SCINTIL PHOTONICS

Presentation EPIC Munich
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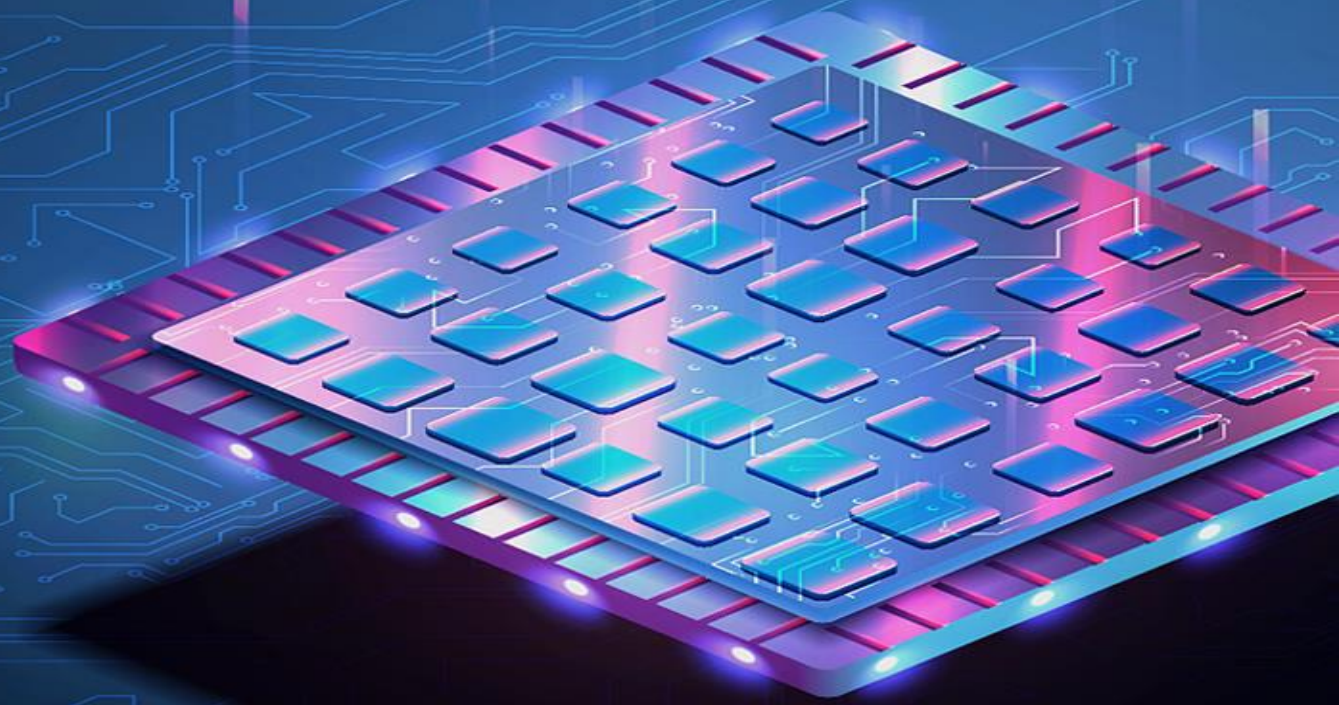
Pascal Langlois
SCINTIL Photonics
pascal@scintil-photonics.com



SCINTIL PRESENTATION

Founded in Nov 2018 from CEA-Leti
Exploit laser-augmented silicon photonics circuit technology

15 employees in 2022

> 35 patents

3 leading edge Customers
HPC & Datacenter
5G

Key Partnership
With CMOS foundries

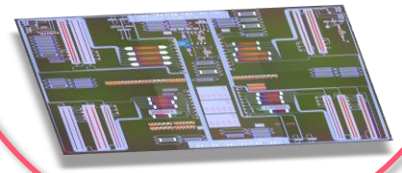
SCINTIL PRESENTATION

15 M€ fund raising completed in summer 2022

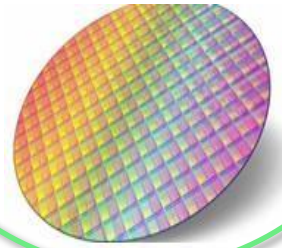
- **Take our Circuit technology to mass production end 2024/ beg. 2025**
- **Expand commercial footprint**

FABLIGHT BUSINESS MODEL

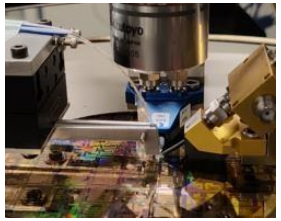
Design (components, circuits)



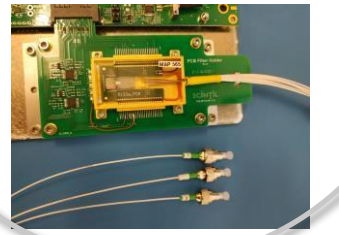
High volume manufacturing (Partner foundry)



Test (components, circuits)



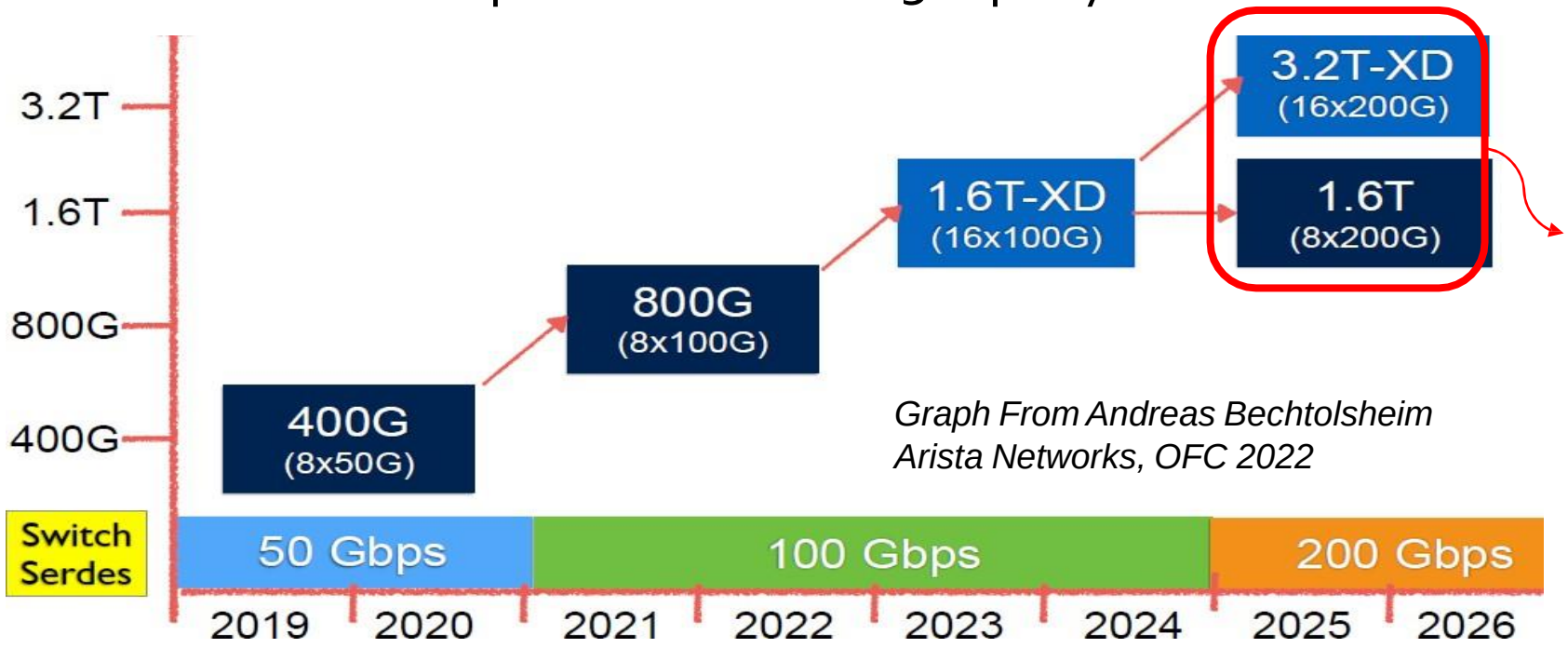
Packaging (electronics, fiber)



Supply of Photonic Integrated Circuits or packaged Photonic Integrated Circuits

PHOTONICS IN DATACENTER

- Fibre optic transmissions over up to 2km: **15 Millions of 800 G and 1600 G transceiver units in 2027*** ** Extract from aggregated market studies*
- Cloud bandwidth increases 50% per year
- Power per bit declines 25% per year



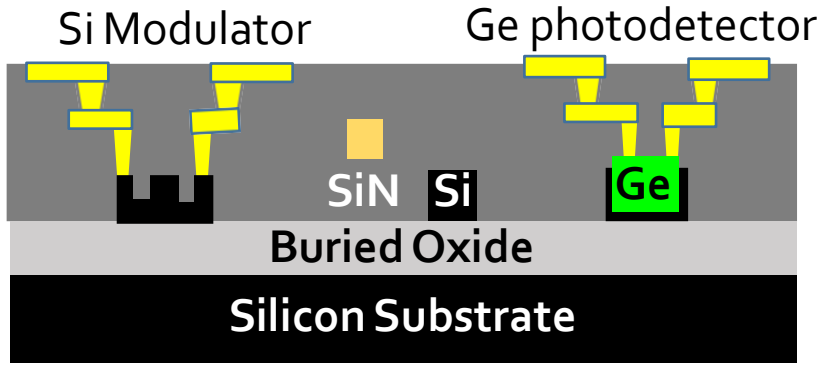
Graph From Andreas Bechtolsheim Arista Networks, OFC 2022

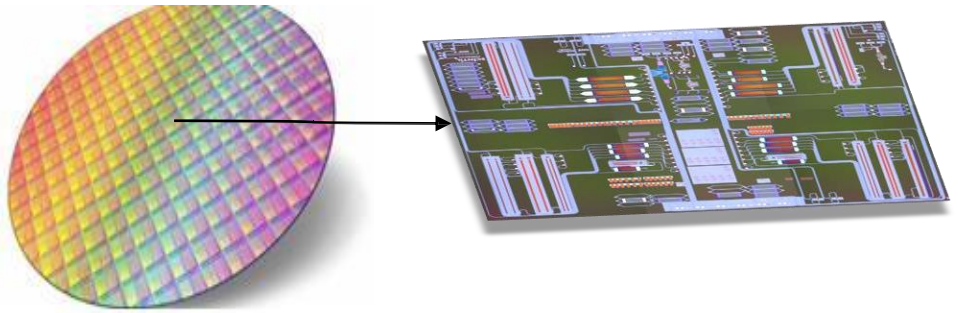
3.2 Tbit/sec as

- 16 lasers x 200G modulators
- 16 x 200G photodetectors

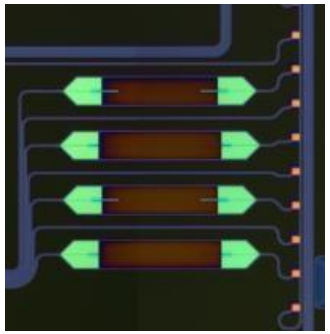
FOUNDATIONS OF SCINTIL TECHNOLOGY

- Silicon Photonics as a powerful enabling low power interconnect technology
  - Available in commercial foundries (leverages CMOS supply chain)
  - Integrated Circuits with modulators and photodetectors
  - **Missing integrated lasers** now makes it tough to scale (1.6 Tbit/sec and 3.2 Tbit/sec as **8 and 16 lasers** x 200 Gbit/sec modulators)
- SCINTIL aim: Seamlessly integrate Lasers at the wafer level leveraging Si photonics



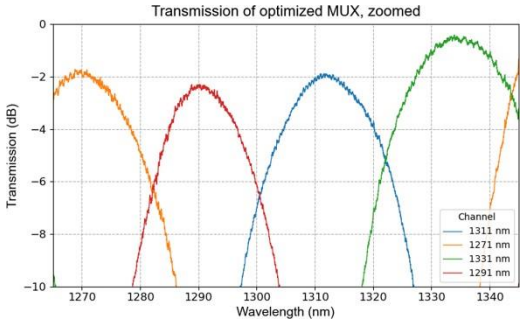


FULLY INTEGRATED PHOTONIC CIRCUIT (PLUGGABLE OPTICS)

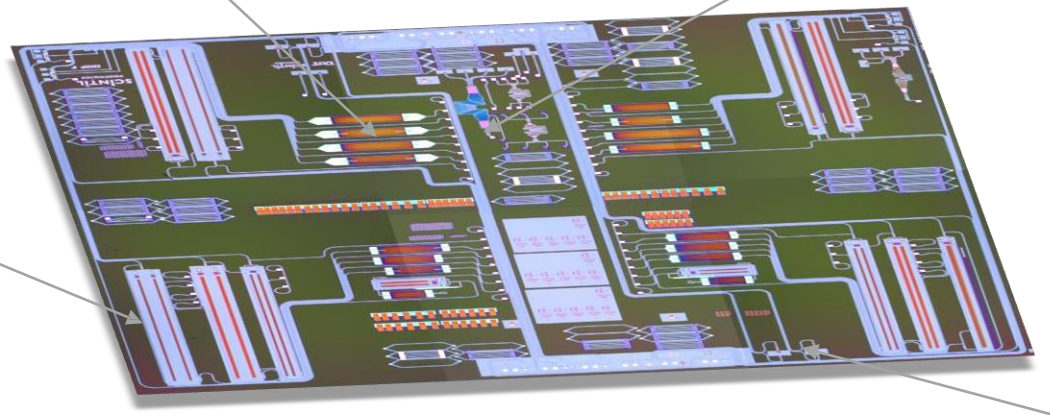


16 x III-V-on-Silicon Integrated gain waveguide
- DFB lasers, amplifiers
- No hermetic Package required

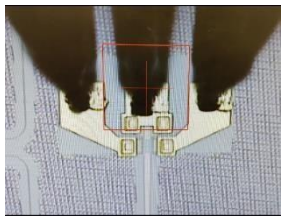
Tunable filters & low loss SiN wg



16 x Silicon Integrated MZM modulators
➔ 3mm 35 GHz, 56 GBaud PAM4
➔ 2 mm > 60 GHz)



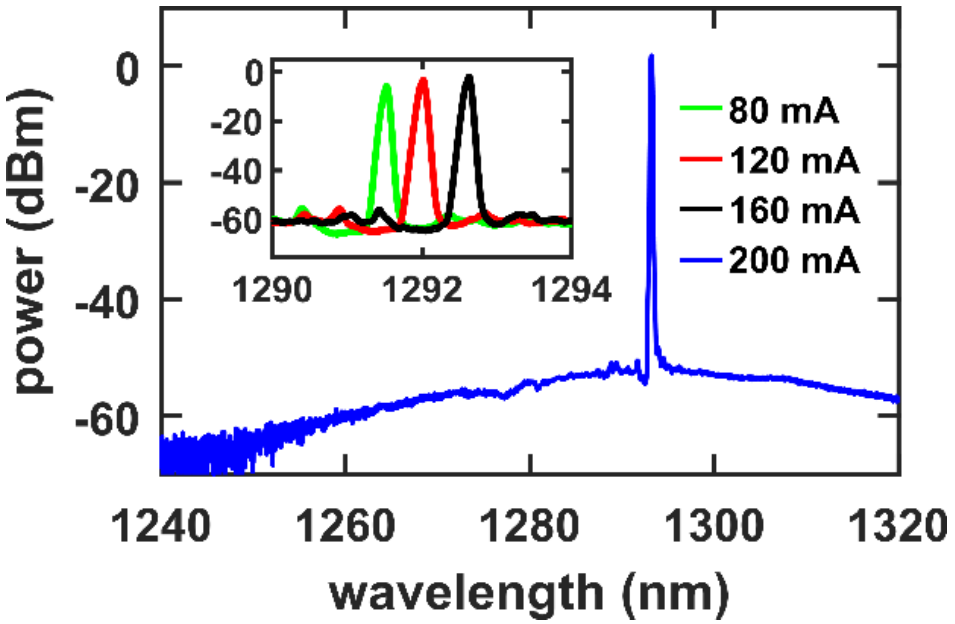
Top view of first SCINTIL Photonic Prototype
1 600 Gbit/sec



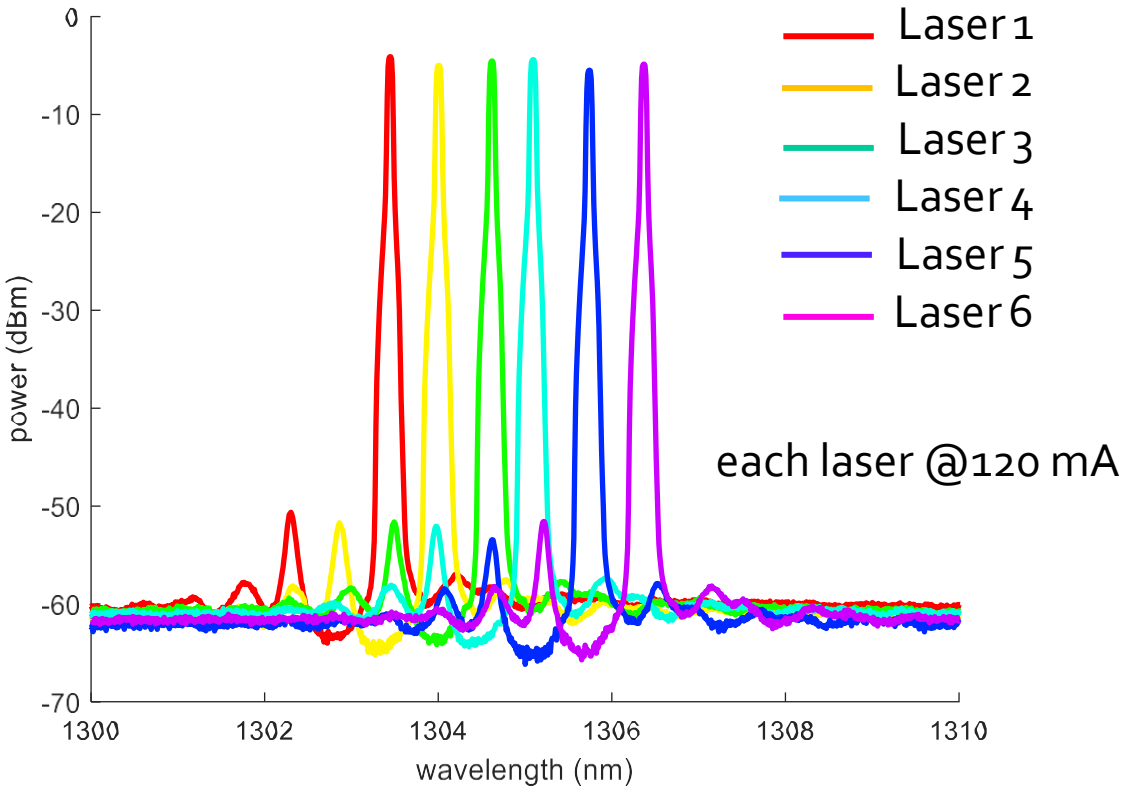
16 x > 40 GHz
56 GBaud PAM4
Germanium Integrated photo detectors

DFB LASERS

- Threshold current, < 30 mA
  - σ_{Ith} < 2 mA (within wafer and wafer to wafer
- Good wavelength reproducibility (within wafer and wafer to wafer)
- 14 to 16 dBm in Silicon waveguide, ambient T°
- 4 CWDM lasers (20 nm spacing) through III-V die bonding of multiple epi-stack



DFB LASER ARRAY
(REMOTE LASER SOURCE FOR NEAR PACKAGED OPTICS)

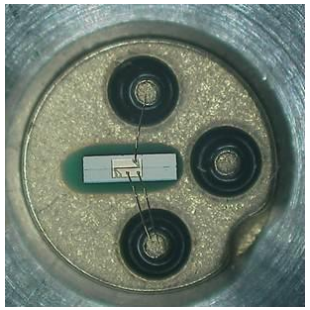


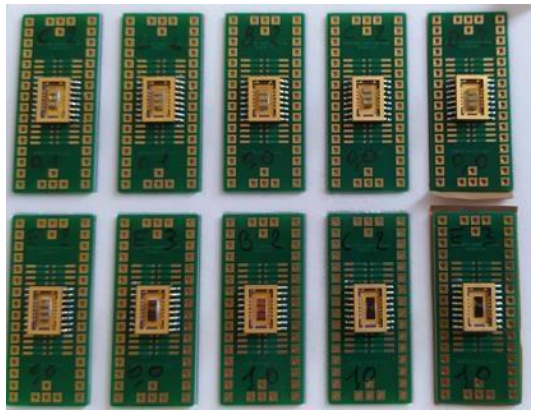
- DFB laser array – **100 GHz spacing**
- Laser lines combined/ multiplexed on the silicon PIC
- Additional functions in the silicon PIC

DFB LASER HERMETICITY AND ROBUSTNESS

- **No need for hermetic package** (2,500 hours @85°C, 85% humidity): no III-V facet needing Anti Reflection coating
- **Robustness** assessed through 1 500 cycles of Rapid ThermalVariations (-55°C + 150°C) at the wafer level
- **Performed Life tests on packaged lasers**
  - 2 000 hours @ 100°C, 100 mA completed.

    Cumulated ageing hours =2,500 hours



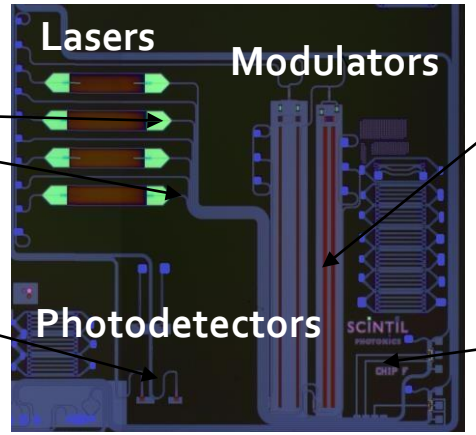


SUMMARY

Only Technology to integrate all the Transmit and Receive Components on Advanced Silicon Photonic circuits

III-V-on Silicon Integrated lasers

Germanium photo detectors 100 Gbit/sec (200 G in dev)



Silicon modulators 100 Gbit/sec (200 G in development)

Tunable filters & Passive circuitry

- Sustainable data rate (800 Gbit/sec to 3200 Gbit/sec)
- High volume manufacturing capability (~Mu) using standard Silicon Fab
- 40% reduced power consumption through laser integration

Contact: sylvie.menezo@scintil-photonics.com