

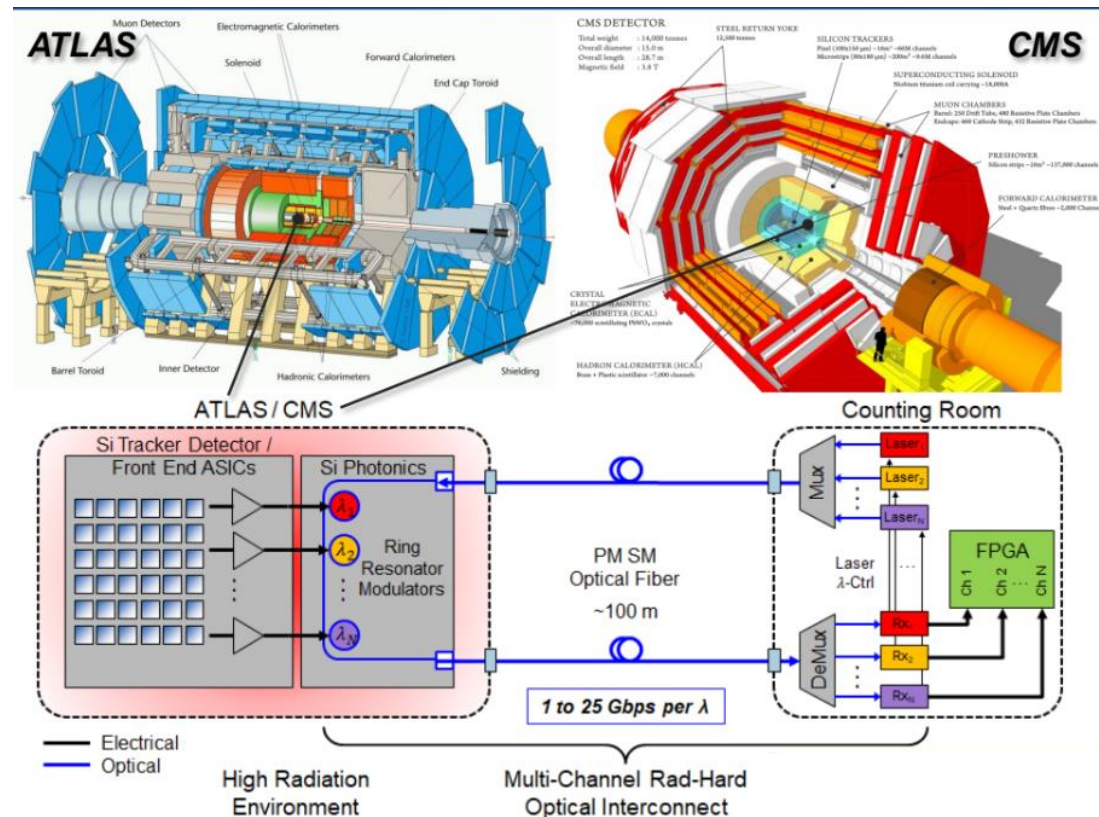
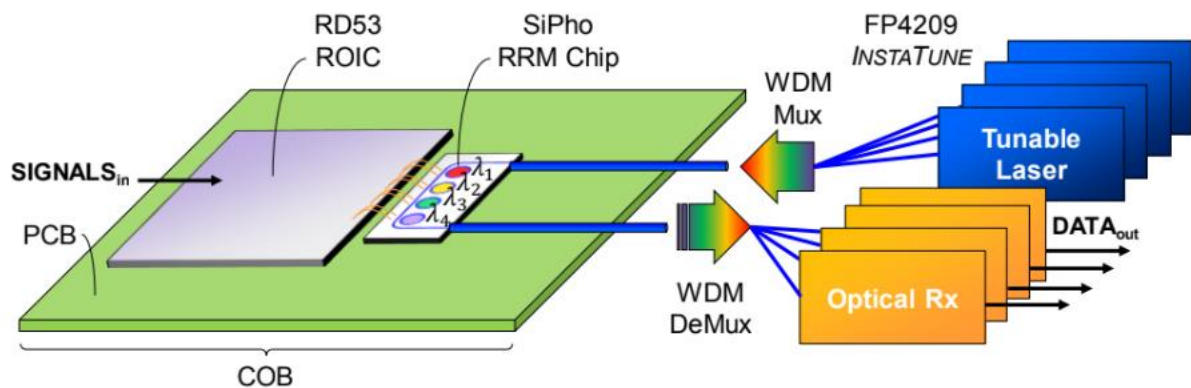
04/07/23

Silicon Photonic Modulators to a GigaRad

Evan Chansky, Miao Hu

RadLink: Radiation Hard, High Bandwidth Optical Fiber Links for Detectors at High Energy Colliders

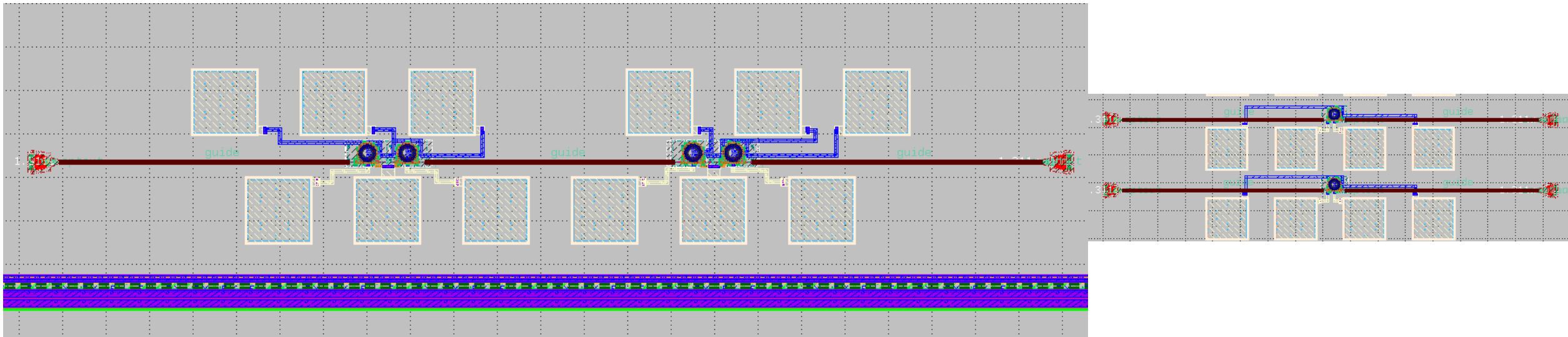
- Wavelength Division Multiplexing
 - Parallel readout on a single fiber
- External Optics
 - Lower mass, power, and complexity



Background

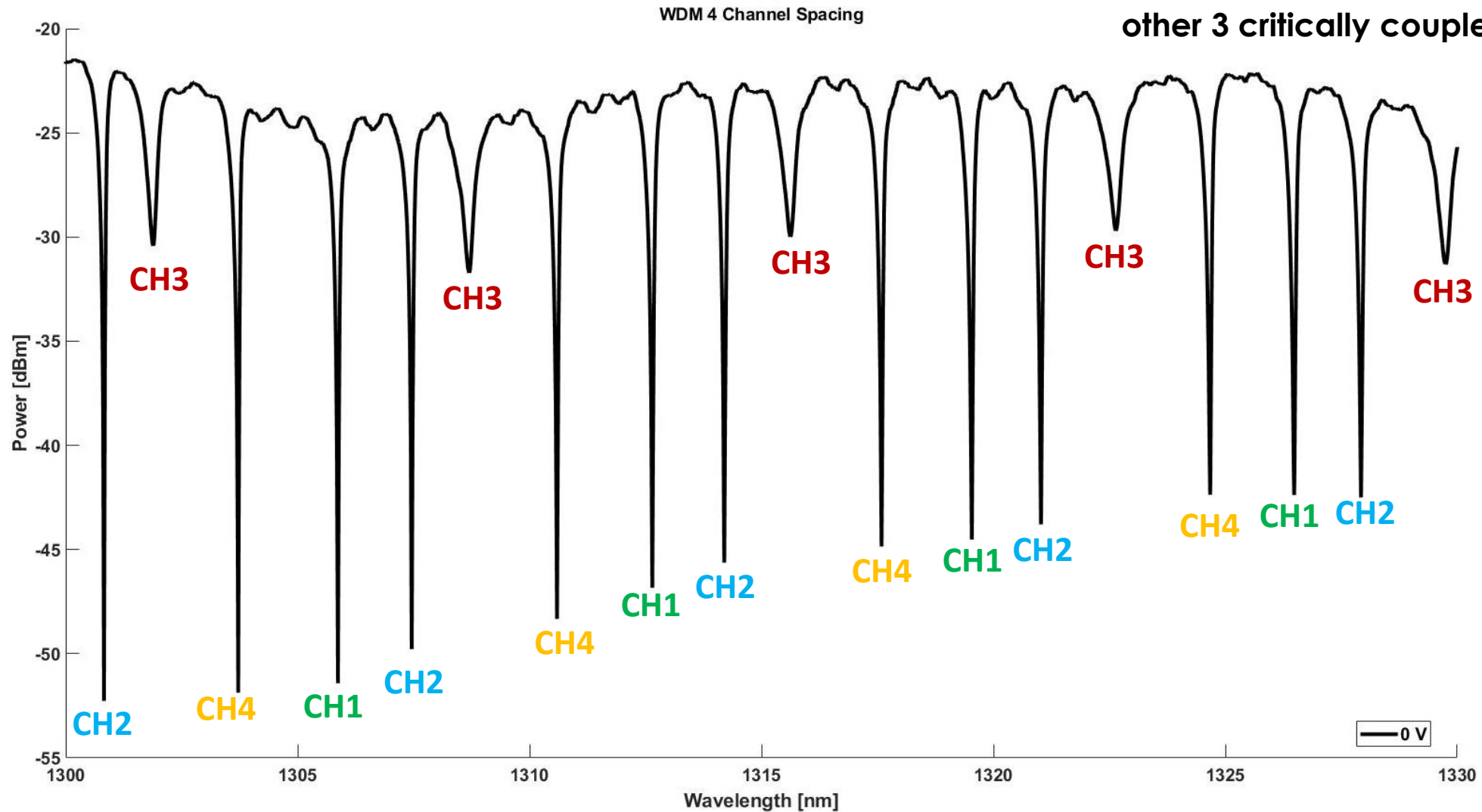
PIC Test site

- 4 Channel WDM with design error on Channel #3
- Only the RRM with design error has previously been irradiated

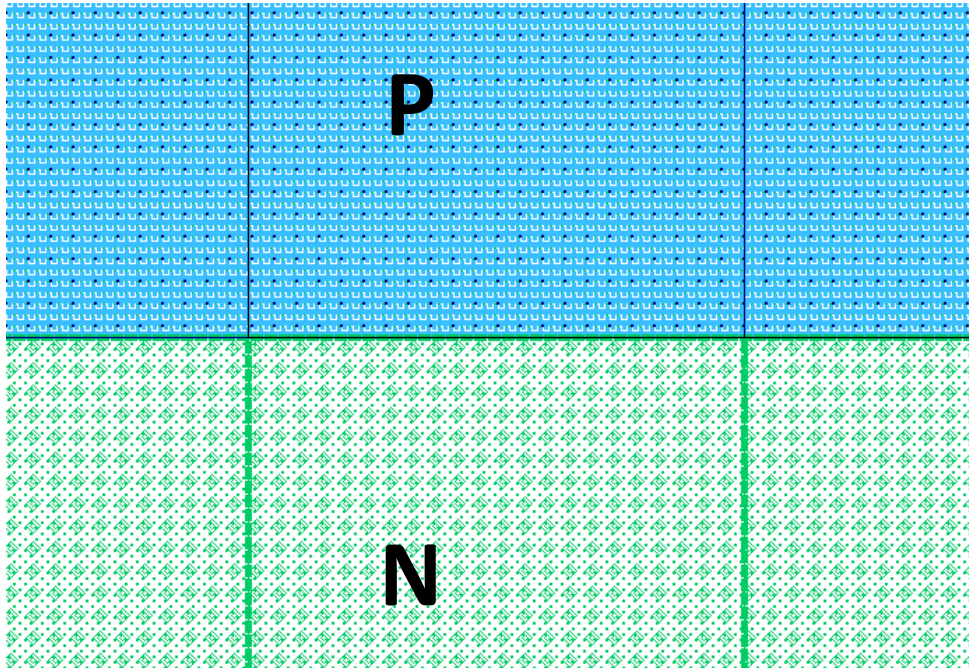


4 Channel WDM PN Anomaly

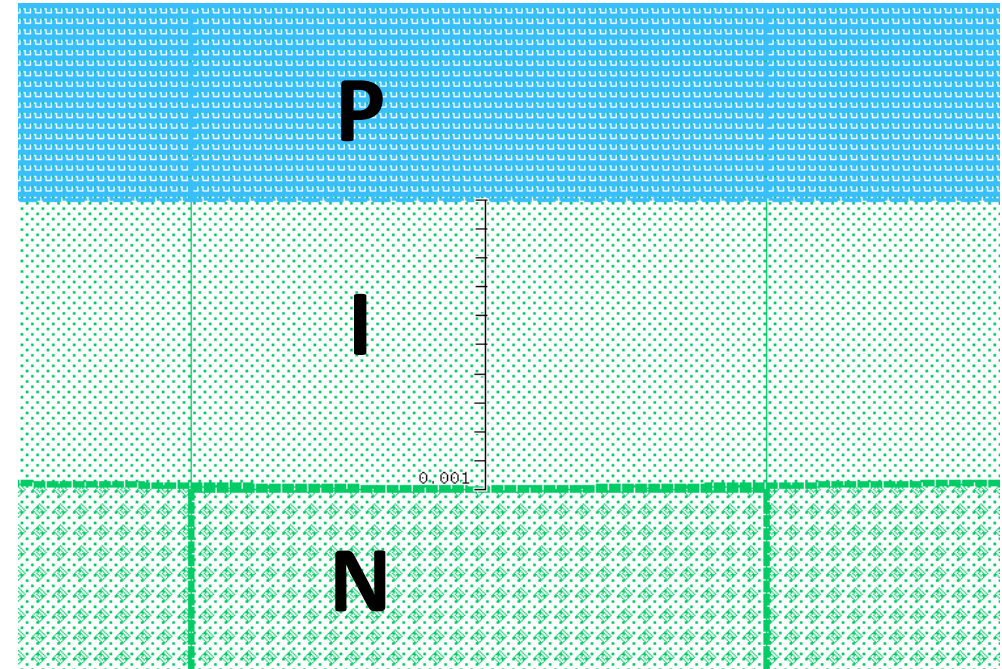
CH3 is over-coupled meaning there is less loss inside the ring than the other 3 critically coupled channels



4C01 Nominal PN Ring Design Error

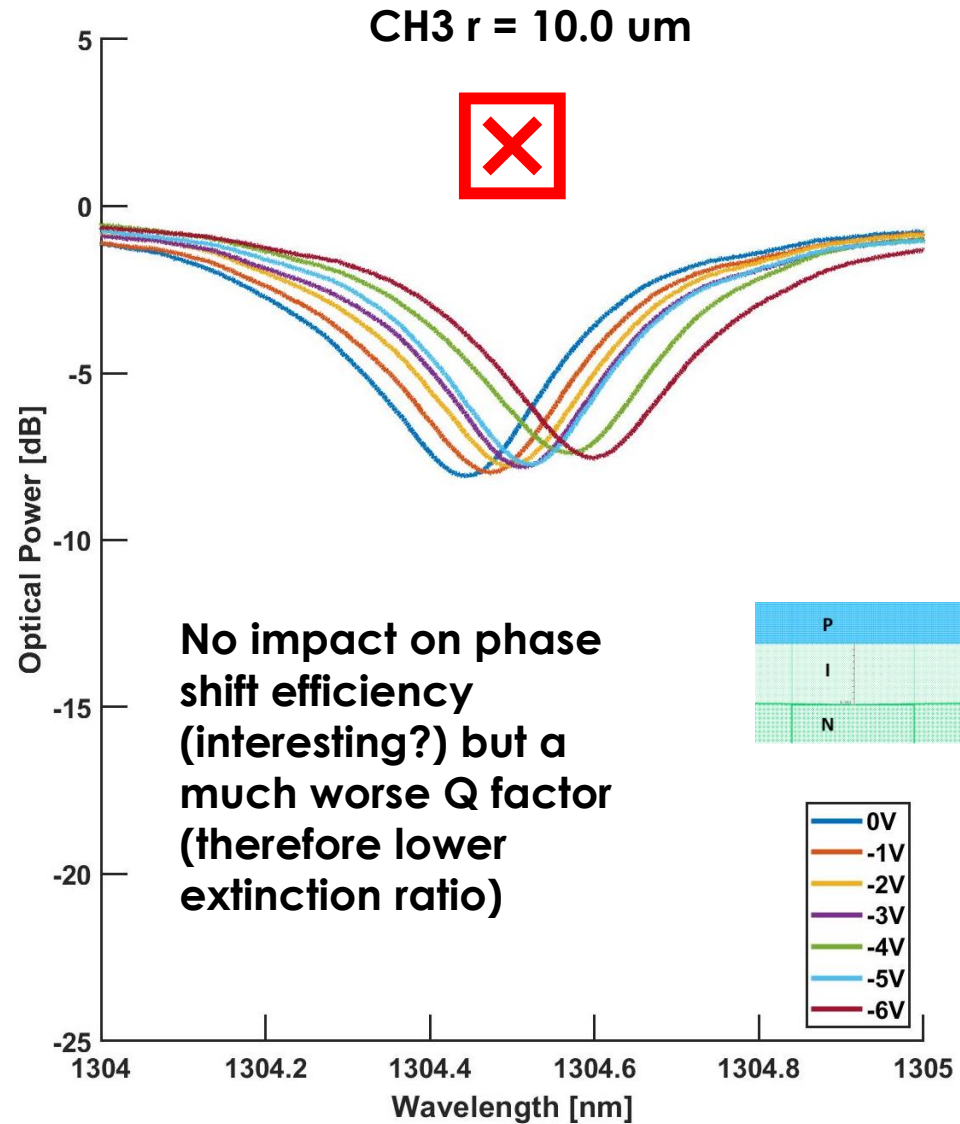
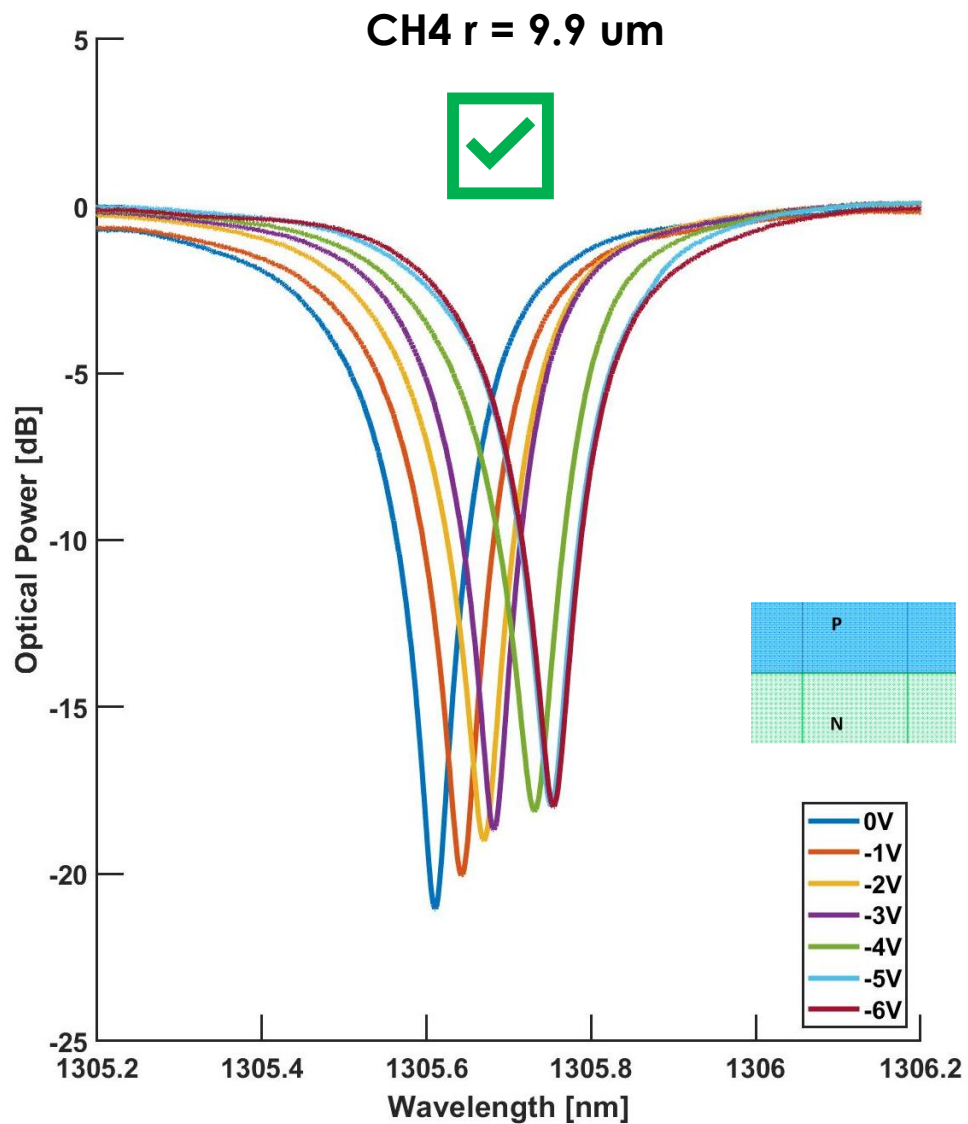


Fine: CH 1,2,4 WDM and standalone highly doped PN



Impacted: CH 3 WDM and standalone nominal PN

Impact to Device Performance

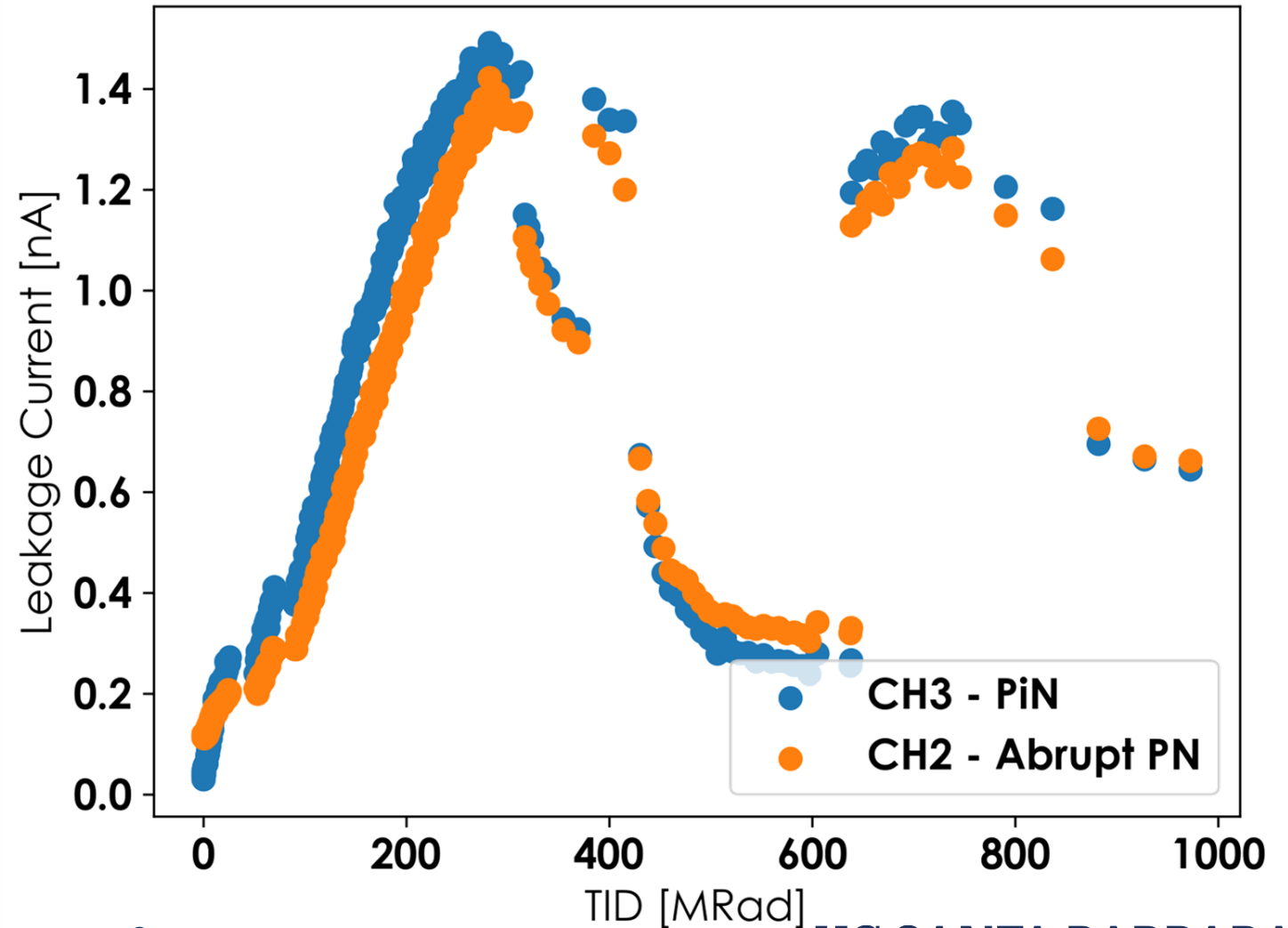


Results

IV Sweep Results

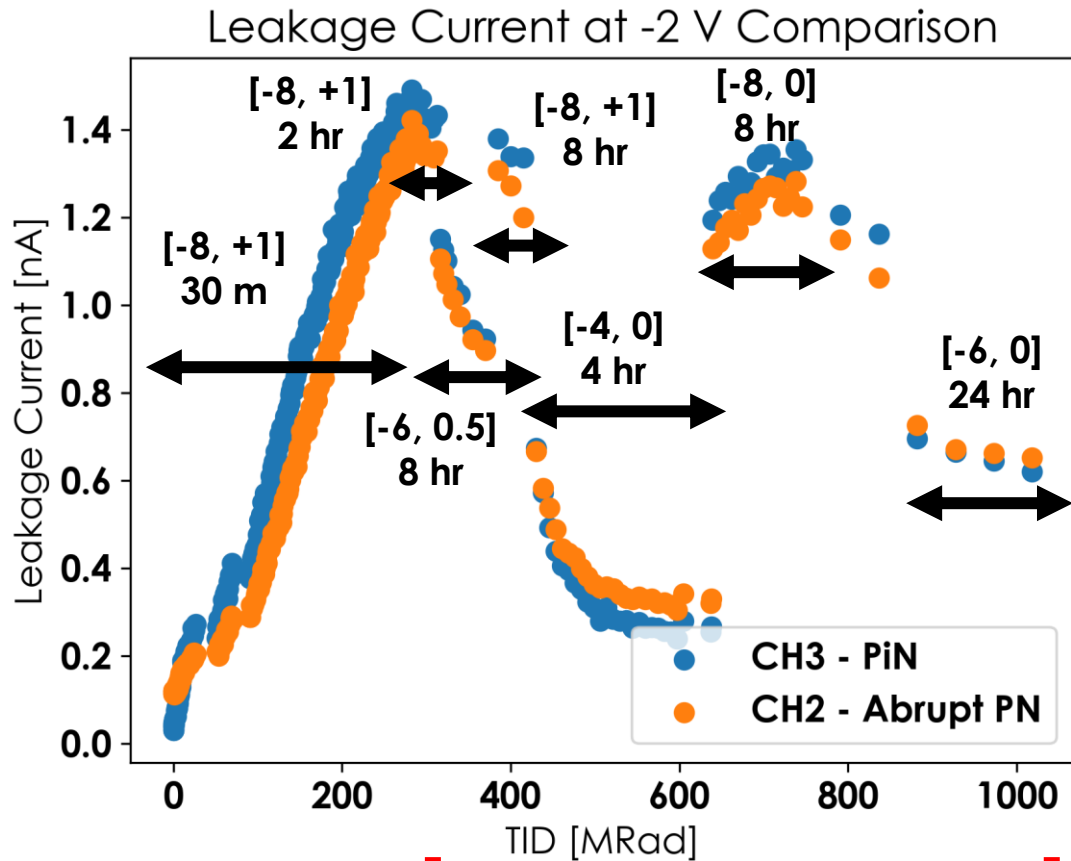
- Current at -2 V during IV sweep
- No appreciable difference between design error / correct

Leakage Current at -2 V Comparison

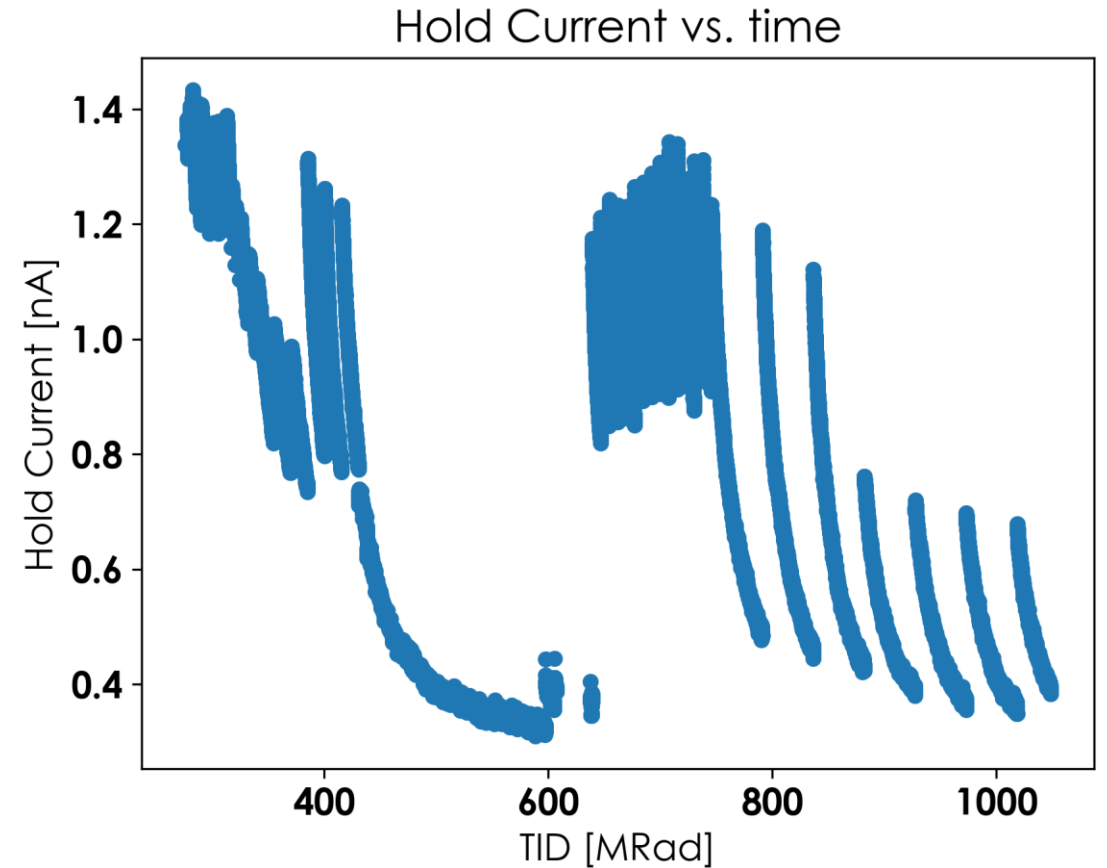


Leakage Current Impacts

Sweep Current (only taken during sweep)

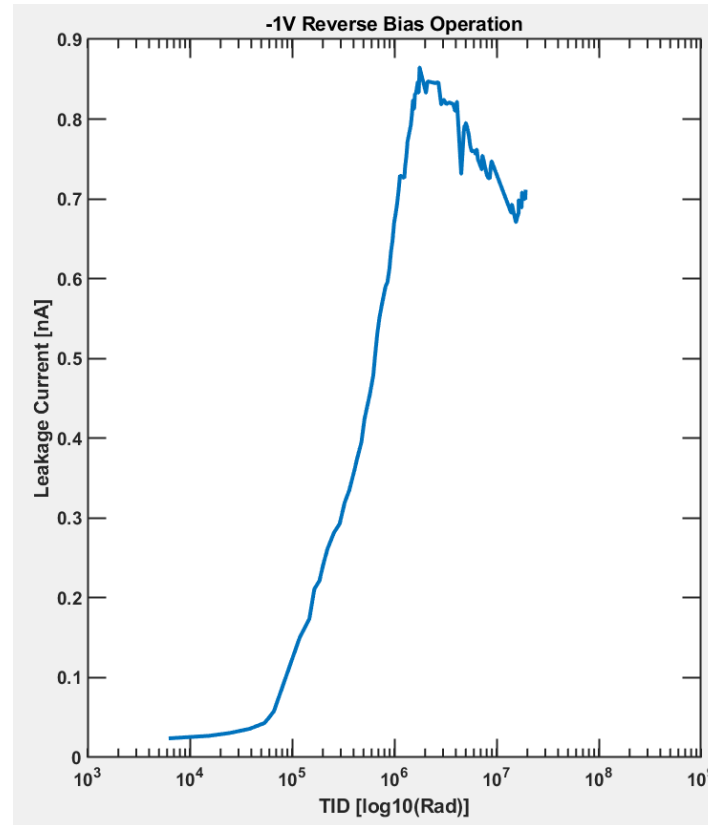
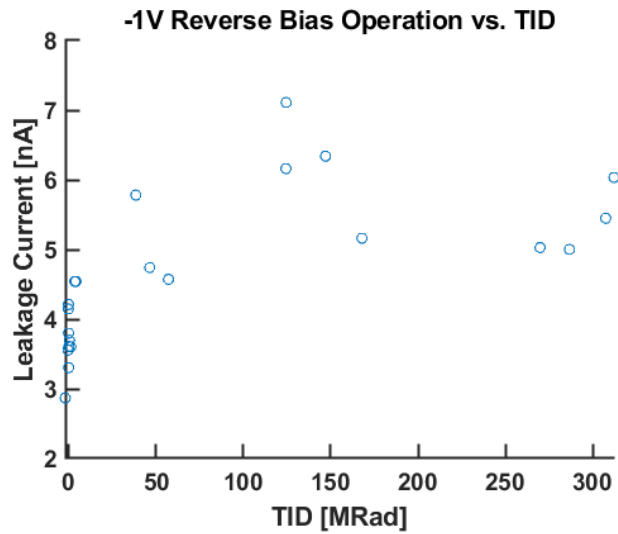


Held Current (taken every minute)



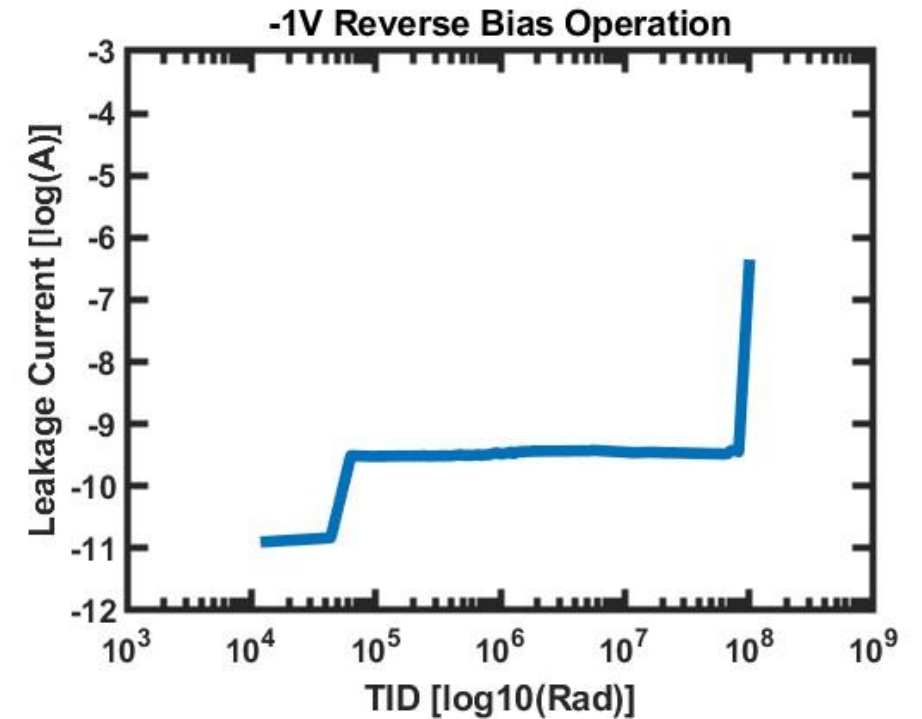
Previous Results

Forward Biased (1 mA)



Unbiased

TowerJazz PH18 PIN



Future work

Optical Setup

