Coherent Optical QPSK Transmitters
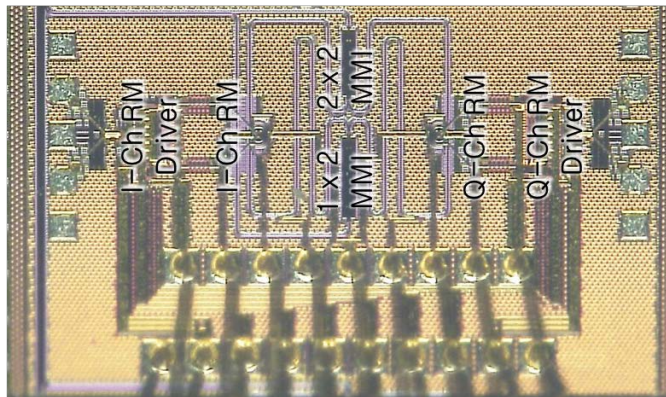
Si BPSK Ring Modulator

12.5Gbps, PRBS7
Initial testing w/ photonics

Before DSP

20ps 800 mVpp

After DSP

[ps]

<Chip Micro-Photograph>

Monolithic Optical QPSK Transmitter

EPIC integration of RMs and modulator driver

I-Ch RM Driver · I-Ch RM · 1×2 MMI · 2×2 MMI · Q-Ch RM · Q-Ch RM Driver
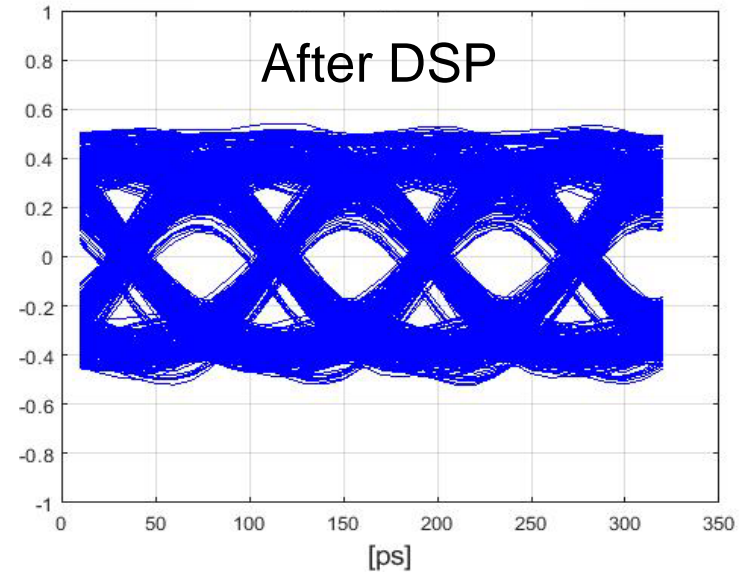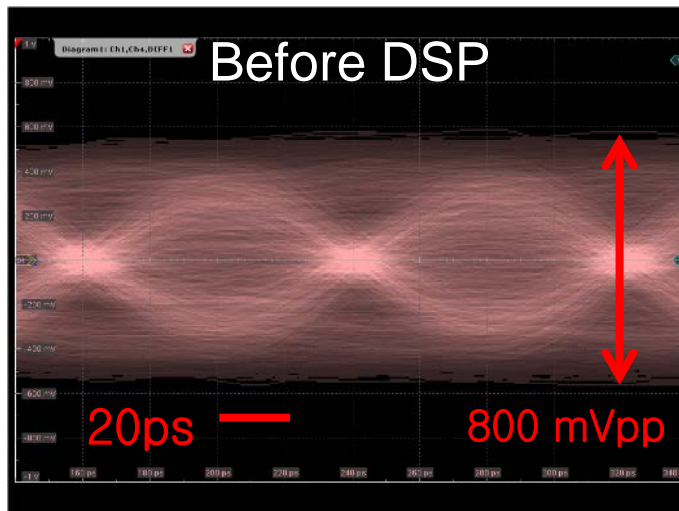
Monolithic QPSK Tx Measurement (2020.3~4)

HSCS
Innovative Research Group

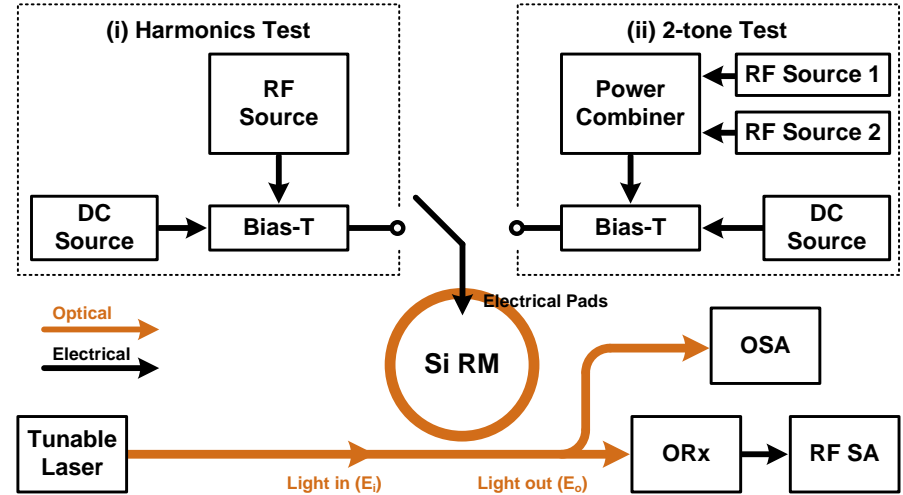# Modulation Linearity Analysis of Si Ring Modulators

<Coupled-Mode Theory Model>

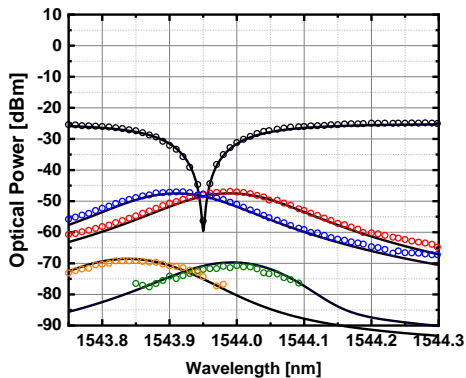$$\frac{d}{dt}a(t) = \left(j\omega_r - \frac{1}{\tau} \right)a(t) - j\mu E_{in}(t)$$

$$E_{out}(t) = E_{in}(t) - j\mu a(t)$$

→ 3 model parameters (t_e, t_l, n_{eff})
→ Transient solution
→ Fourier transform

<Measurement Setup>

<1-tone OSA>   <1-tone ESA>   <2-tone ESA>

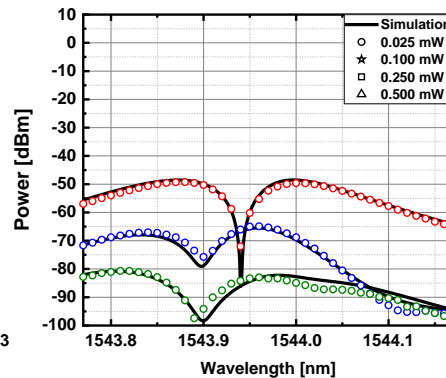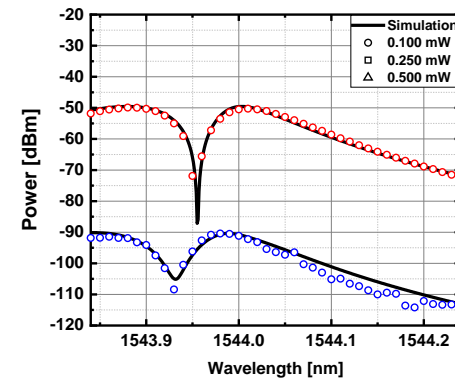✓ *Model expansion for self-heating effect and temperature variation*