State Secretariat for Education,
Research and Innovation SERI

KANTON AARGAU

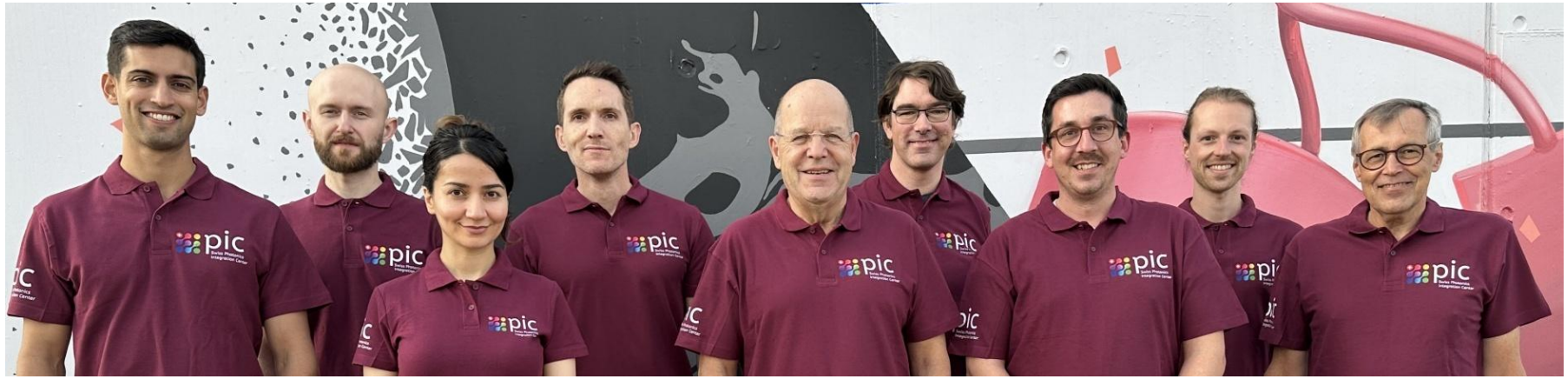
Advanced Manufacturing
Technology Transfer Centers

Swiss Photonics Integration Center
ISO7 AM TTC packaging fab

Christoph Harder

pic
Swiss Photonics
Integration Center

Swiss Photonic Integration Center

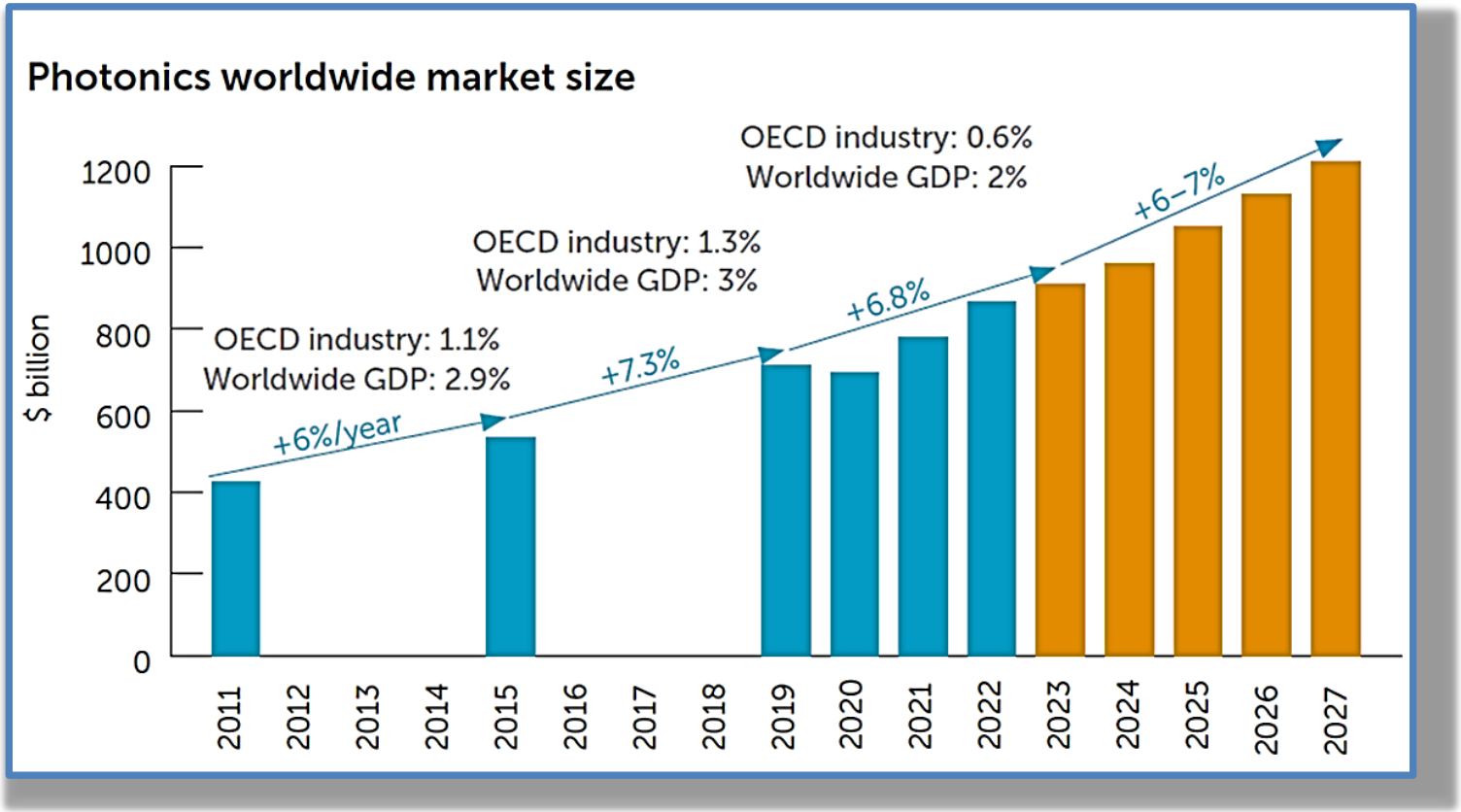


- **Swiss PIC is one of four AM TTC:**
  - Advanced Manufacturing Technology-Transfer Center
    - Integration of photonic, electronic and mechanical components
    - Advanced development, pilot line as well up-scaling and technology transfer to industry
  - Business model:
    - Funded by ETH AM/TTC, Kanton of Aargau, SERI (article 15)
    - PPP: Income from projects, production
  - Our mission:
    - Enable chip companies to access the market of connectorized modules by offering advanced packaging technologies and services.

Photonics: Photons and Electrons

- **Light-current and current-light transformers**
  - Photovoltaics, Lasers, Cameras, Displays

- **Light “particles”: Photons**
  - Quantum computers
  - Sensors
  - Time clocks

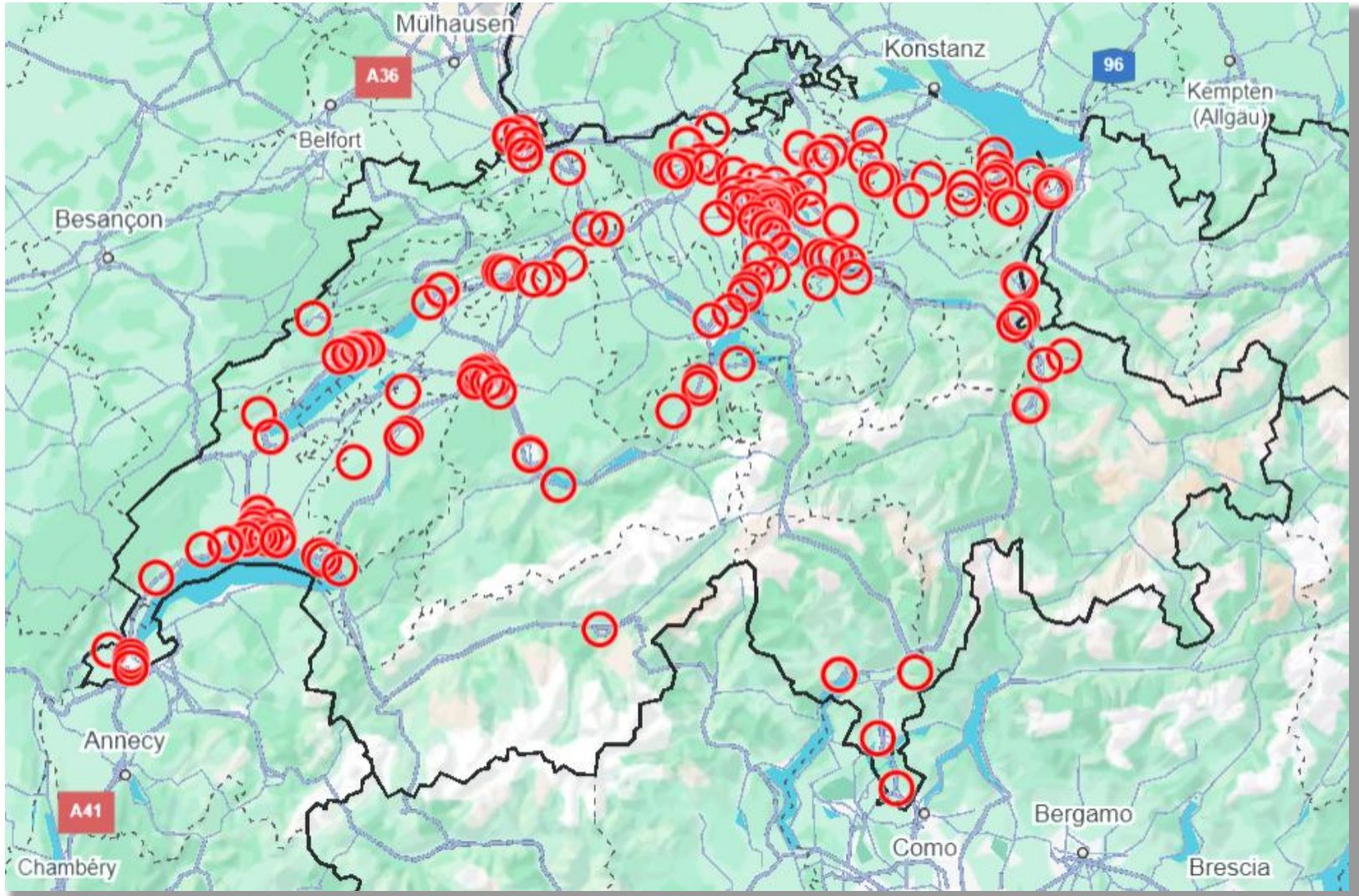


Switzerland: Number One within Europe in Photonics

- **Switzerland**
  - 4% of European market share
  - Number One in Photonics revenue per employee and per capita in Europe

Country	Photonics revenue (Billion EUR)	Share of Photonics within Europe	Number of employees in Photonics (persons)	Photoics Revenue per employee (EUR)	Population	Photonics Revenue per capita (EUR)
Germany	48.1	39%	188000	255'851	83'237'000	578
France	16.8	14%	60000	280'350	67'872'000	248
UK	14.5	12%	58000	250'000	66'971'000	217
Netherlands	8.4	7%	24000	350'000	17'591'000	478
Italy	6.3	5%	16000	393'750	59'030'000	107
Switzerland	5.6	4%	12000	**466'667**	8'739'000	**641**
Rest of Europe	24.9	20%	70000	355'714	437'605'000	57
Europe	124.6	100%	428000	291'121	741'045'000	168

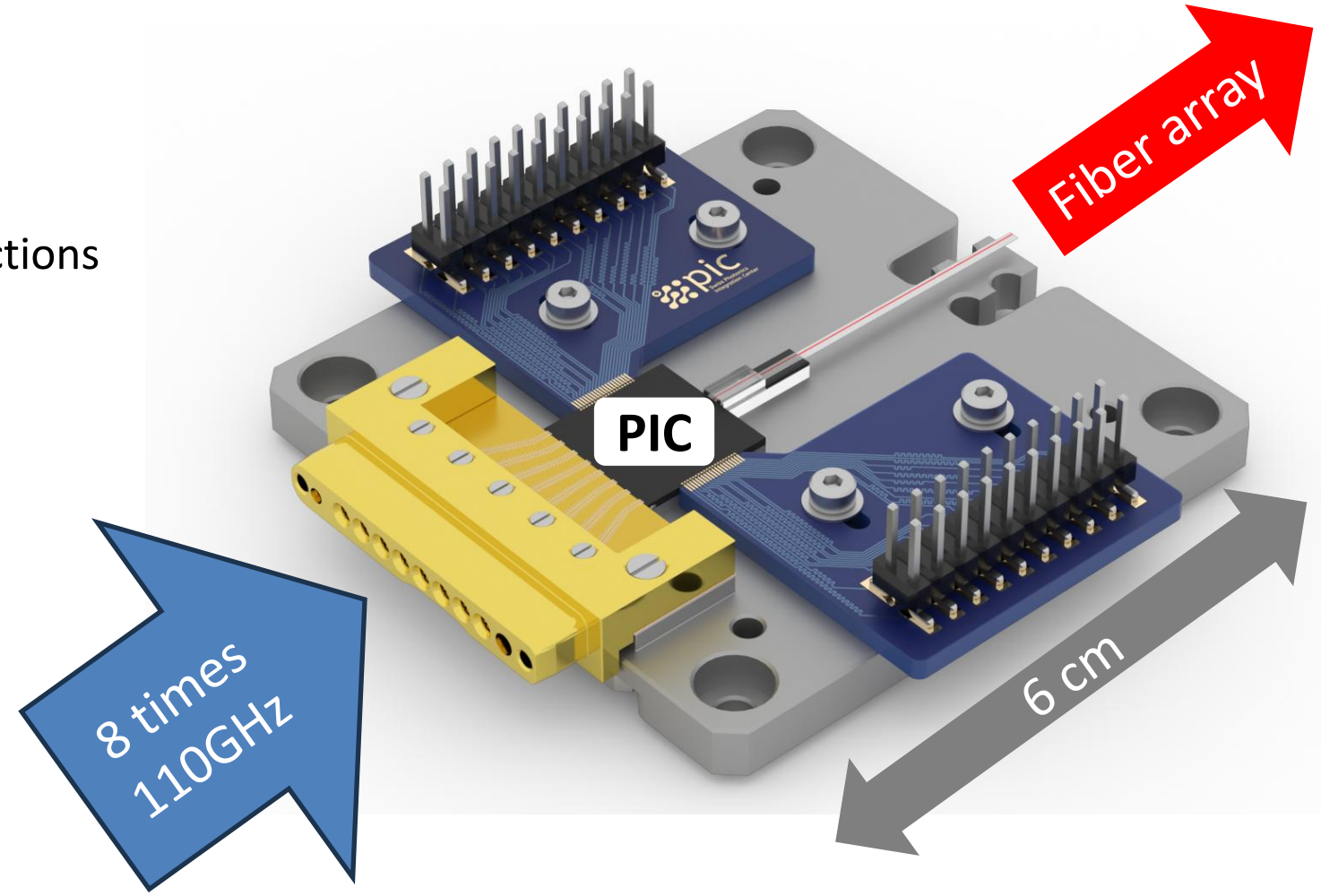
Swiss Photonics Ecosystem: It is a Cluster



- **Swissphotonic** 200+ members
- **Swissmem:** Industry sector Photonics
- **Leading Photonics research institutions** EPFL, ETH, PSI, CSEM, …

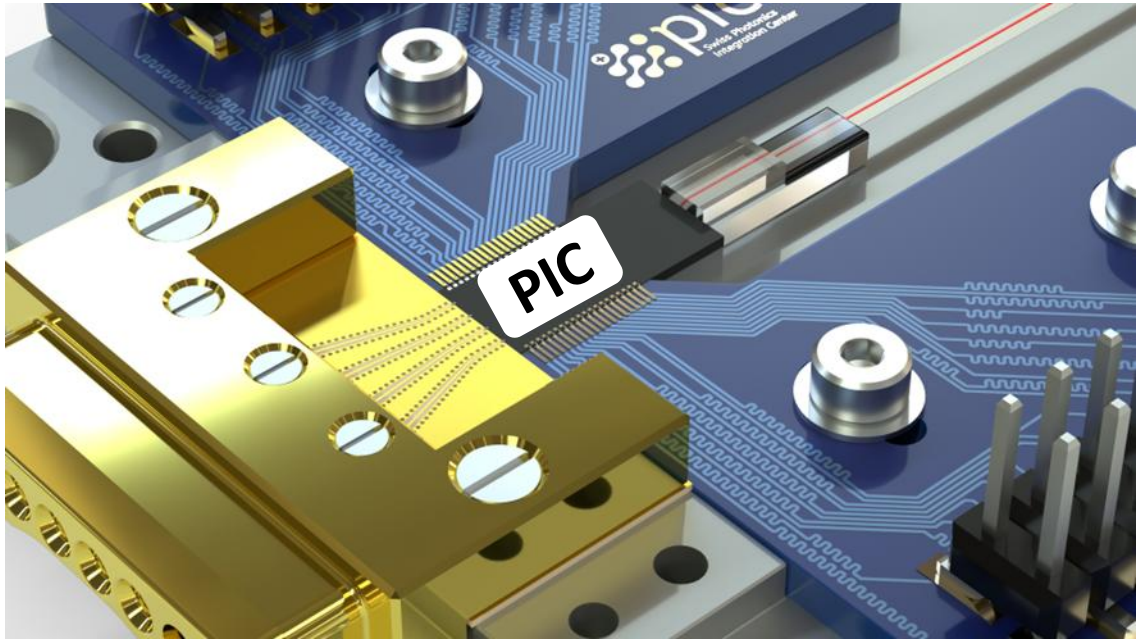
Photonic Integration Example

- **Evaluation board (THz)**
  - Electrical signal inputs
    - 8 times 110GHz high speed
    - 40 times dc electrical connections
  - Optical outputs
    - Fiber array



Die bonding

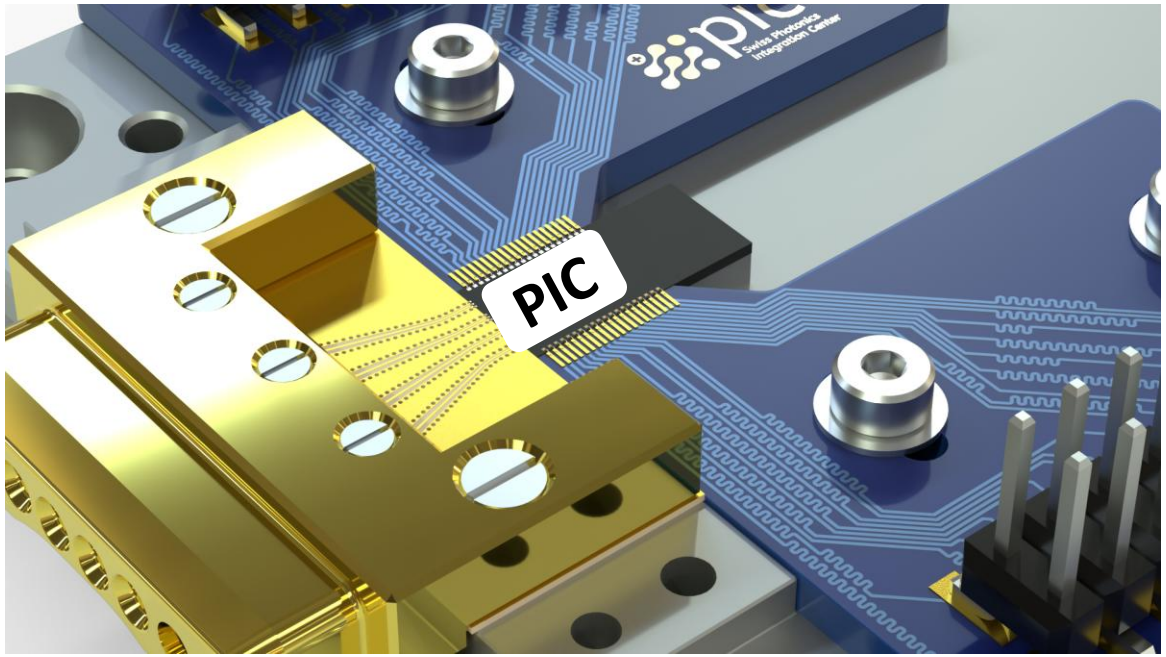
- **Placing PIC**
  - Place chip (black) onto board
  - Alignment to RF coaxial striplines with +/- 5um



- **Equipment (among others)**
  - SET AccuraM – die bonder. Die bonding using multiple techniques with 3 µm post-bond position accuracy.
  - PICO-Lab: SET FC150 Platinum - high accuracy die bonder with 0.7 µm precision for chip-to-chip coupling

Wire bonding

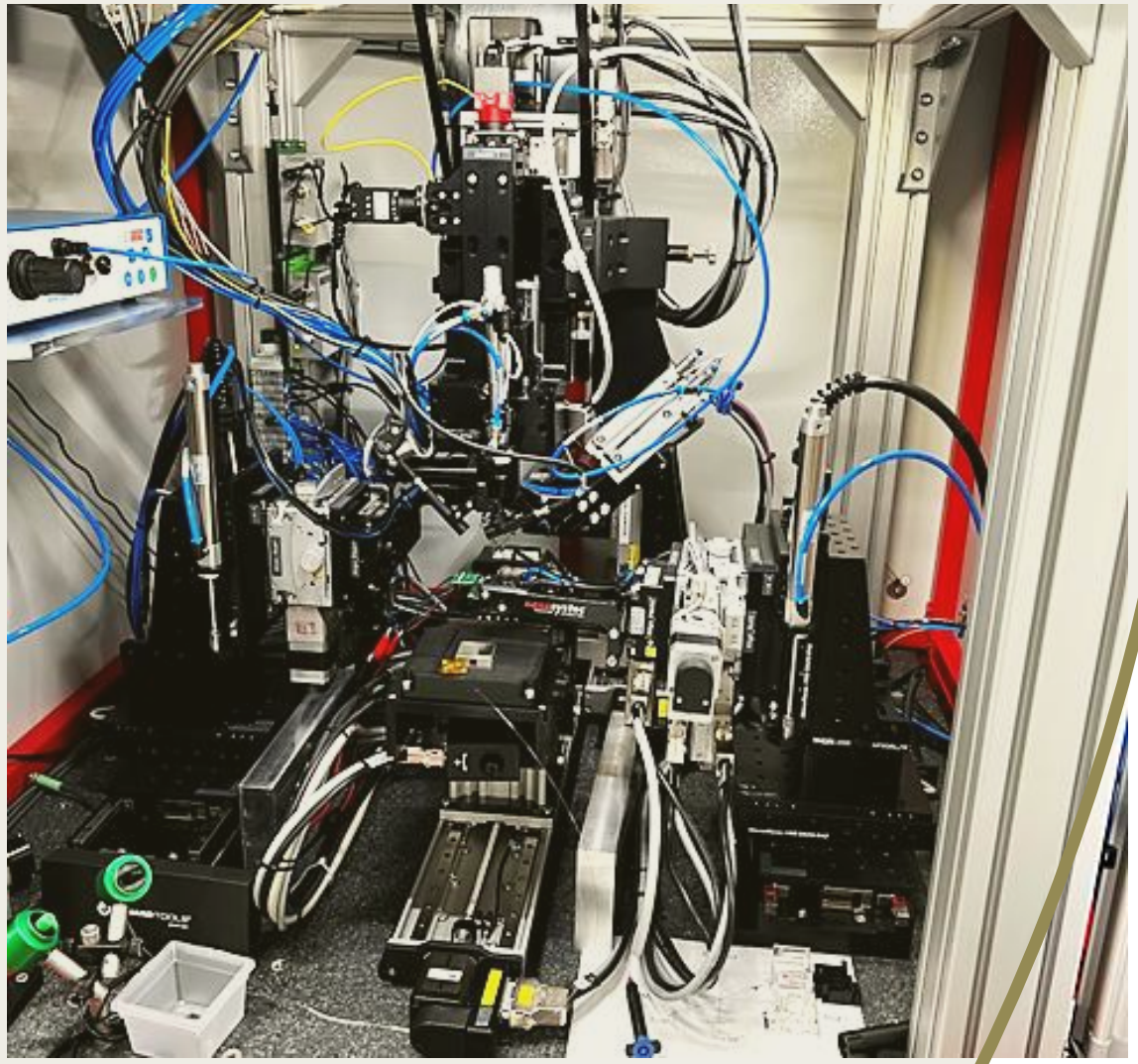
- **Wiring up**



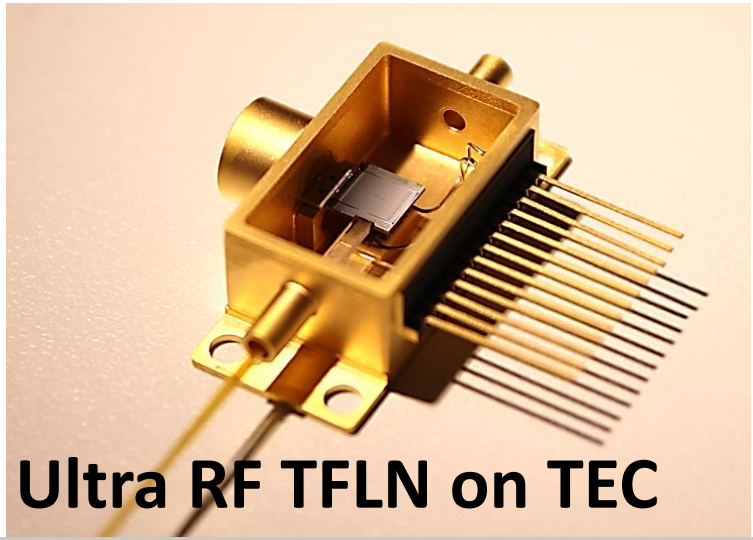
- **Wire bonder**
  - FS Bondtec 56XXi – Semi-automatic wire bonder with multiple heads. wedge-wedge & ball-wedge. Minimum pitch in general: 60 µm. Ribbon bonding also accessible, with the minimm pitch depending on the ribbon width.

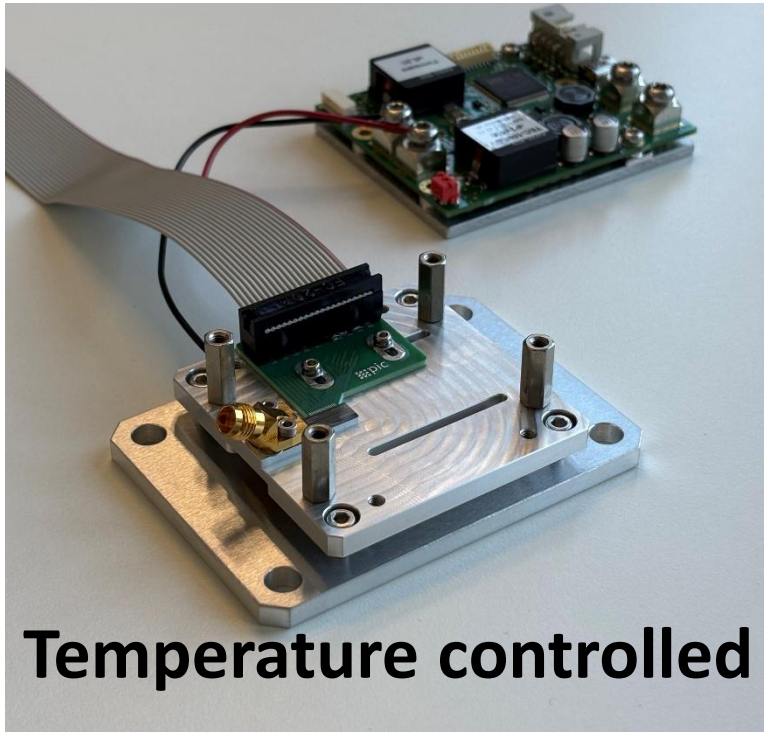
Fiber bonding

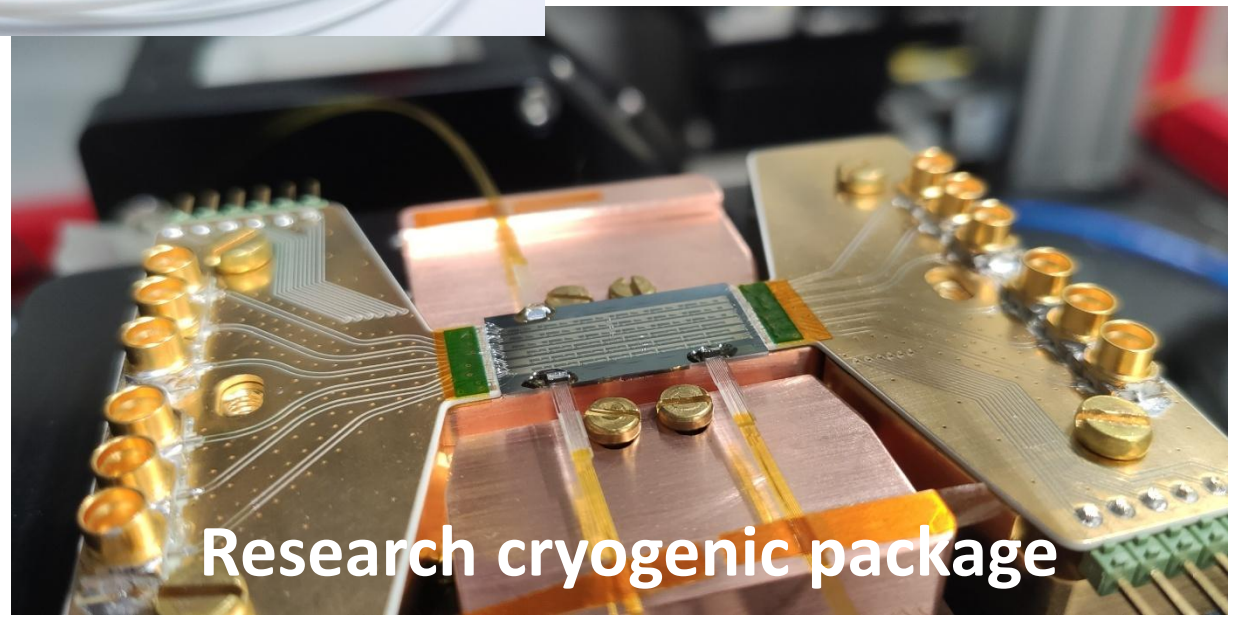
- **Equipment**
  - Nanosystech Nanoglue
    - 2x6 axes (XYZ, Roll, Pitch, Yaw), LED UV curing. Resolution: 20 nm on X, Y, and Z axes.
  - Ficontec C2000
    - 2x6 axis alignment, LED UV curing & laser through chip soldering with capabilities for multichip hybrid assemblies, the most advanced 3D photonic assembly machine currently on the market.
  - Suruga EW60
    - R&D alignment - Manual alignment with 25-nm step size - reconfigurable for flexibility



Formfactors



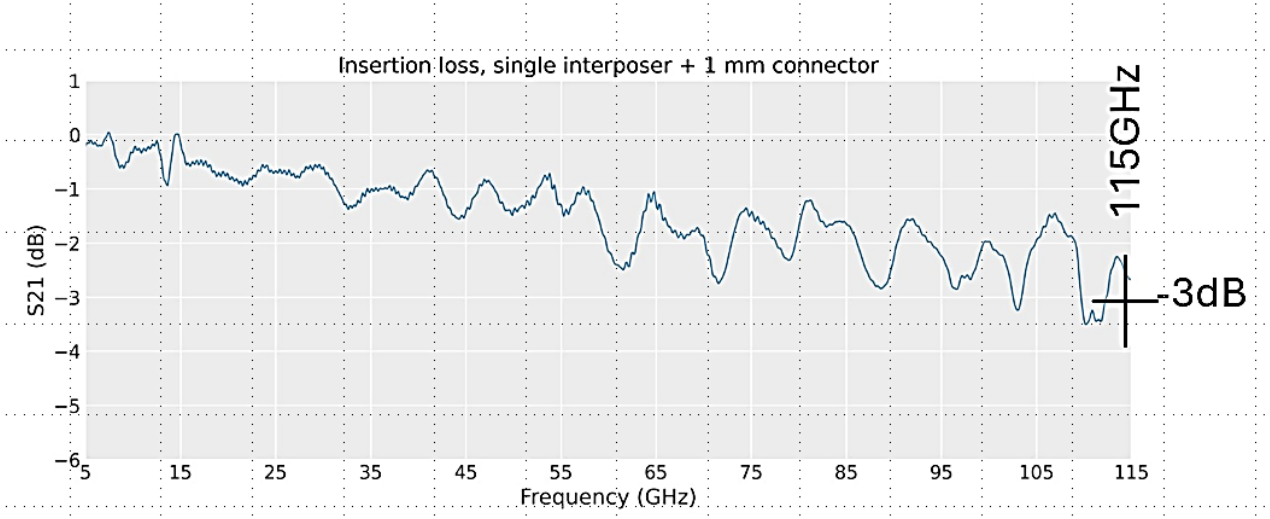


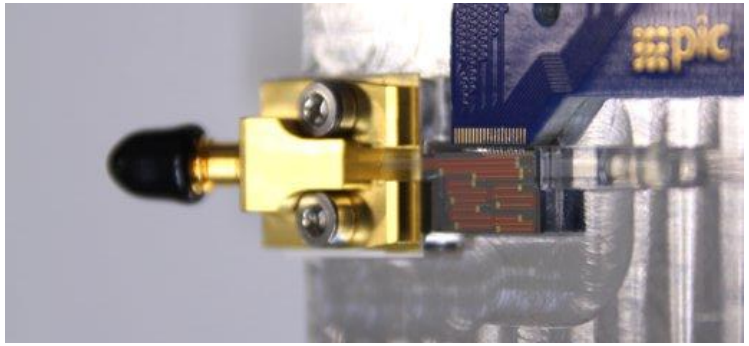


Testing: Pushing the limits together with Yotavis

Collaboration with Yatovis

-3dB at 115GHz





From 2023 to June 2025 to November 2025 to …

Who can profit from Swiss PIC AM TTC

Feedback from first customers:
Very fast response
Extremely helpful support

- **Chip manufactures**
  - Market for chips is limited, Market for modules with connectors is much larger
  - Development of photonic integrated modules, Scale-up to initial volume production
- **Deep Tech Start-ups**
  - Swiss PIC develops customized advanced integration of photonic/ quantum chips with electronics, electrical and optical connectors
  - Do not buy your own equipment: Come to us!
- **SMD manufacturers**
  - Know-how support for PCB companies
    - Upgrading electronic PCBs by adding opto-electronic (photonic) components
  - We provide know-how on how to make use of opto-electronics

www.swiss-pic.ch

Mission:
Enable chip companies to access the market of connectorized modules by offering advanced packaging technologies and services.

Our operation is up and running in ISO7 fab.
We deliver!

We are very thankful for support

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