PHOTONICS RESEARCH GROUP

GHENT UNIVERSITY imec

HANDS-ON COMPUTER LAB
SILICON PHOTONIC CIRCUITS

Wim Bogaerts, Lukas Van Iseghem

INFIERI Summer School

UAM Universidad Autónoma de Madrid

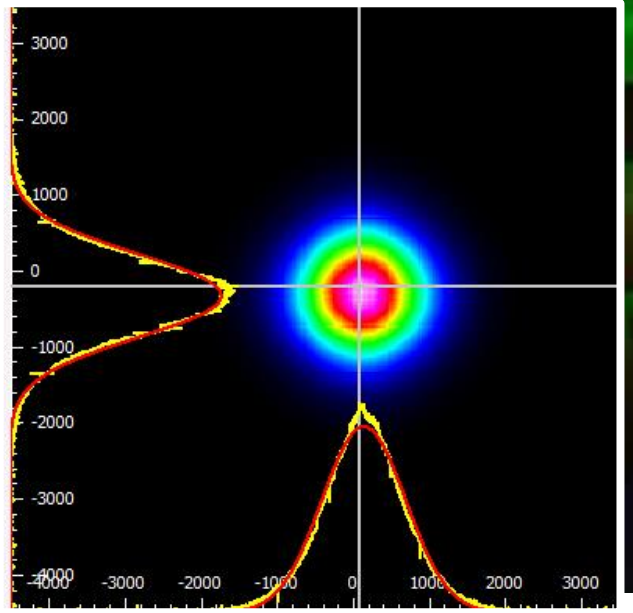
INFIERI

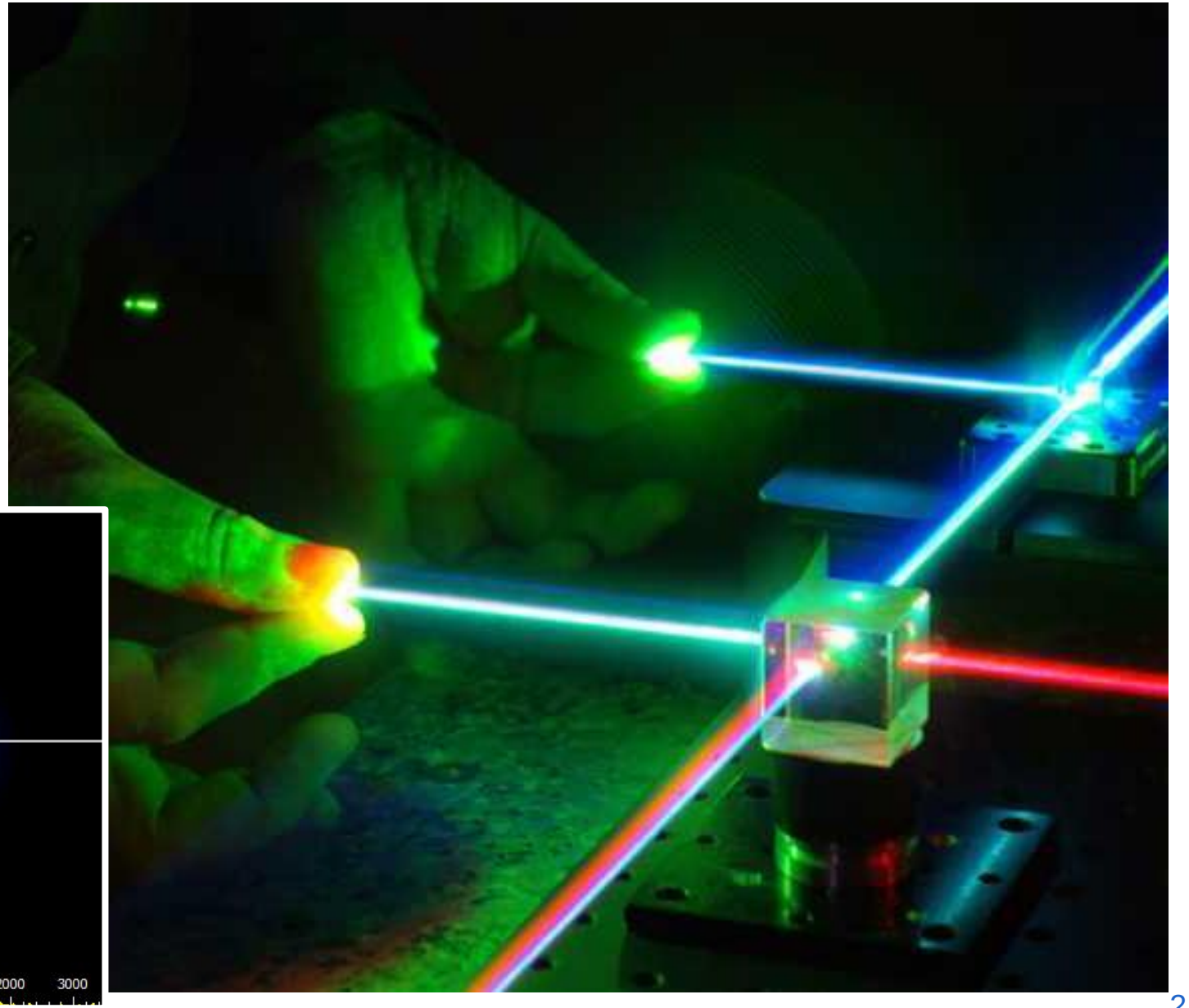
6th Summer School on INtelligent signal processing for FrotIEr Research and Industry

MANIPULATING BEAMS OF LIGHT

Beams of light contain information

- Total power
- Intensity profile
- Phase profile
- Wavelength
- Polarization



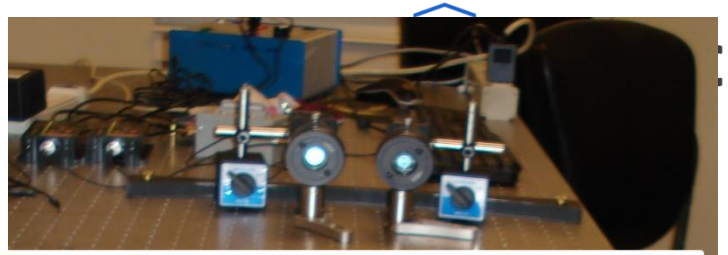


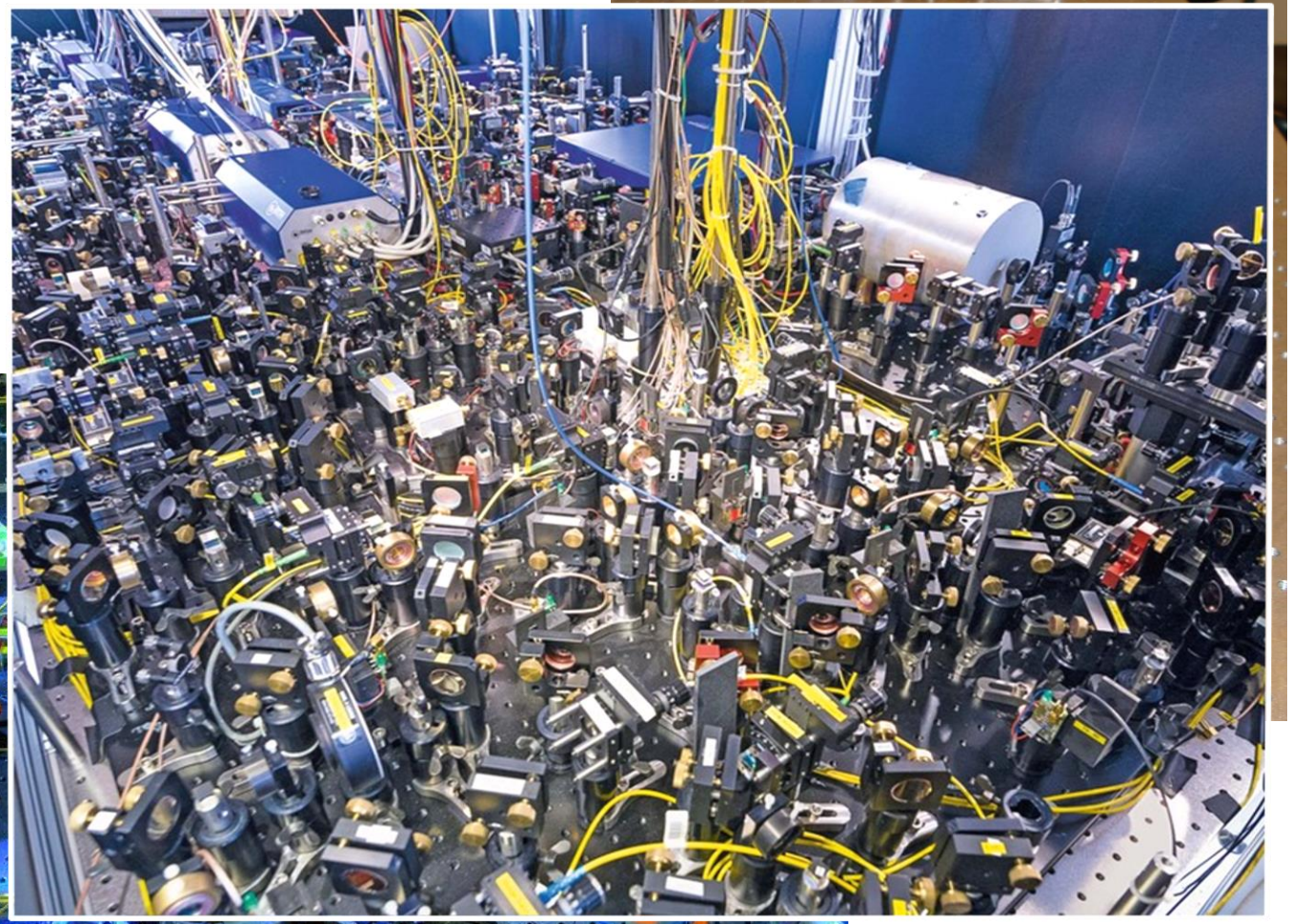
MANIPULATING BEAMS OF LIGHT

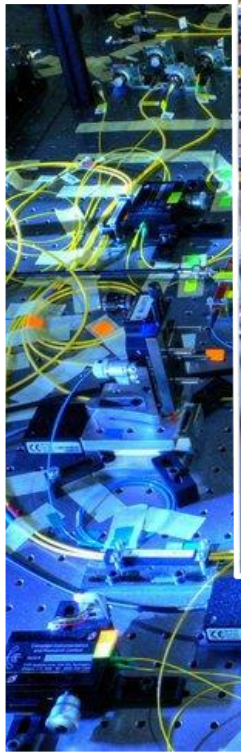
Using optical elements

- Lenses
- Mirrors
- Polarizers
- Shutters
- Spatial filters
- Wavelength filters
- Phase plates
- SLM

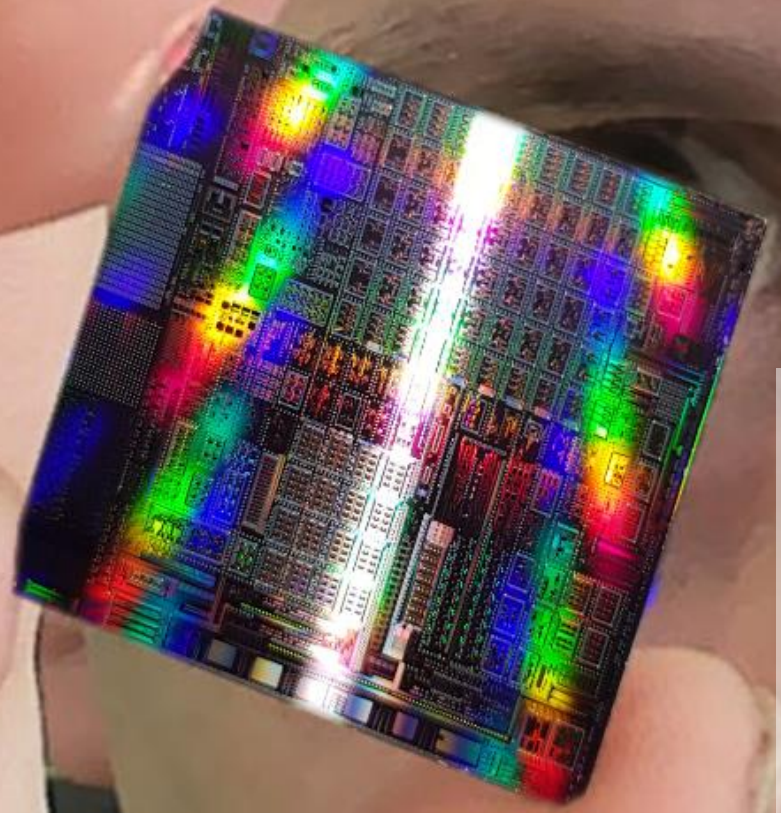
Does not scale very well







PHOTONIC CHIPS



Chips for manipulating light

- fabricated on semiconductor wafers
- generating, modulating, filtering, detecting of light
- Application in communications, sensing,…

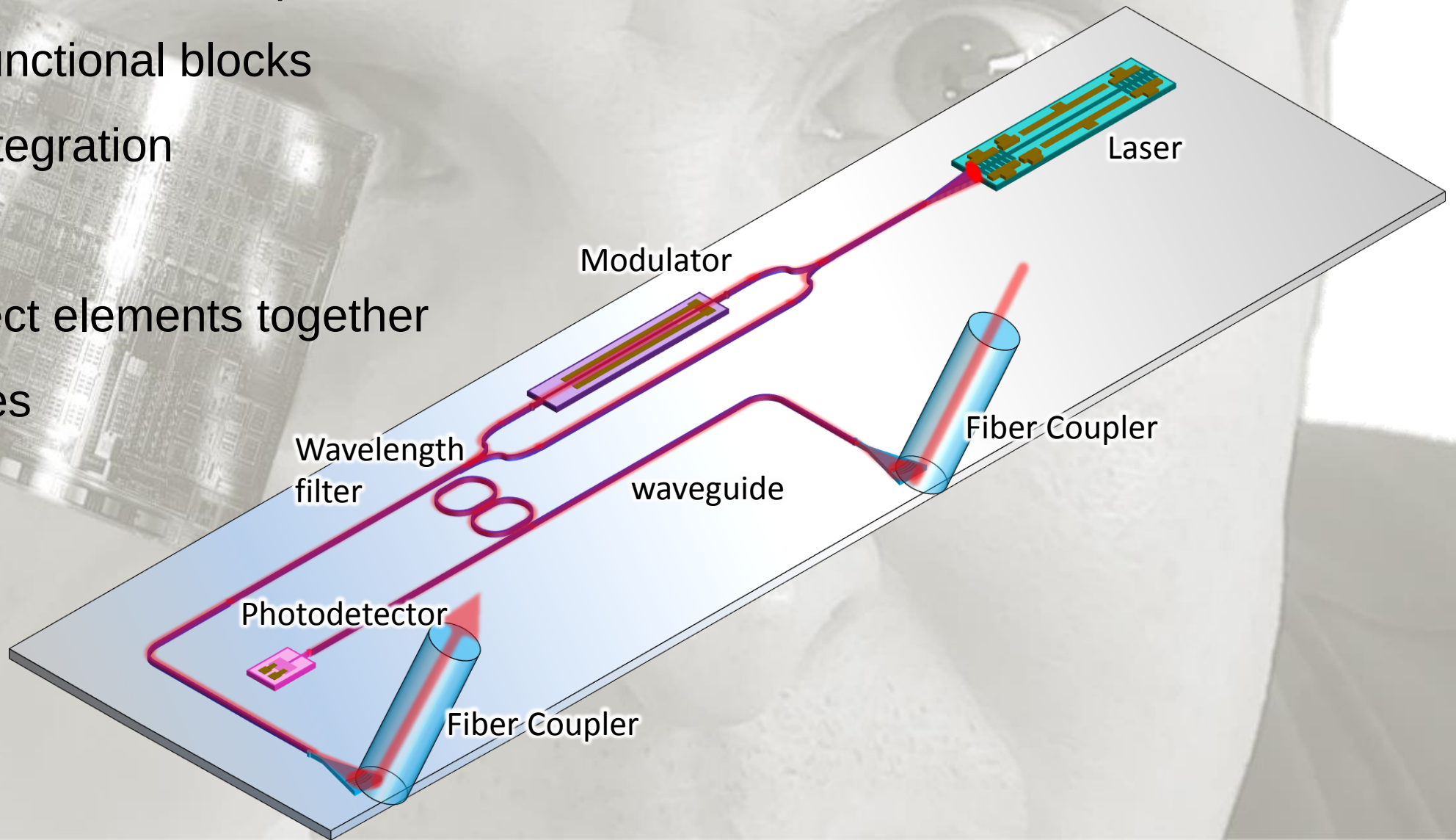
PHOTONIC CHIPS

Complexity of the circuits depends on

- number of functional blocks
- density of integration

Circuits connect elements together

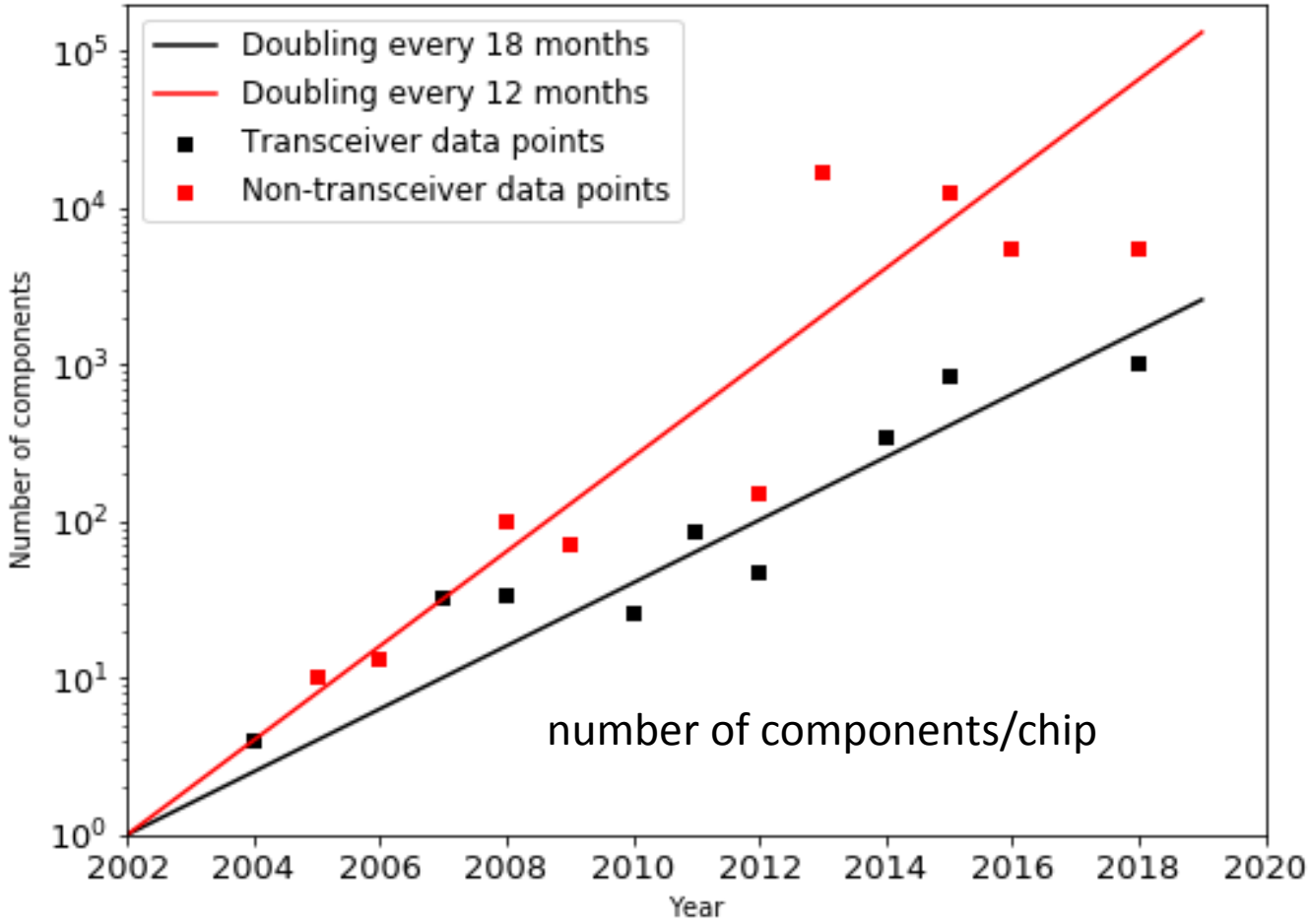
with waveguides



SILICON PHOTONIC CHIP AND CIRCUIT SCALING

Rapidly growing integration

- O(1000) components on a chip
- photonics + electronic drivers
- different applications (mostly comms)
- Relatively small chip volumes (compared to electronics)

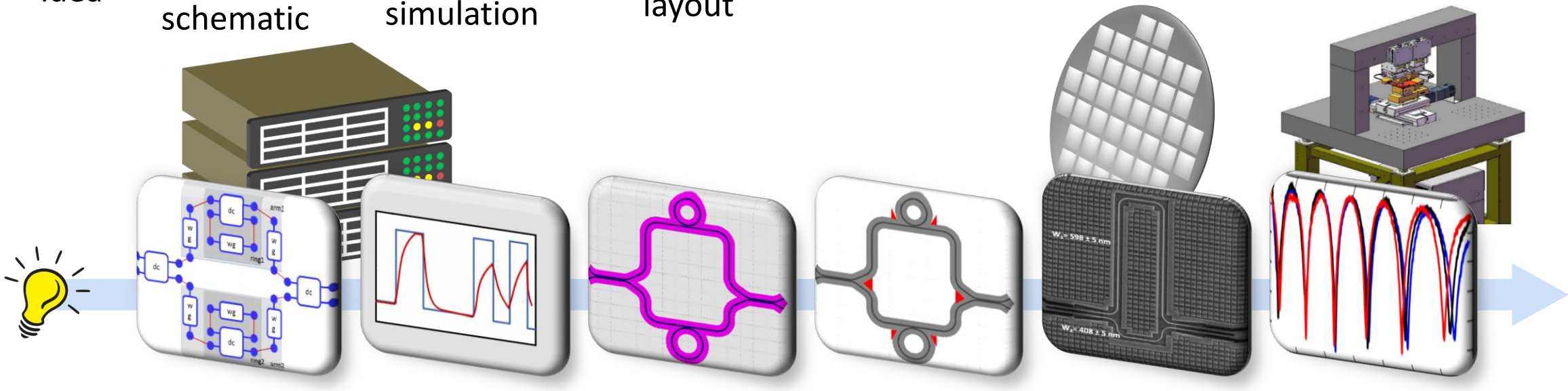


Khanna et al. 2016

MAKING PHOTONIC CIRCUITS

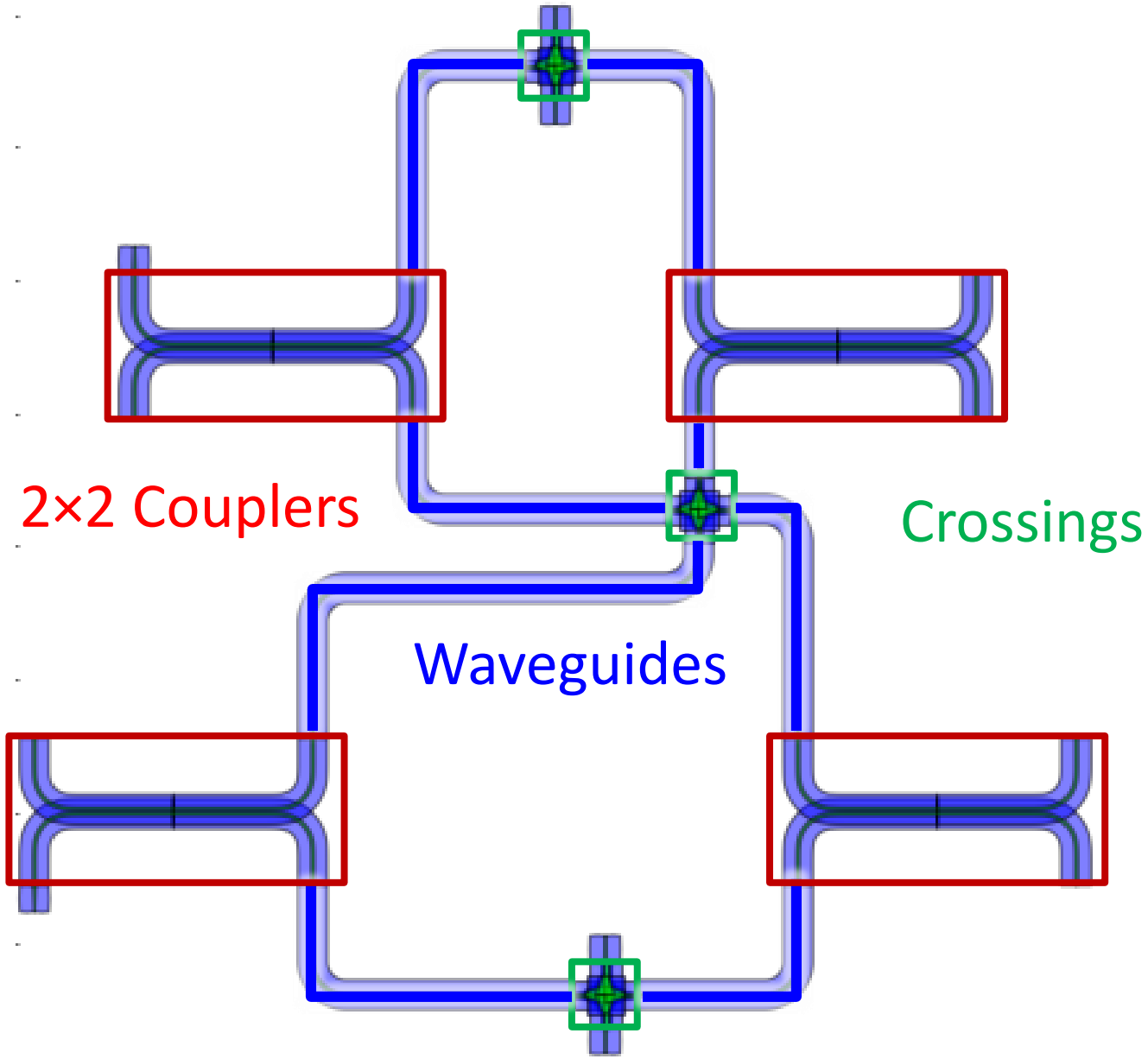
Translating an idea into a chip?

idea → circuit schematic → circuit simulation → chip layout → verification → fabrication → testing



A SIMPLE PASSIVE CIRCUIT

- Four 2×2 couplers
- 3 Crossings
- Connection waveguides



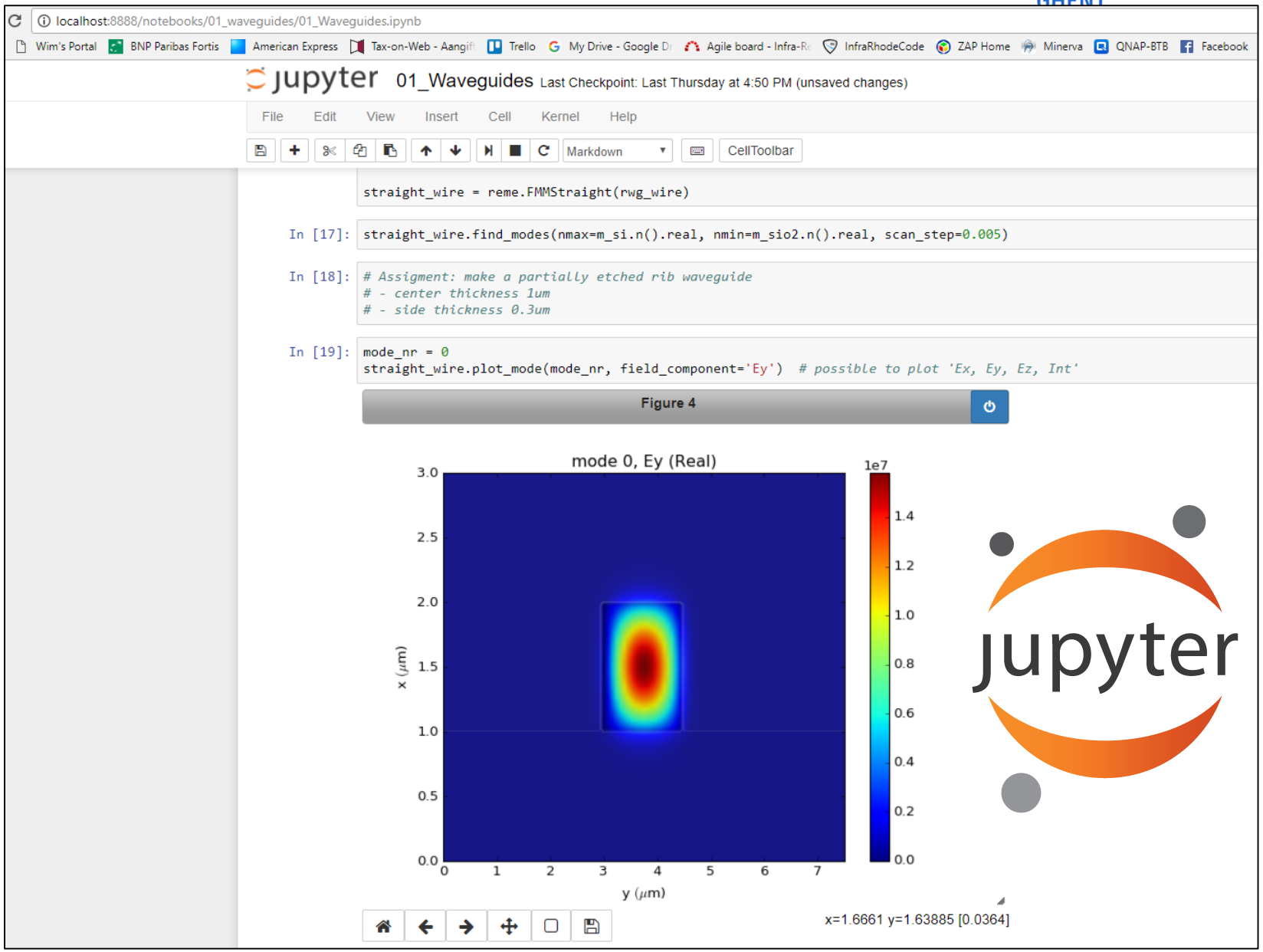
JUPYTER NOTEBOOKS

interactive notebook

- text, figures
- formulas
- python code

simulation and design

- built-in IPKISS



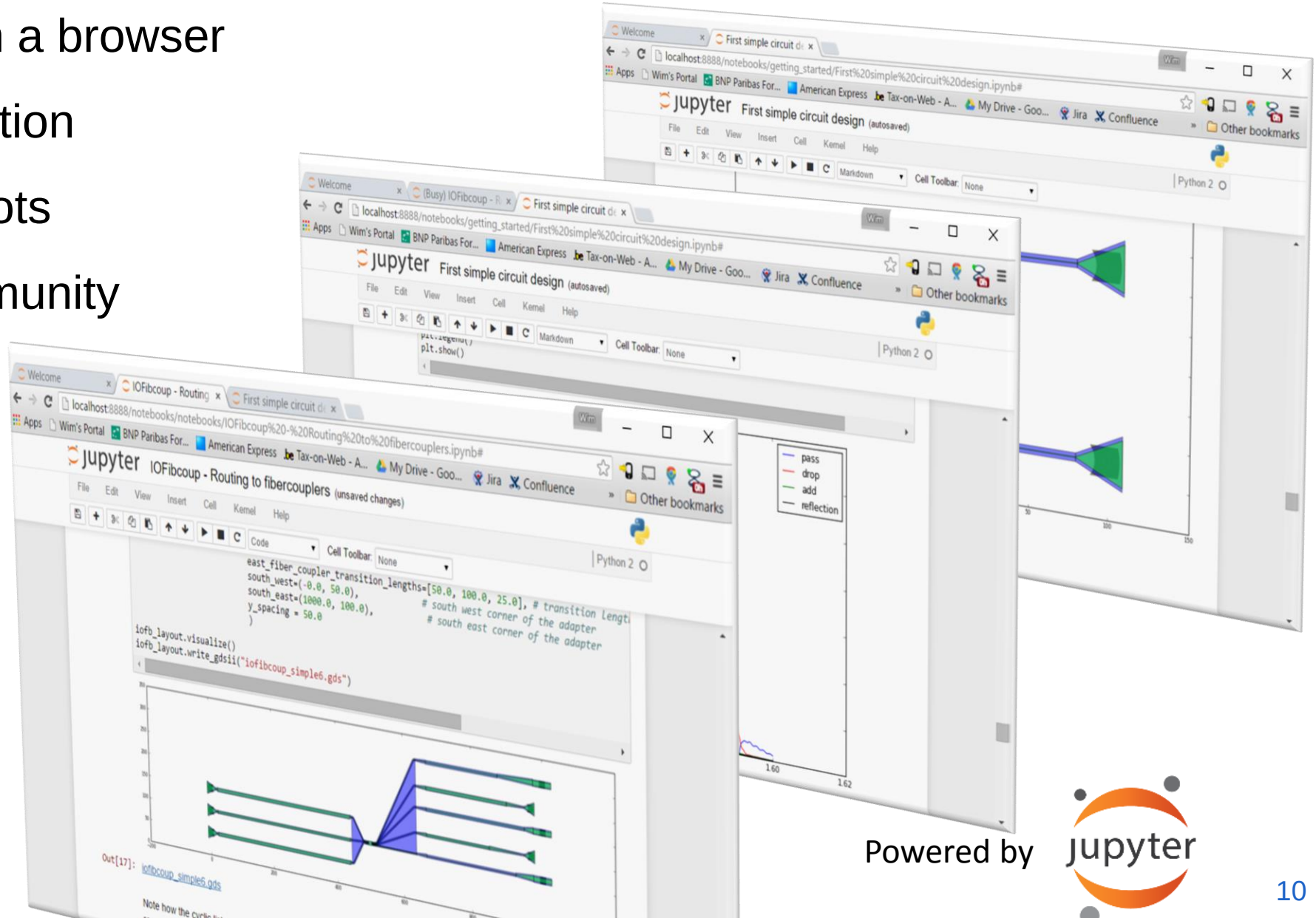
PHOTONIC DESIGN NOTEBOOKS

Explore your designs in a browser

Very rapid experimentation

Interactive code and plots

Widely supported community



Powered by jupyter

PRACTICAL

30 minutes intro: basics of photonics

(by me or Lukas)

Hands-on, self-paced use of notebooks

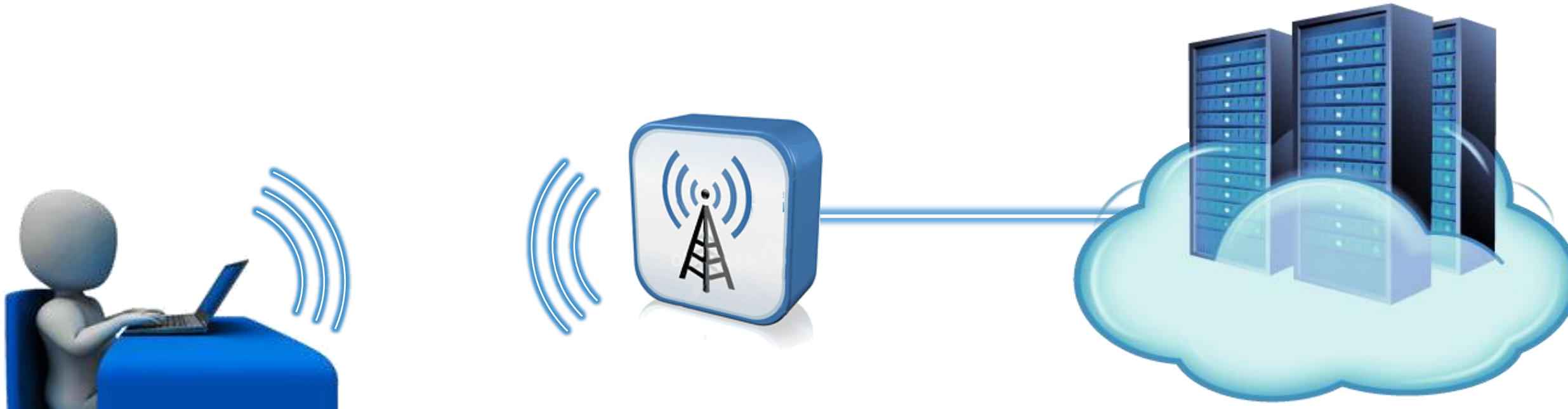
You can use the notebooks afterwards

Use your laptop or lab computer

You will get a log-in and password

Connect to the server

Get started



PHOTONICS RESEARCH GROUP

Wim Bogaerts

Professor in Silicon Photonics

wim.bogaerts@ugent.be

+32 9 264 3324

@PhotonicsUGent

@WimBogaerts

www.photonics.intec.ugent.be

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