PHOTONICS RESEARCH GROUP

GHENT UNIVERSITY

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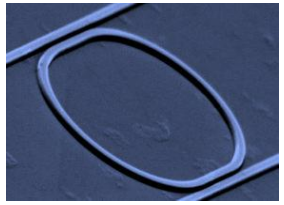
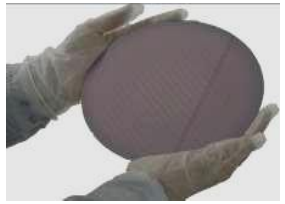
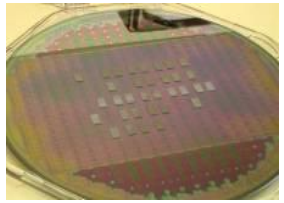
TEST AND MEASUREMENT FOR PROGRAMMABLE PHOTONIC CIRCUITS

Wim Bogaerts

EPIC Online Technology Meeting on PIC Testing
16 November 2020

PHOTONICS RESEARCH GROUP

Research Group of Ghent University

- Faculty of Engineering and Architecture
- Department of Information Technology (INTEC)
- Associated laboratory of IMEC
- Member of the Center for Nano- & Biophotonics (NB photonics)

Technology Research

- Photonic Integrated Circuits: light on a chip
- On silicon: “Silicon Photonics”
- Enhanced with new materials:
  III-V, ferro-electrics, graphene, …

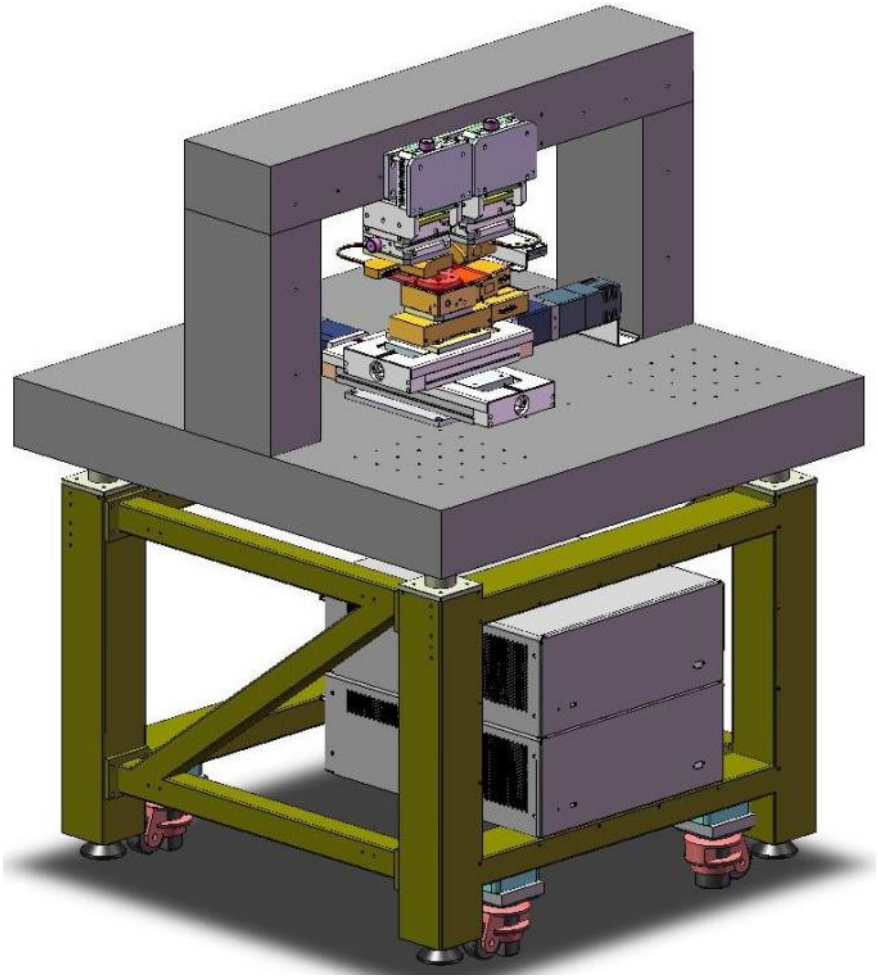
Applications

- High-speed telecom and datacom
- Sensing for life sciences: visible and Mid-IR
- Optical information processing

9 Professors
16 postdocs
50 PhD students
10 support staff

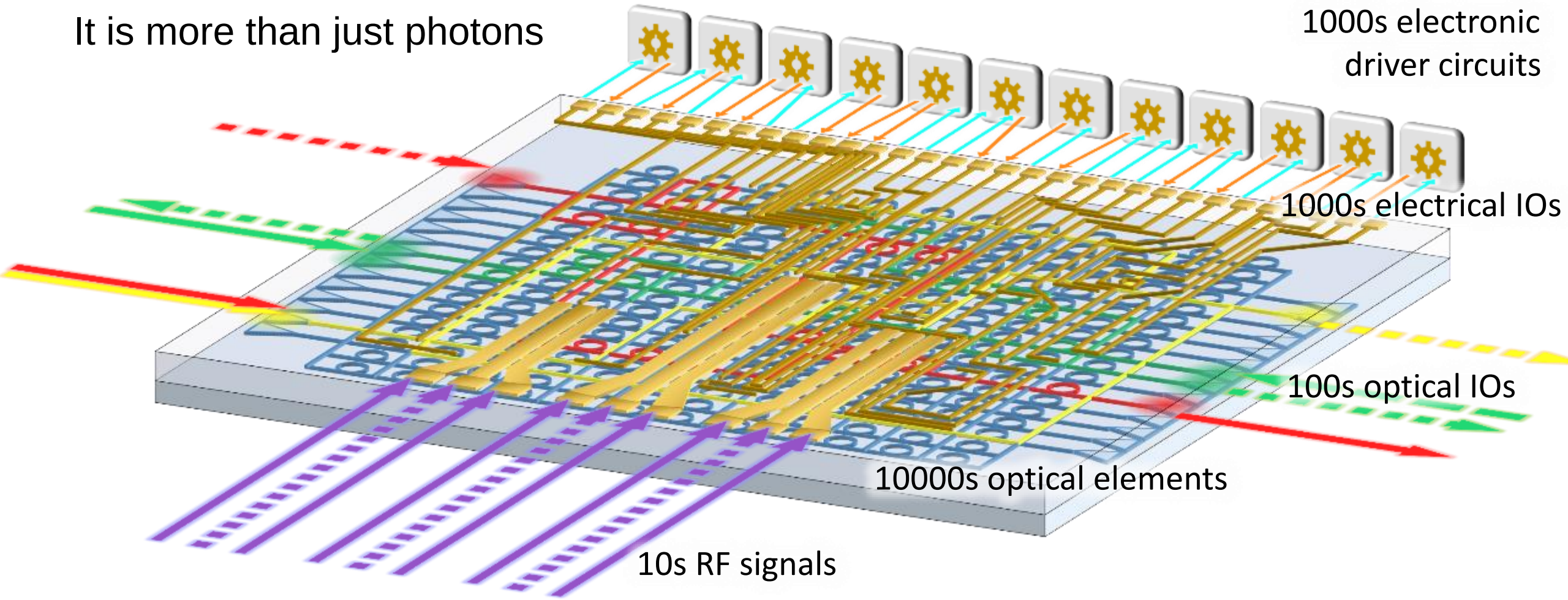
20+ nationalities
7 ERC grants
6 spin-off companies
50 journal papers/year
Class 100 clean rooms
M.Sc. Photonics program

AUTOMATED TESTING IN 2011



THE MOVE TO LARGE-SCALE (PROGRAMMABLE) PICS

It is more than just photons

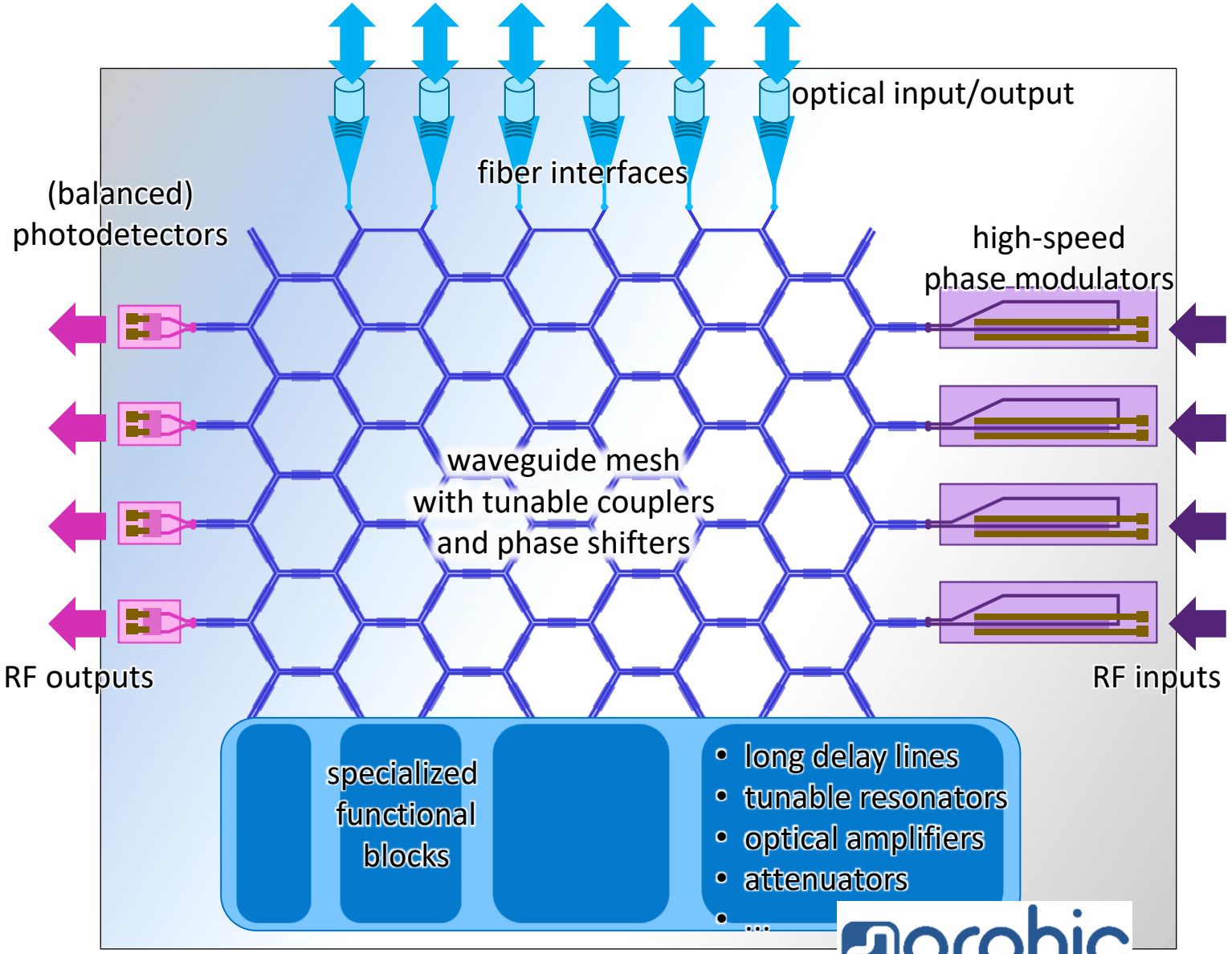


PROGRAMMABLE PHOTONIC CIRCUITS

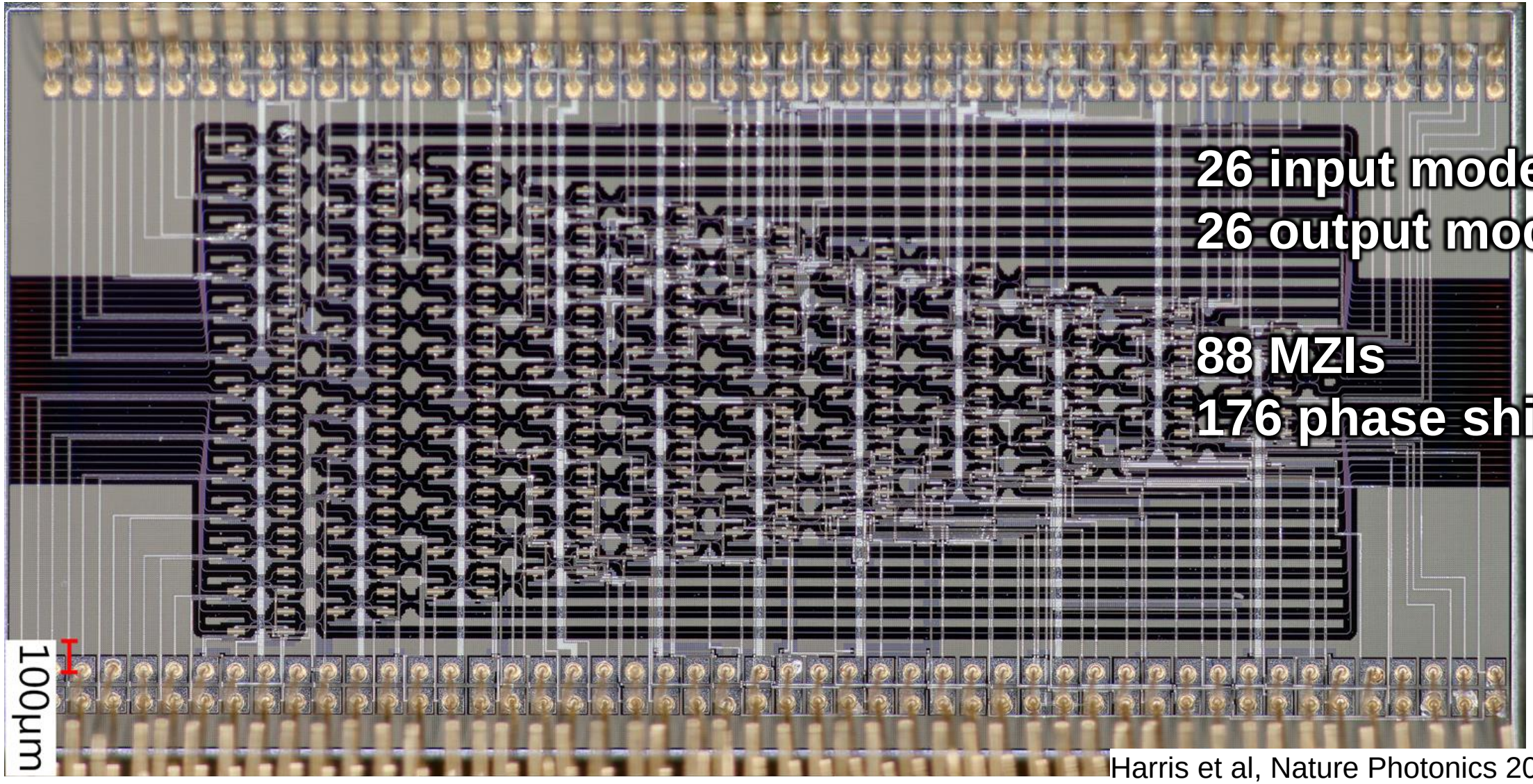
Interconnection = waveguide mesh

- tunable couplers
- phase shifters

Can only work if fully controlled…



Large-scale Forward-only Matrix Circuit

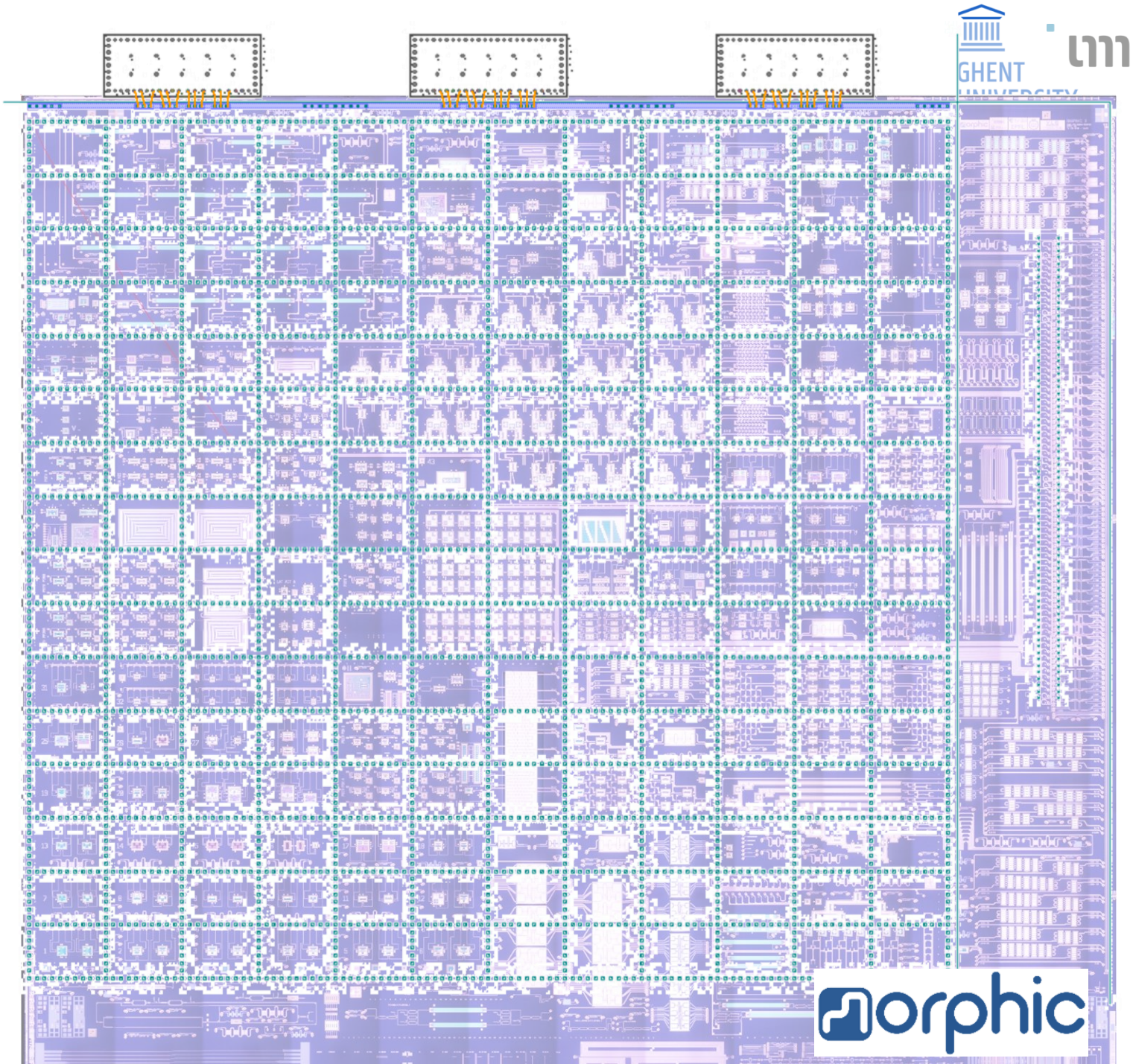


Harris et al, Nature Photonics 2017
Shen, Harris et al, Nature Photonics 2017
Harris et al, Optica 2018

LARGE-SCALE PICS

Connections

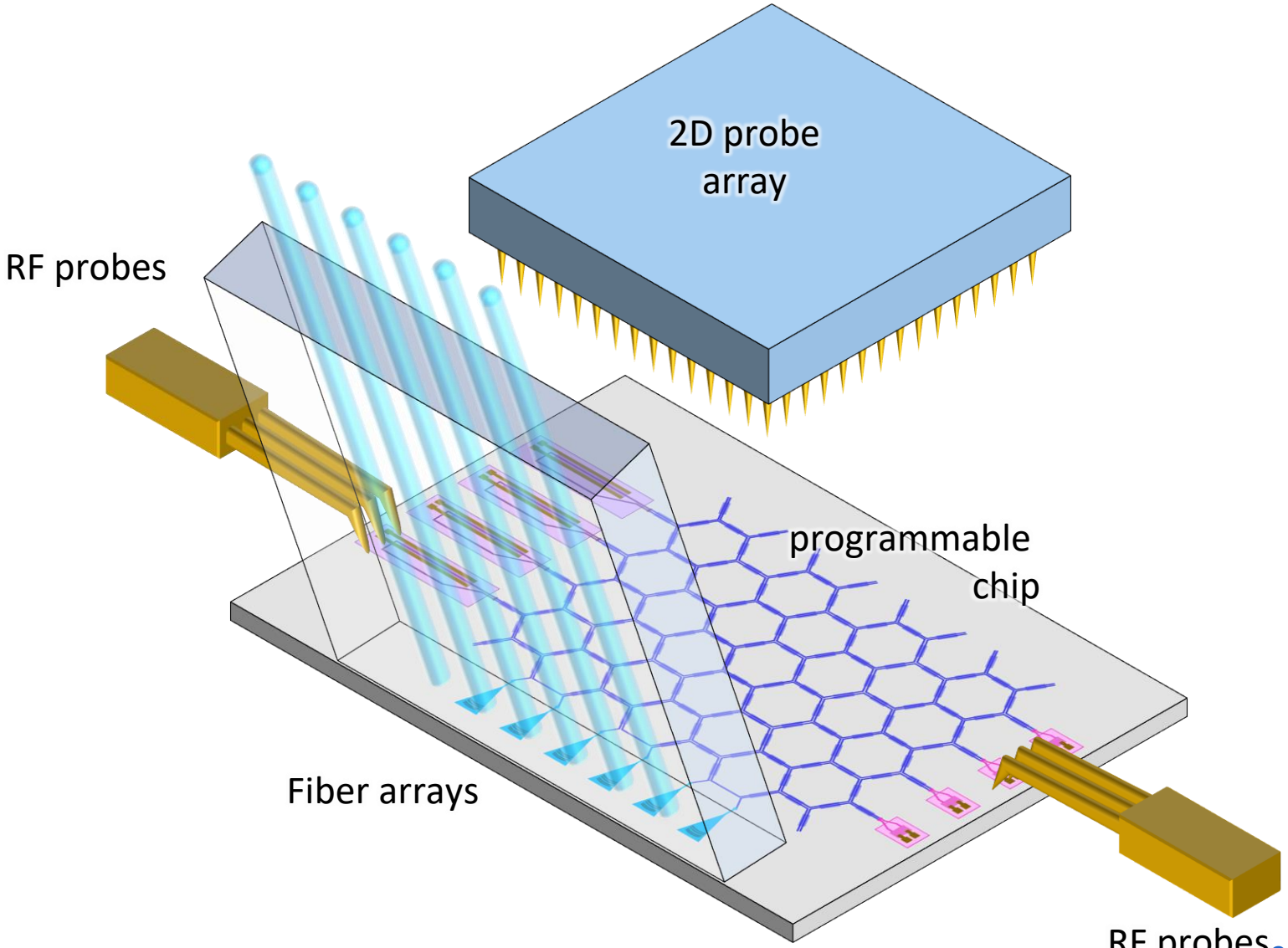
- 72 fibers (2x)
- 12 RF inputs
- 12 RF outputs
- 3305 DC connections on grid



New Test & Measurements capabilities needed

Wafer-scale testing

- Fiber arrays
- RF probes
- Large-count DC probing



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erc European Research Council