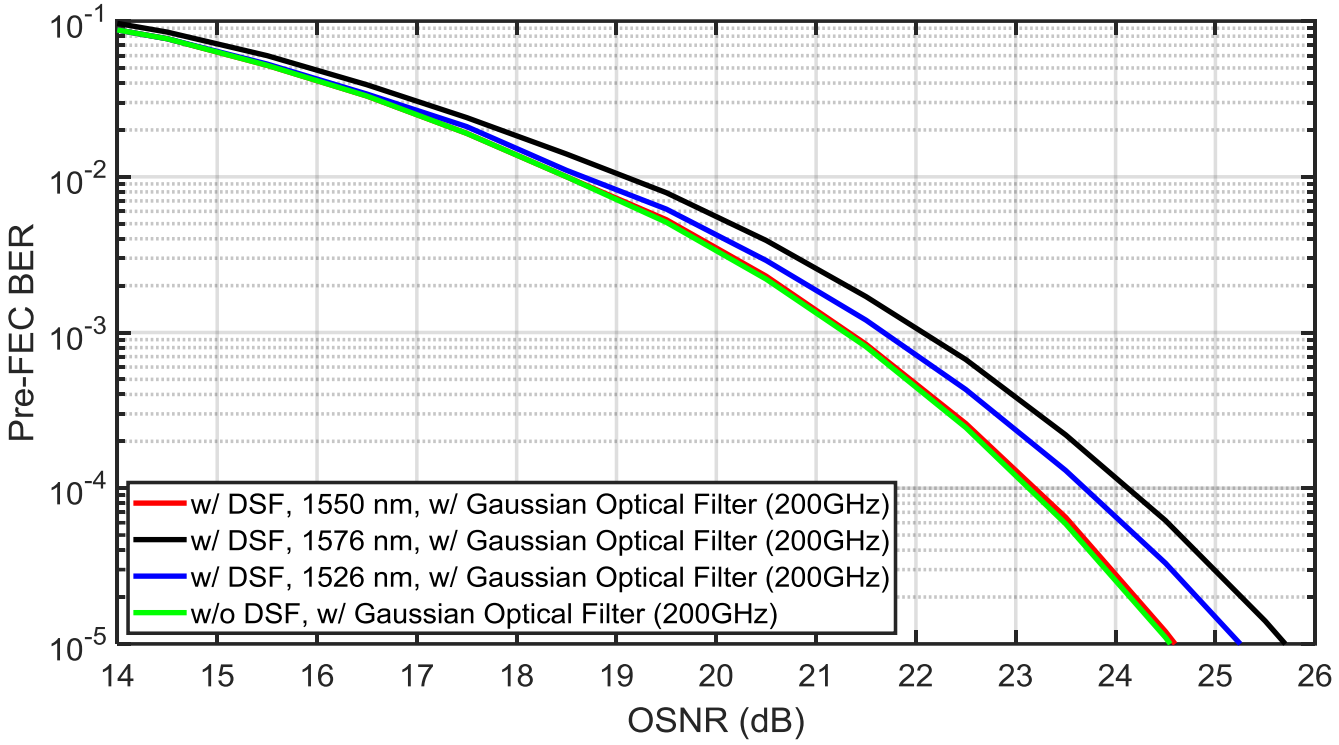
ITU-T C-Band Channel 34: 1550 nm



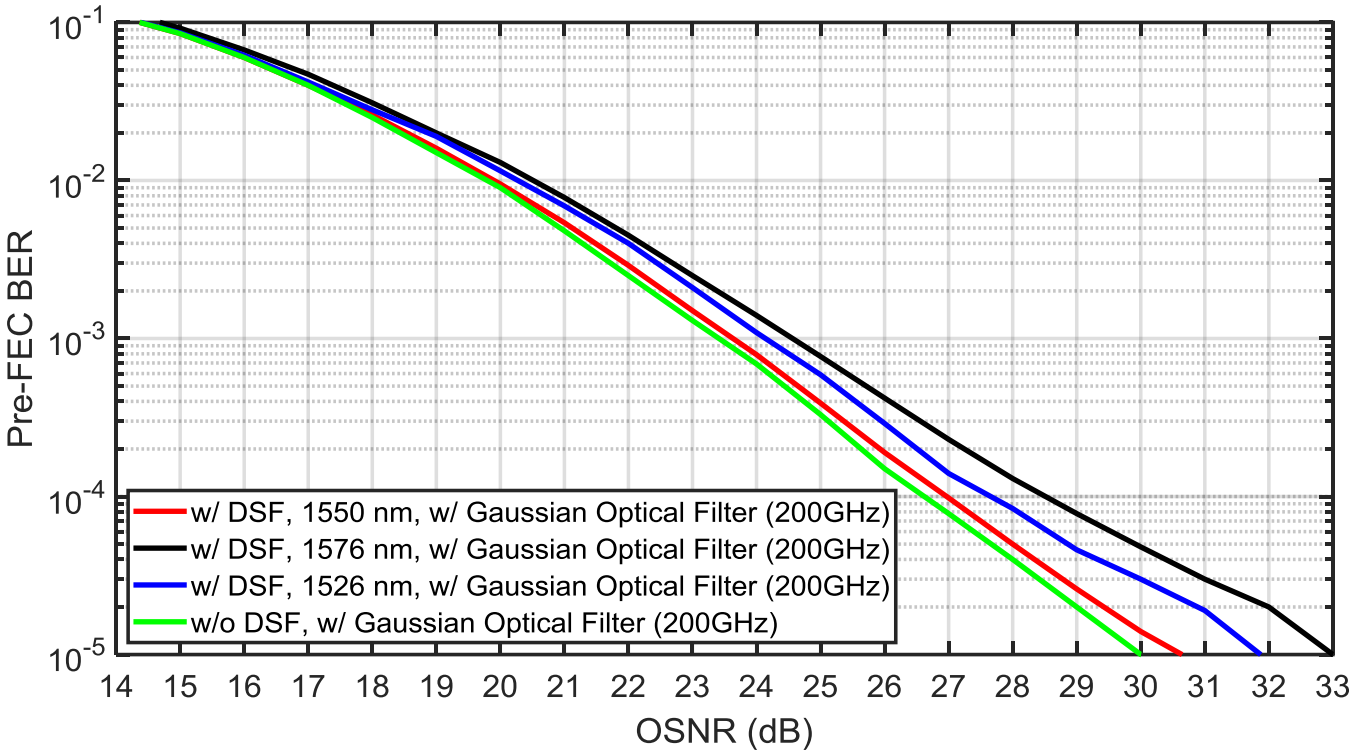
ITU-T C-band Channel 2: 1576 nm



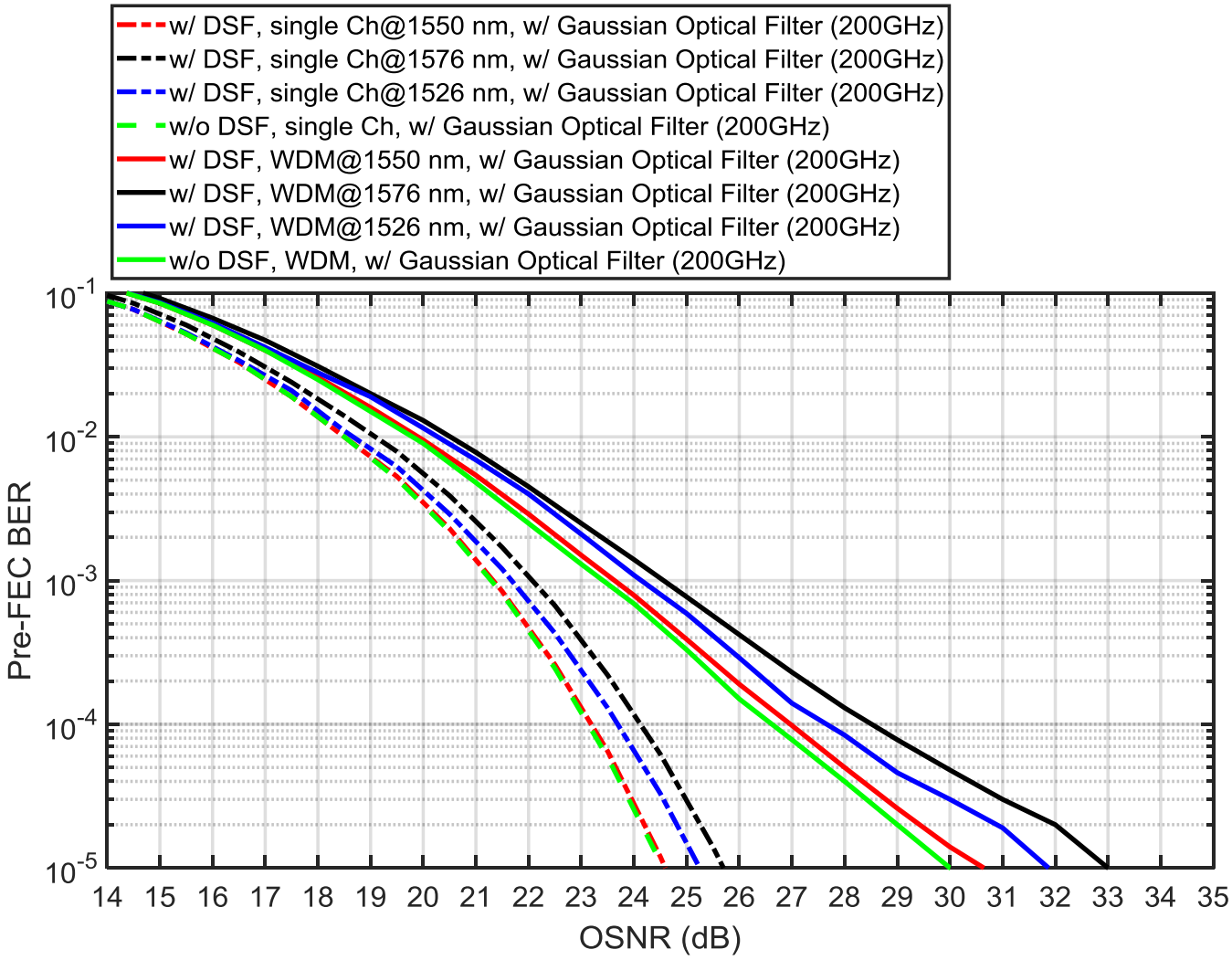
Single channel BER vs. OSNR



Single channel BER vs. OSN)

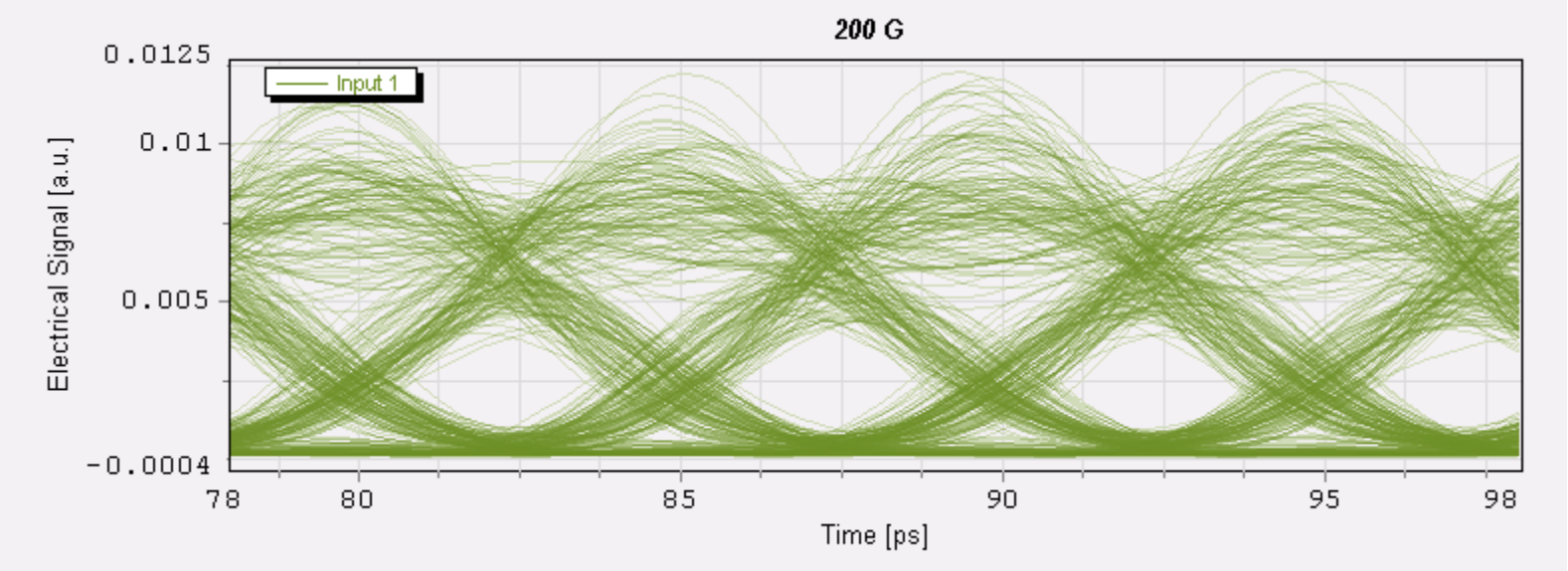


Single Channel BER vs. OSRN w/ Interference



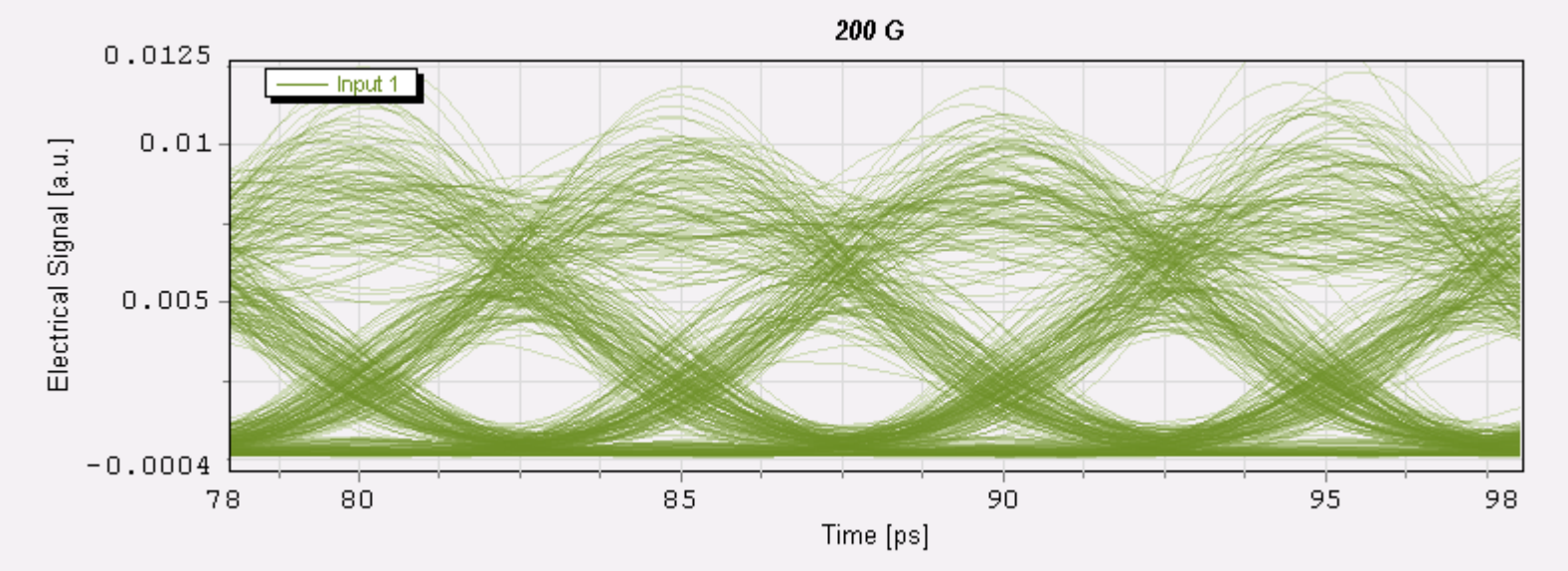
Pre-detection Eye Diagram

λ = 1526 nm, DSF, no ASE noise loading, 200 GHz Gaussian Filter



Pre-detection Eye Diagram

λ = 1576 nm, DSF, no ASE noise loading, 200 GHz Gaussian Filter



Pre-detection Eye Diagram

λ = 1550 nm, DSF, no ASE noise loading, 200 GHz Gaussian Filter

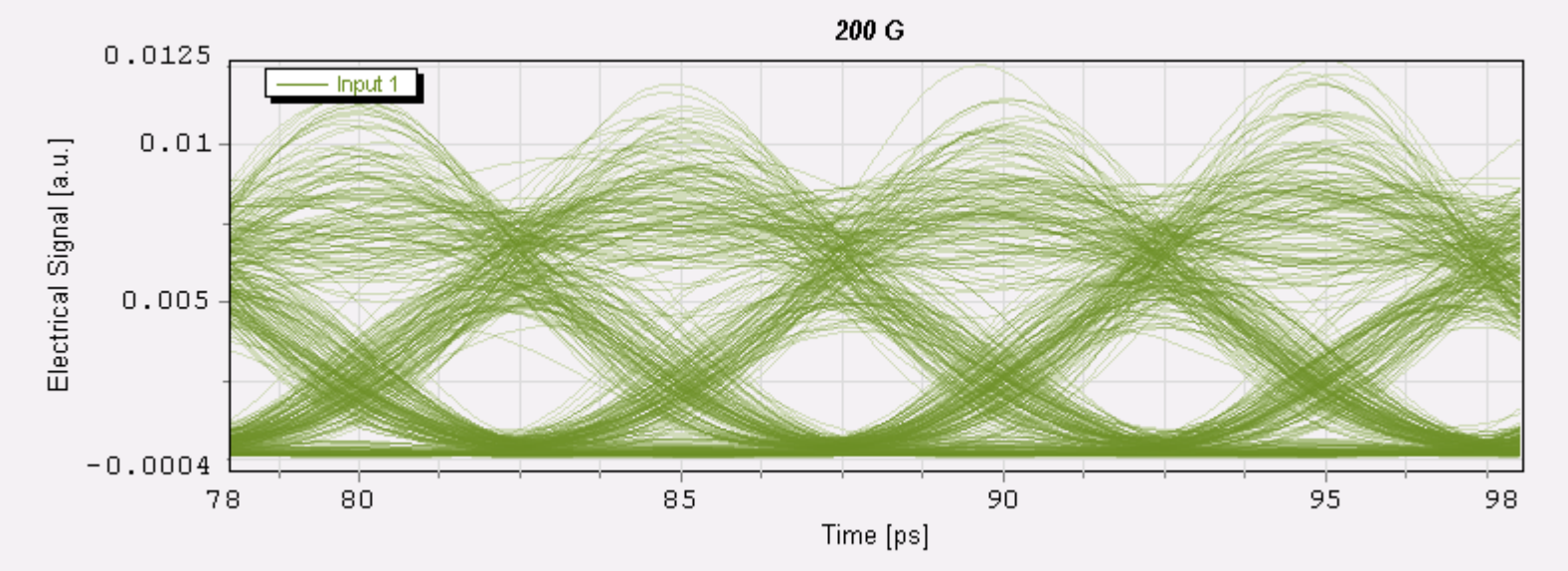


Figure Skater Yazuru Hanyu Bringing Home the Gold

Please support our proposal so that Namiki-san and Kudo-san can bring home the gold.