



*Advanced Photonic Integrated Circuits Solutions with
Integrated Lasers for Ultimate Optical Connectivity in
Datacenters HPC and 5G*

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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

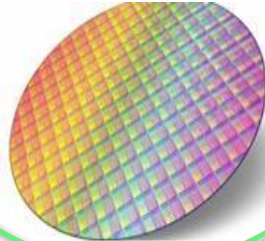


FABLIGHT BUSINESS MODEL

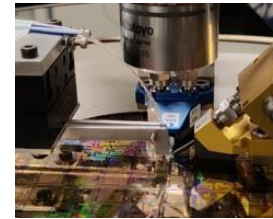
Design
(components,
circuits)



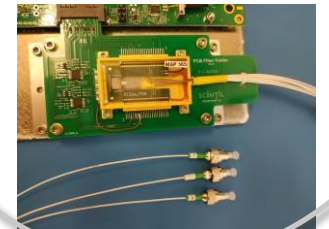
**High volume
manufacturing**
(Partner foundry)



Test
(components,
circuits)



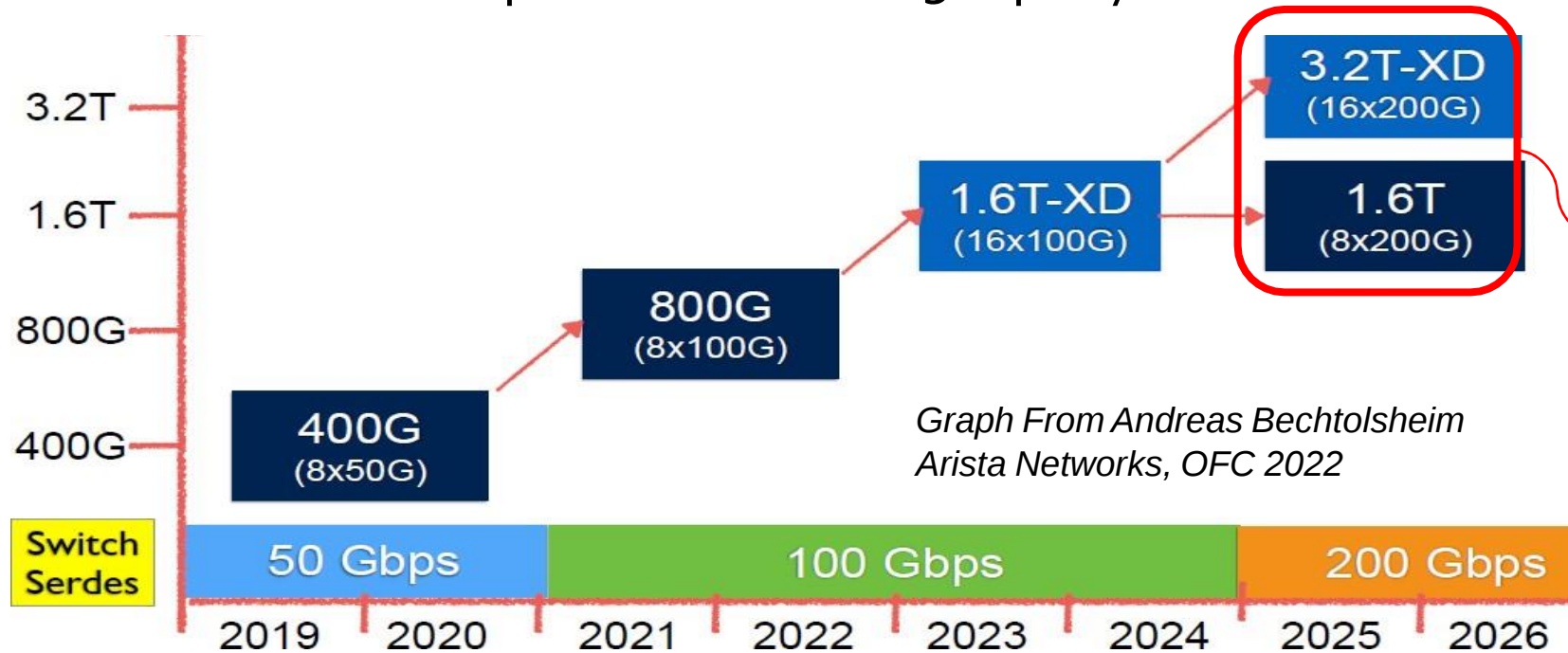
Packaging
(electronics,
fiber)



**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

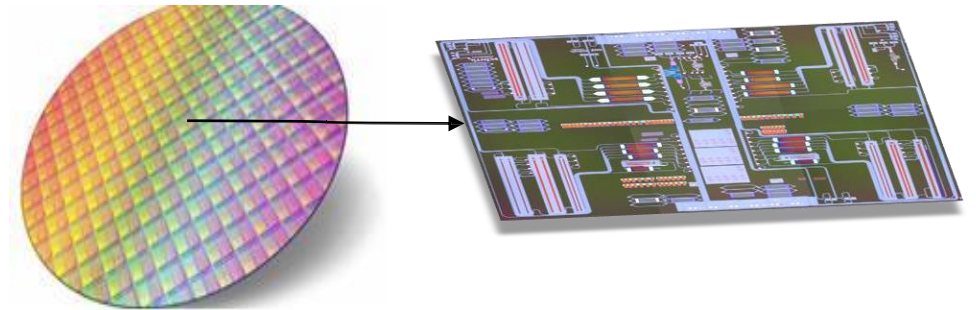
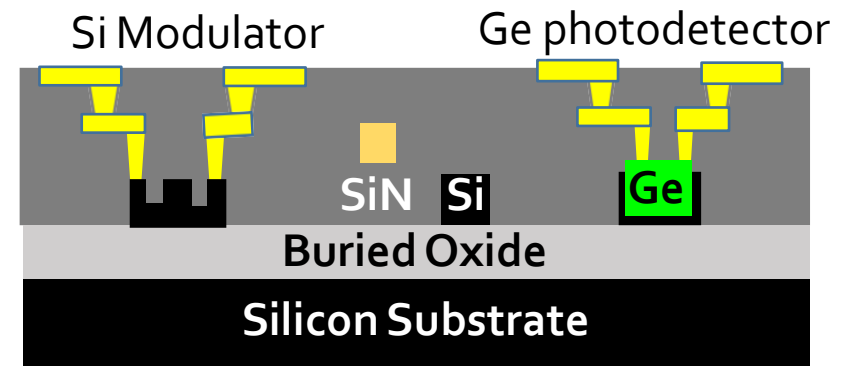


3.2 Tbit/sec as

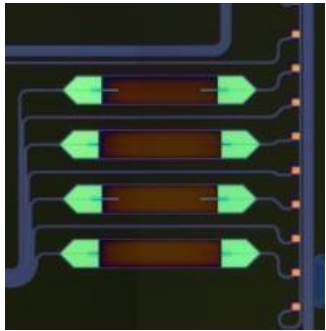
- 16 lasers** x 200G modulators
- 16 x 200G photodetectors

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



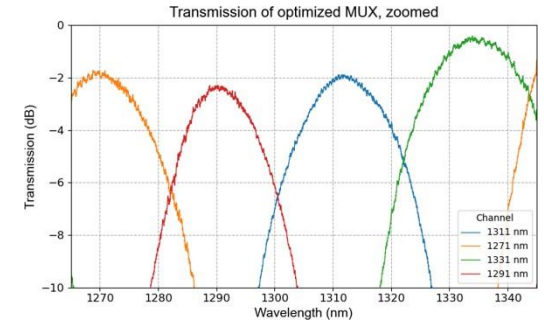
FULLY INTEGRATED PHOTONIC CIRCUIT (PLUGGABLE OPTICS)



16 x III-V-on-Silicon Integrated gain waveguide

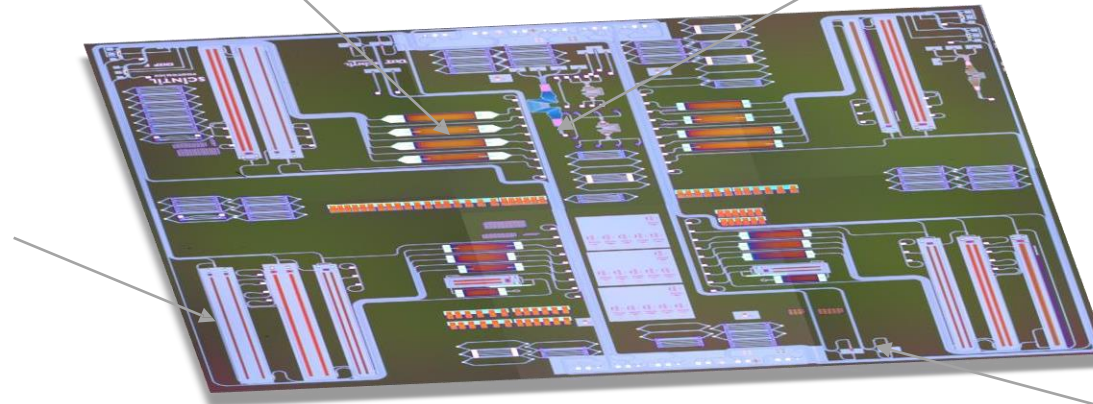
- DFB lasers, amplifiers
- No hermetic Package required

Tunable
filters
& low loss
SiN wg

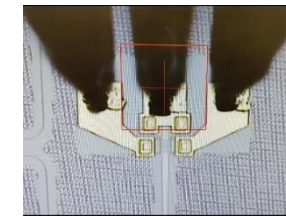


16 x Silicon Integrated
MZM modulators

- ➔ 3mm 35 GHz, 56 GBaud PAM₄
- ➔ 2 mm > 60 GHz)



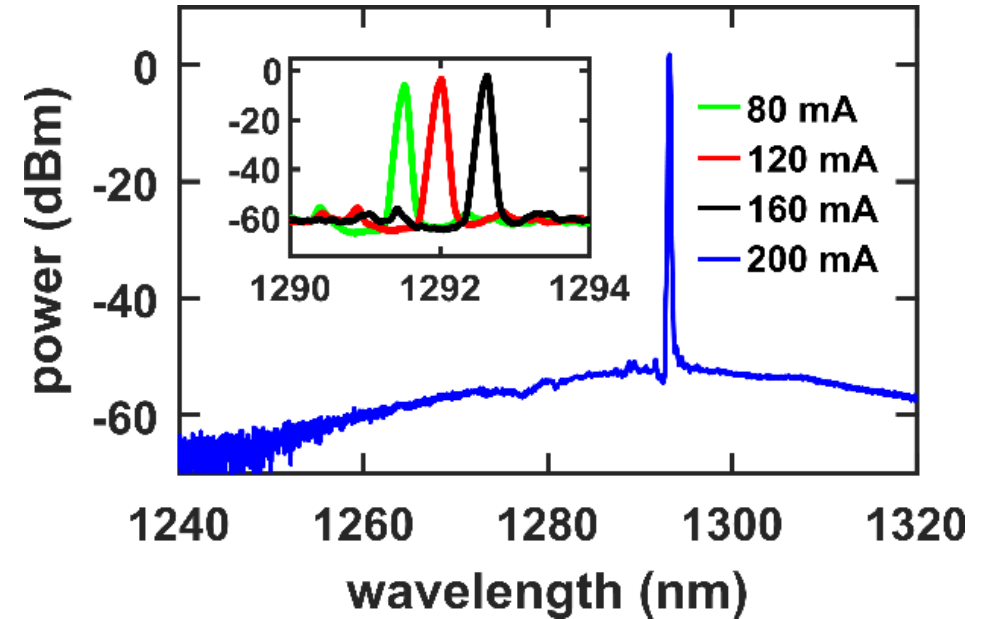
Top view of first SCINTIL Photonic Prototype
1 600 Gbit/sec



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

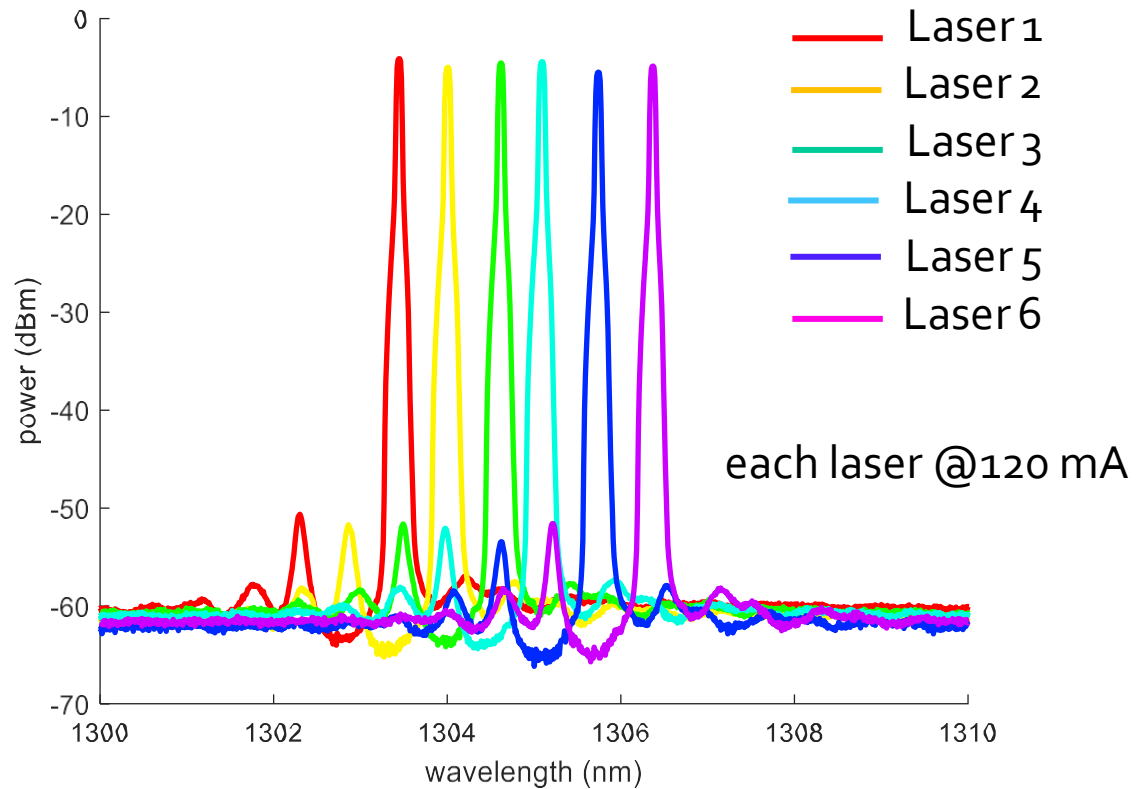
DFB LASERS

- Threshold current, < 30 mA
 - $\sigma_{lth} < 2$ 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)

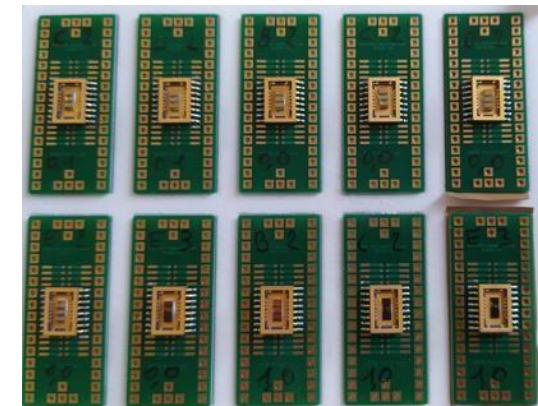
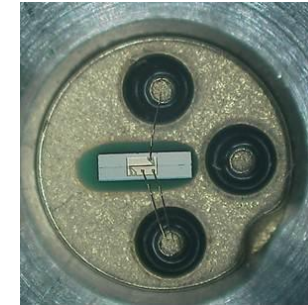


- DFB laser array – **100 GHz spacing**
- Laser lines combined/ multiplexed on the silicon PIC
- Additional functions in the silicon PIC

DFB LASER HERMETICITY AND ROBUSTNESS

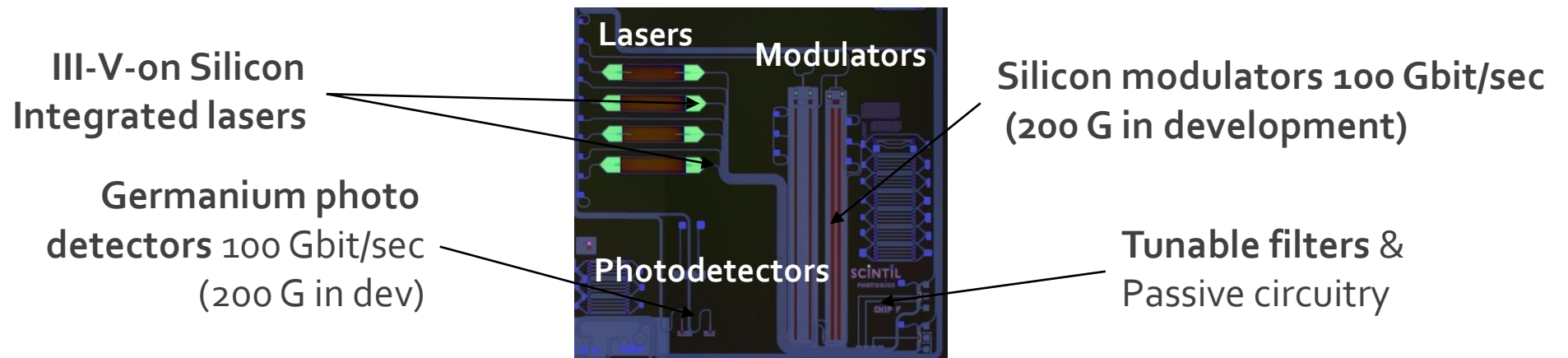
- **No need for hermetic package** (2,500 hours @85°C, 85% humidity): no III-V facet needing Anti Reflection coating
- **Robustness** assessed through 1 500 cycles of Rapid Thermal Variations (-55°C + 150°C) at the wafer level
- **Performed Life tests on packaged lasers**
 - 2 000 hours @ 100°C, 100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

Cumulated ageing hours =2,500 hours



SUMMARY

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



-  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

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