360 Carla
Manufacturing
Industry 4.0

CARLA 2025

Photonics Career Event
Delft

Day 1 – Creating your Career

ICFO

PHOTONICS21
PHOTONICS PUBLIC PRIVATE PARTNERSHIP

This project has received funding from the European Union Horizon Europe research and innovation program under grant agreement No 101135838.

360 Carla
Manufacturing
Industry 4.0

Photonics Career Event
Delft

Suzanne van Grootel – van den Bergh

PhotonDelta

This project has received funding from the European Union Horizon Europe research and innovation program under grant agreement No 101135838.

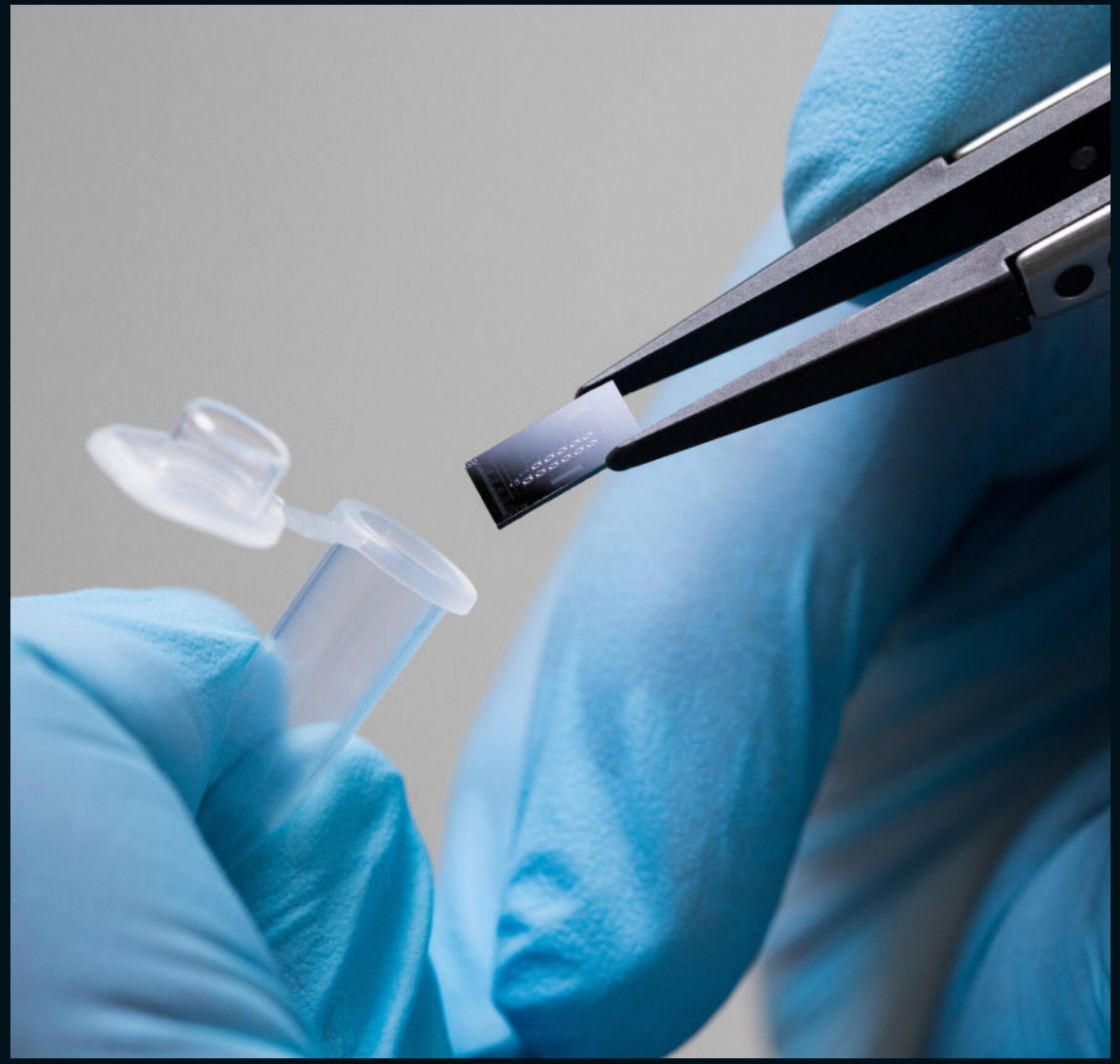
PhotonJobs

Carla Camp 2025

The PhotonDelta Ecosystem

What are photonic chips?

- A photonic integrated circuit (PIC) or is a microchip containing two or more photonic components that form a functioning circuit.
- Photonic technology detects, generates, transports and processes light.
- They utilize photons (or particles of light) as opposed to electrons
- Considered a crucial technology in the pursuit of faster, more efficient, and higher-capacity data systems, offering an optical solution that goes beyond the limits of traditional electronics



PhotonJobs

The Netherlands: Hotspot for Photonic Microchips

Fundamental research &
academic collaborations since

1970s

Netherlands is home to global leading companies as

ASML & NXP

surrounded by extensive ecosystems for high-tech equipment

Large research institutes and

State-of-the-art

open lab facilities

Netherlands is home to

Largest concentration

of start-ups active with PIC technology in Europe

Global top 3 position

for research publications (Technical Universities in Eindhoven, Twente, and Delft)

Solid financial base with

1.1B euro

National Growth Fund plan PhotonDelta

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Light the way in:

Medical & Healthcare

Early detection of diseases by developing biosensors and point-of-care diagnostic instruments.

Data & Telecom

Reduce energy usage and increase data processing and transmission speeds.

Engineering & Transport

Create cost-effective and miniaturised solutions for monitoring systems, fibre optic sensing systems, and LiDAR.

Food & Agriculture

Allow food producers to accurately measure and evaluate food quality and quantity.

Quantum

Allow quantum computers to operate at room temperature, instead of below freezing for classic quantum computers.

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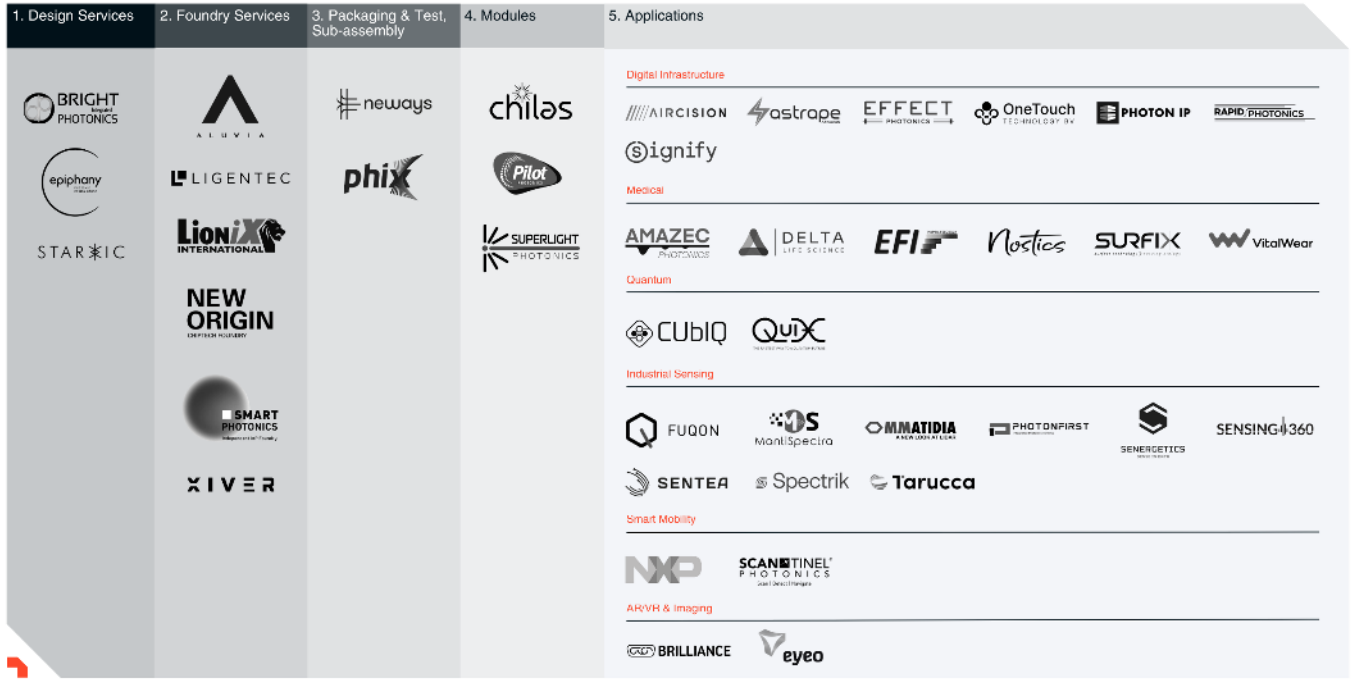
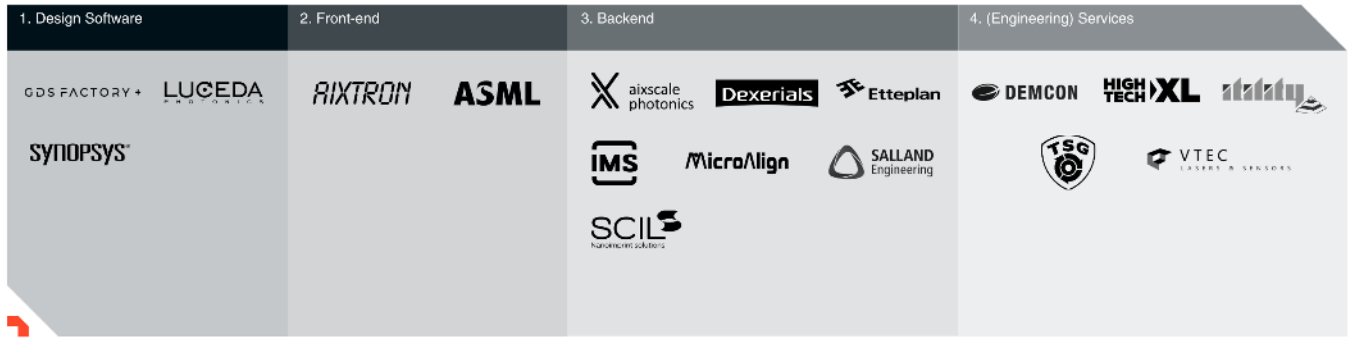
Dutch Photonic Chip Industry

Version 05.2025

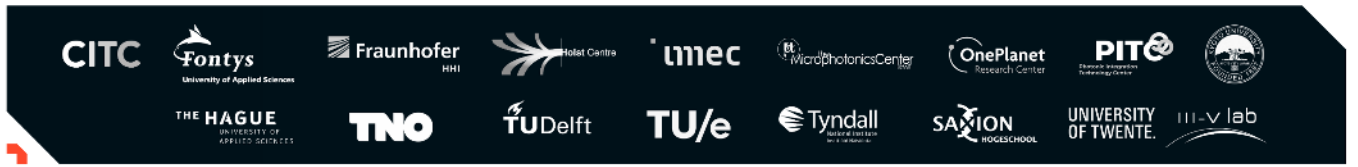
PhotonDelta Ecosystem | Value Chain Partners



PhotonDelta Ecosystem | Tech Partners



PhotonDelta Ecosystem | Research & Development Partners



Disclaimer: Visual is subject to change

PhotonJobs

What can you expect from working in this industry?

Create real-world impact / By developing innovative solutions for global challenges, from improving food production to faster disease detection.

Grow fast / With ample investments and support for innovation, you're encouraged to learn quickly.

Carve your own path / You'll be empowered to advance your career based on your ambitions.

Share knowledge / You'll join a dynamic, multidisciplinary melting pot of skills and nationalities keen to bring out the best in each other.

What does PhotonDelta offer?

Sponsor Programme Study Associations

www.photondelta.com/initiatives/sponsor-programme-study-associations/

PhotonJobs Career Hub

www.photonjobs.nl

PhotonDelta Start-Up Fund

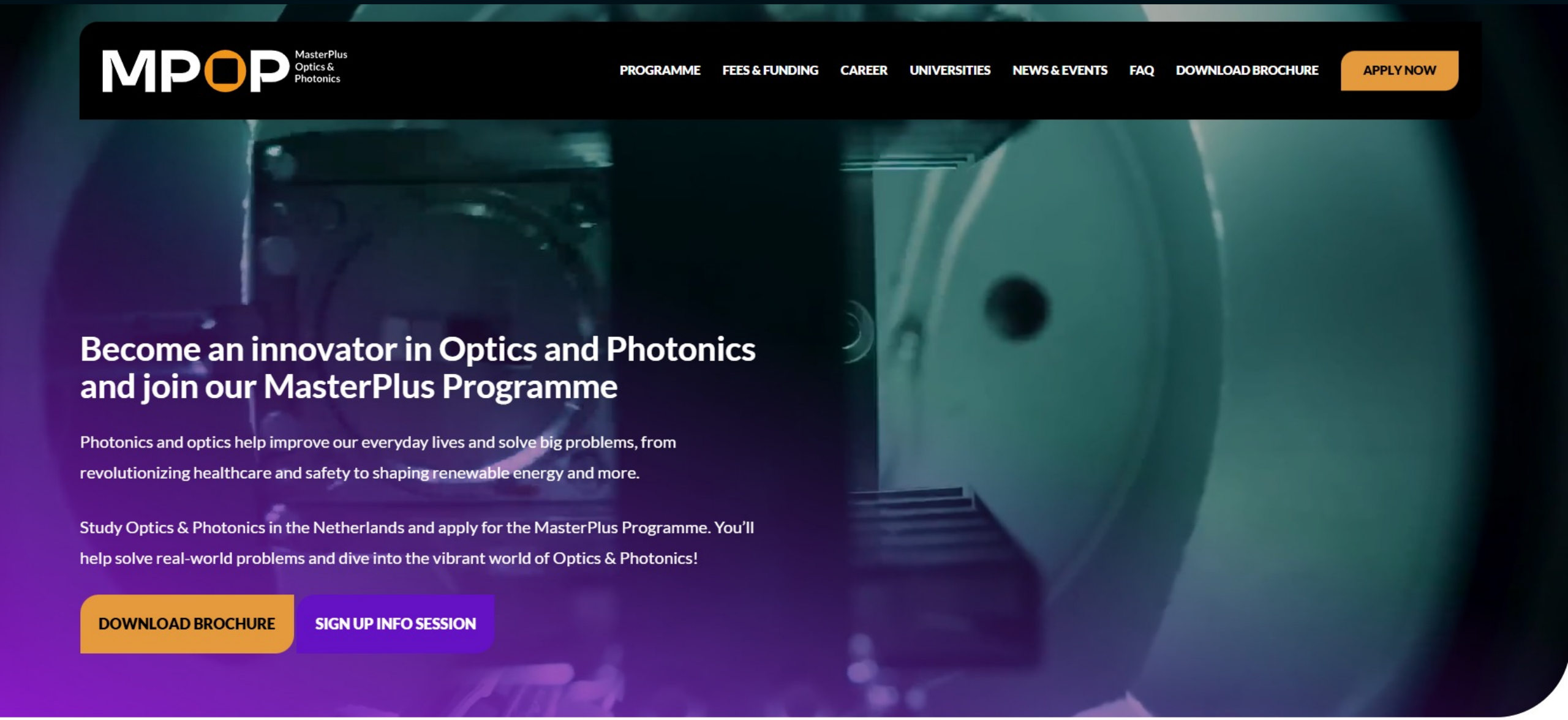
www.photondelta.com/funding

Community Activities

www.linkedin.com/company/photonjobs/

PhotonJobs

MasterPlus Optics & Photonics



Explore top opportunities with PhotonJobs partners. Apply now via www.photonjobs.nl!

PhotonJobs

PhotonJobs connects talent to opportunities in the Dutch Photonics Chip Industry.

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Ece Demirer
ASML

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Self Intro, ASML as a company and Integrated optics in ASML

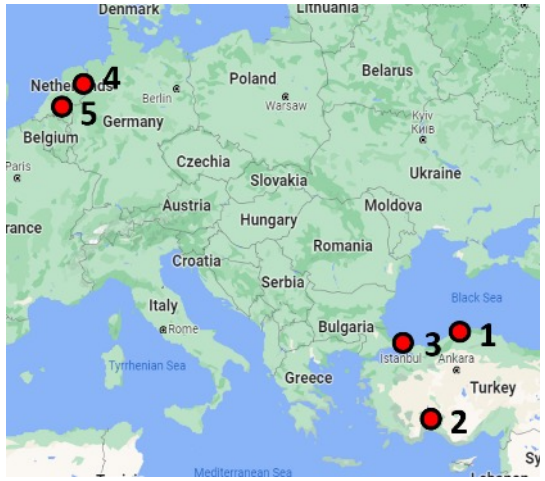
Carla event - Integrated photonics
Public presentation

Ece Demirer
Researcher in Optics and Photonics competence group

August, 28, 2025
Delft
CREATION DATE: YYYY-MM-DD

Self-intro

Self intro Ece Demirer

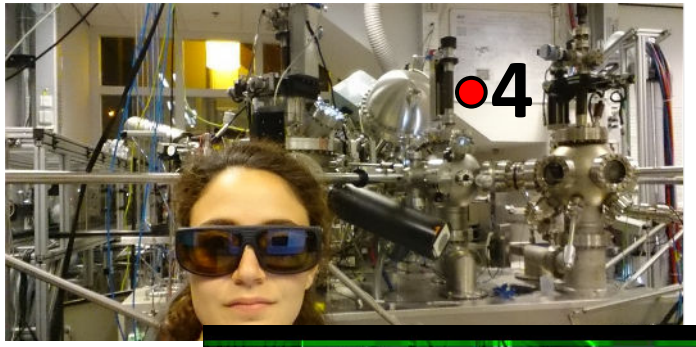


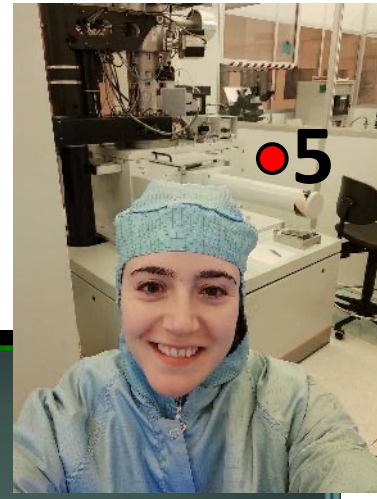
Born and raised in **Turkey**.

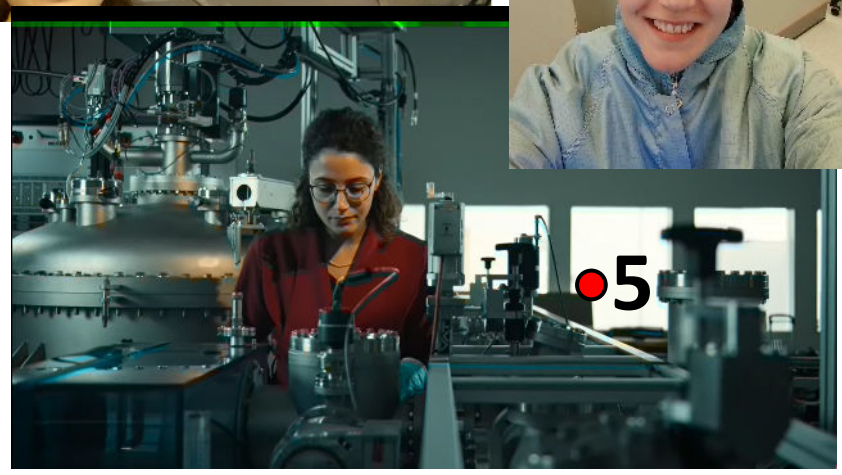
Living in the Netherlands for almost 10 years.

Like dancing, nature and permaculture.

Married and have one son (1.5years).







Bachelors in **Materials Science**, **Sabanci** University, Istanbul Turkey.

Masters in **Nanotechnology**, University of **Twente**.

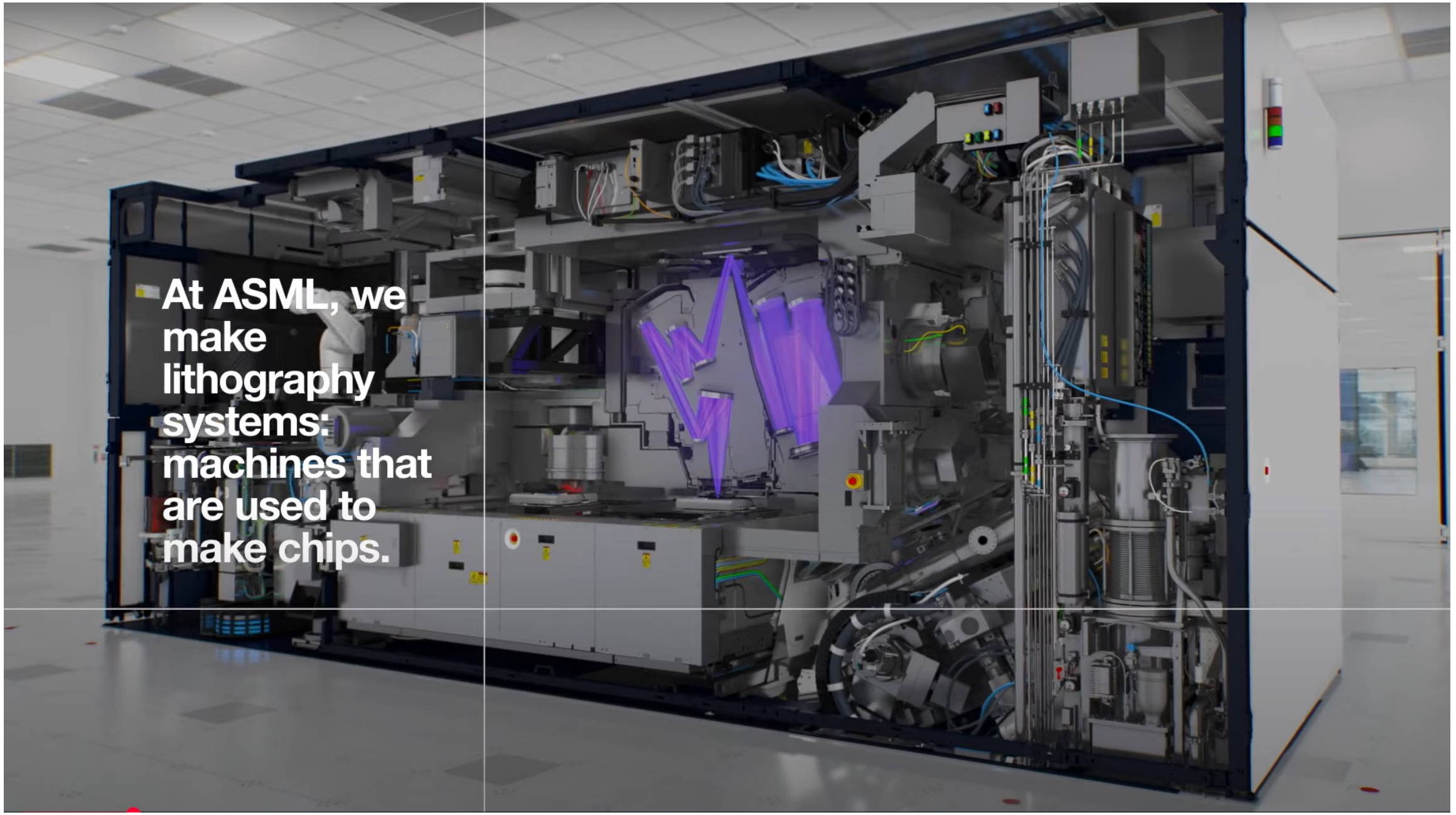
PhD in **Applied Physics**, Eindhoven University of Technology (**TU/e**).

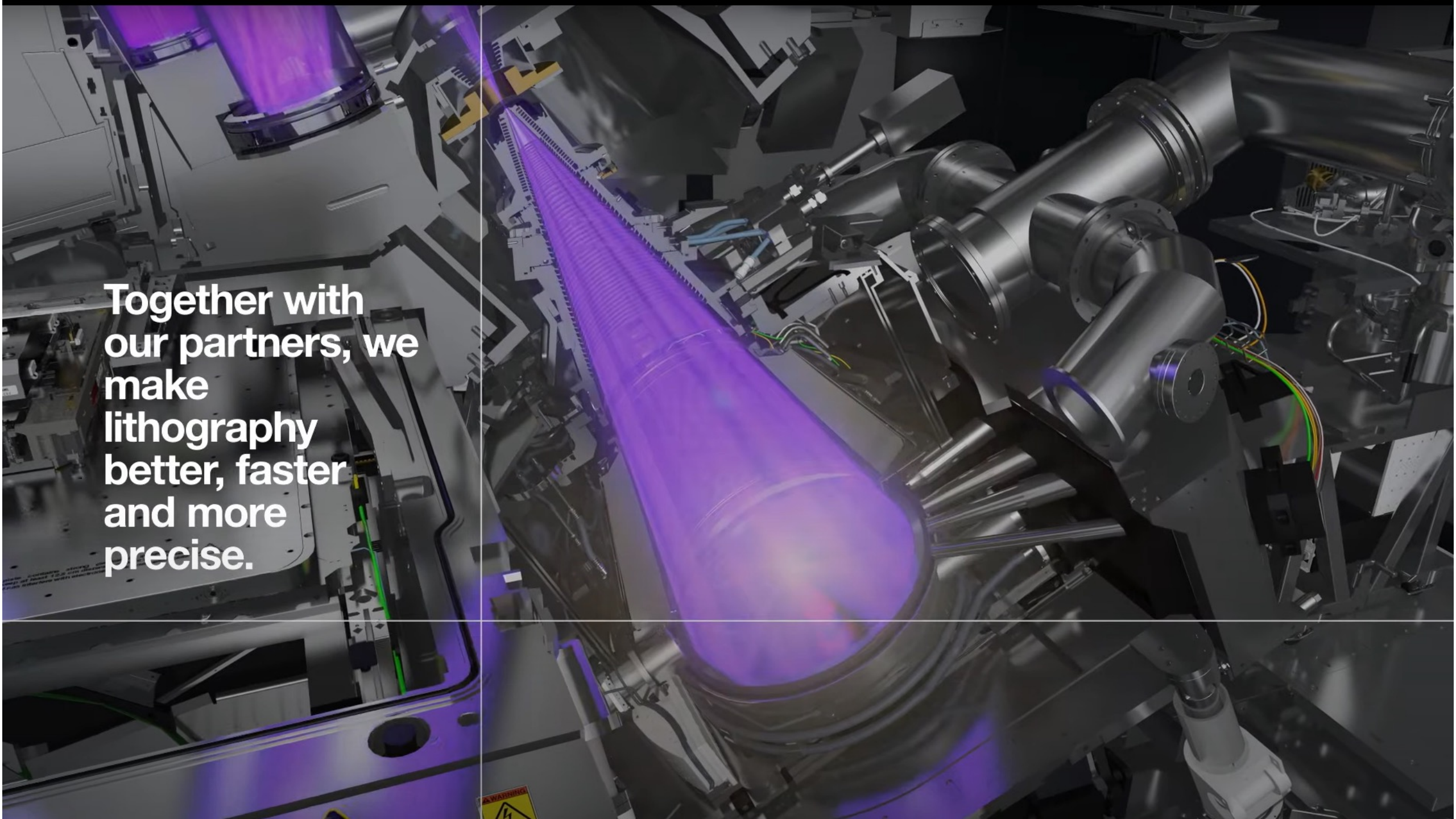
Keywords from previous works:

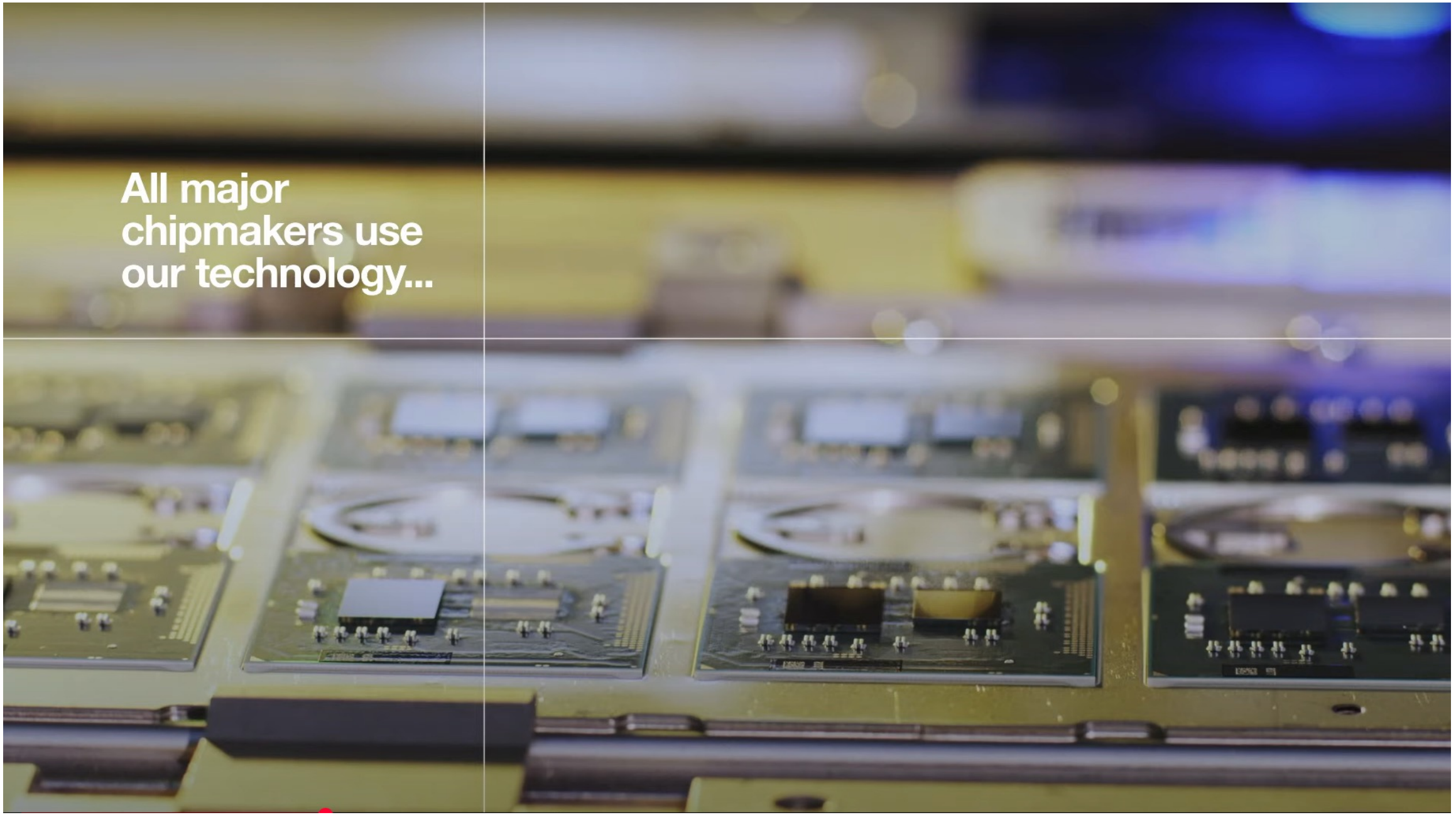
Integrated photonics, Photonic design and modelling, fabrication, testing. Magneto-optic reading of non-volatile magnetic memory.

Materials science and **physics**, thin-film multilayers of metals, magneto-optic Kerr effect (MOKE), cleanroom fabrication techniques, metal and oxide deposition, analytical modelling, data-analysis automation.

ASML and its ecosystem


At ASML, we make lithography systems: machines that are used to make chips.


Together with our partners, we make lithography better, faster and more precise.




That's how we unlock the potential of people and society by pushing technology to new limits.
module 01
module-02
module-03
ASML

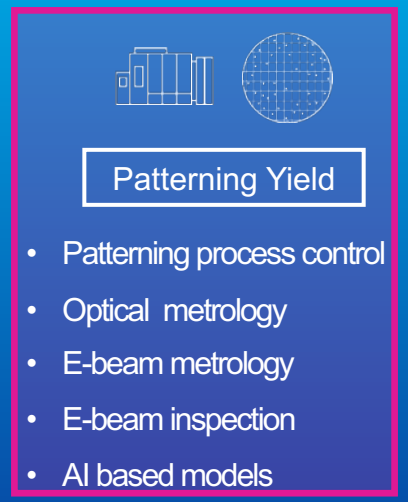
Innovation ecosystem from design to manufacturing

Innovation domain at ASML

Holistic lithography enables our customers to maximize Good Wafers per Day

Our product portfolio focuses on Patterning Yield and Accuracy

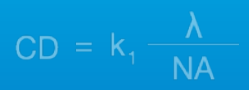
ASML Holistic lithography value =



Patterning Yield

- Patterning process control
- Optical metrology
- E-beam metrology
- E-beam inspection
- AI based models

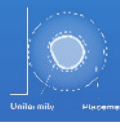
×



Resolution

- Advanced ArFi
- EUV 0.33 NA
- EUV 0.55 NA

×



Accuracy

- Overlay
- Local CDU
- Edge Placement Error (EPE)

×

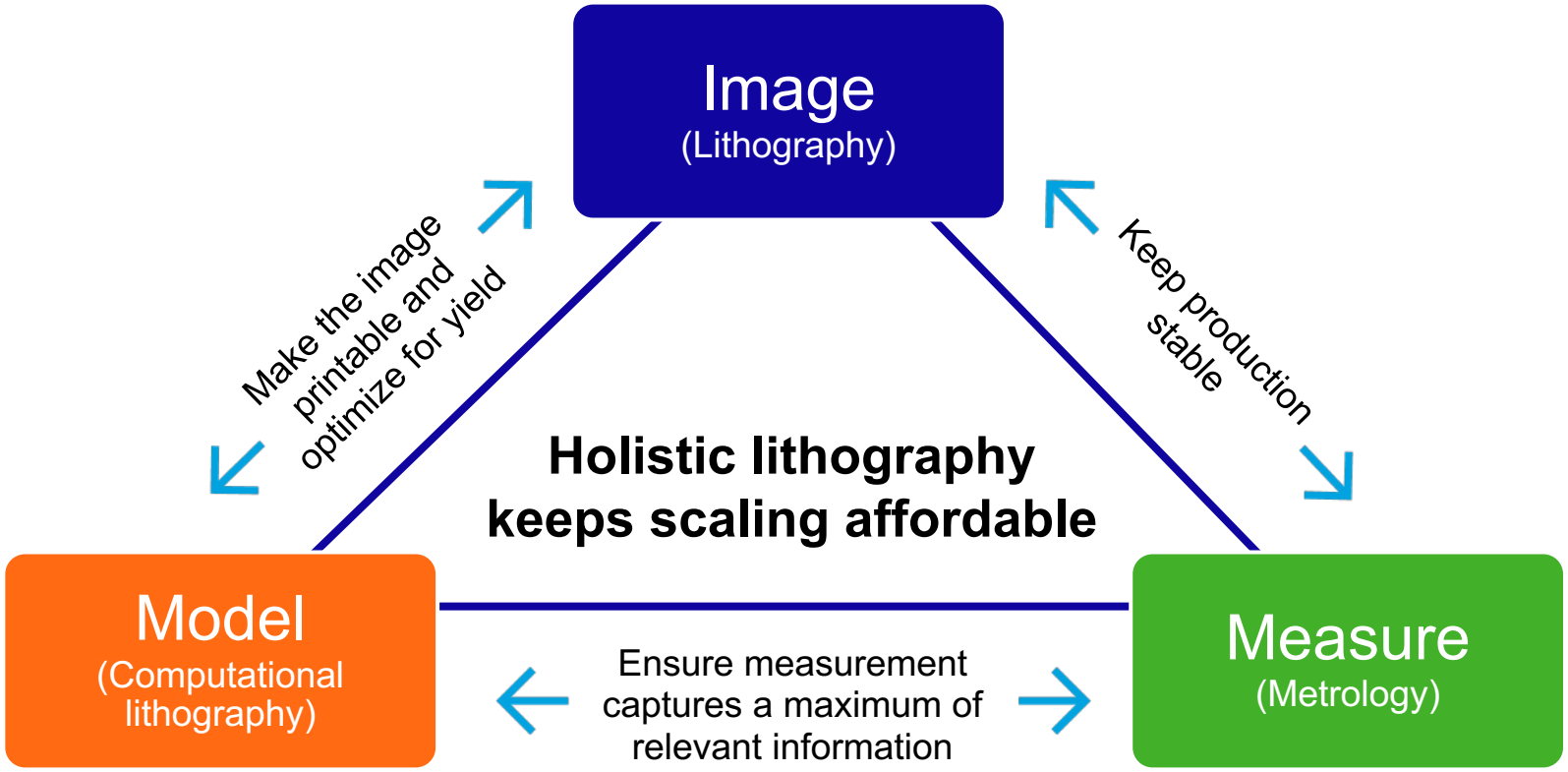
Productivity

- System Throughput
- Overall equipment efficiency

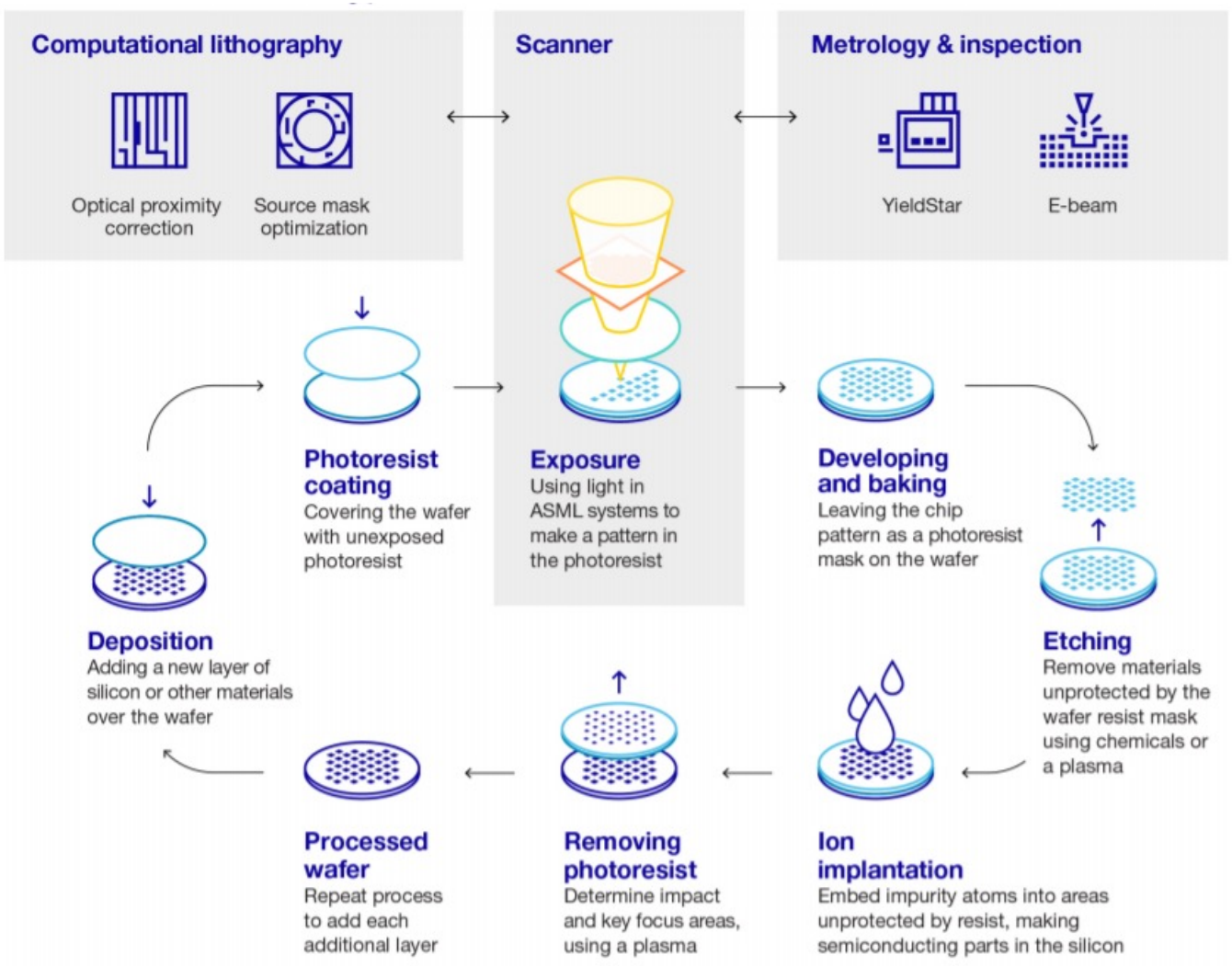
System cost / Lifetime + Operational cost + Environmental cost

1 Ton CO_2 = 200 EUR

A tightly integrated set of solutions for scaling and yield

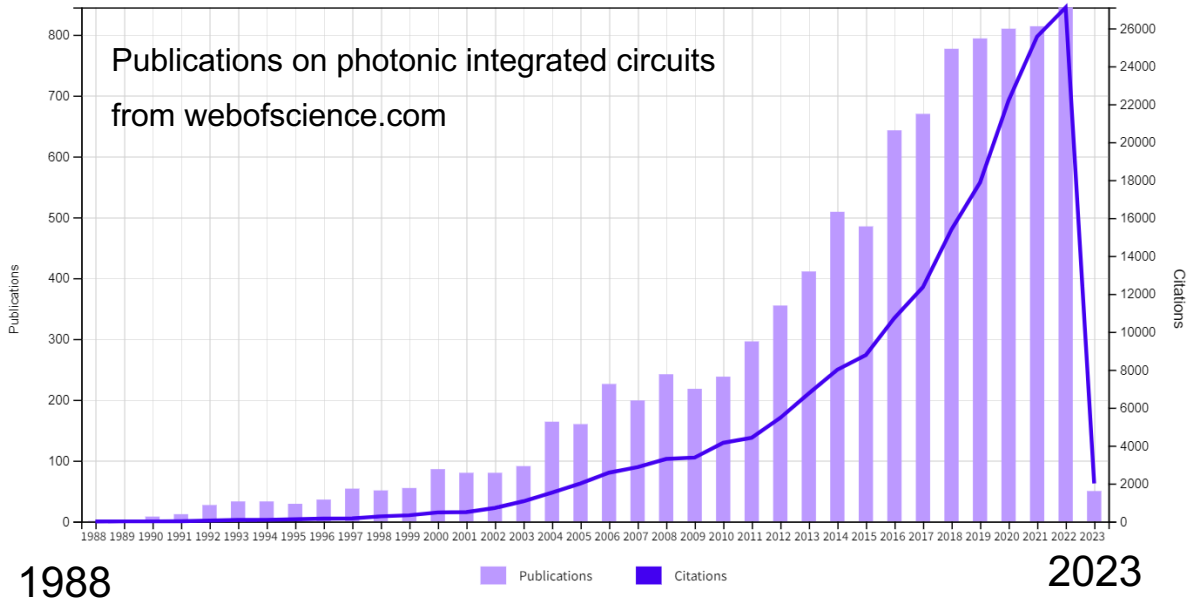


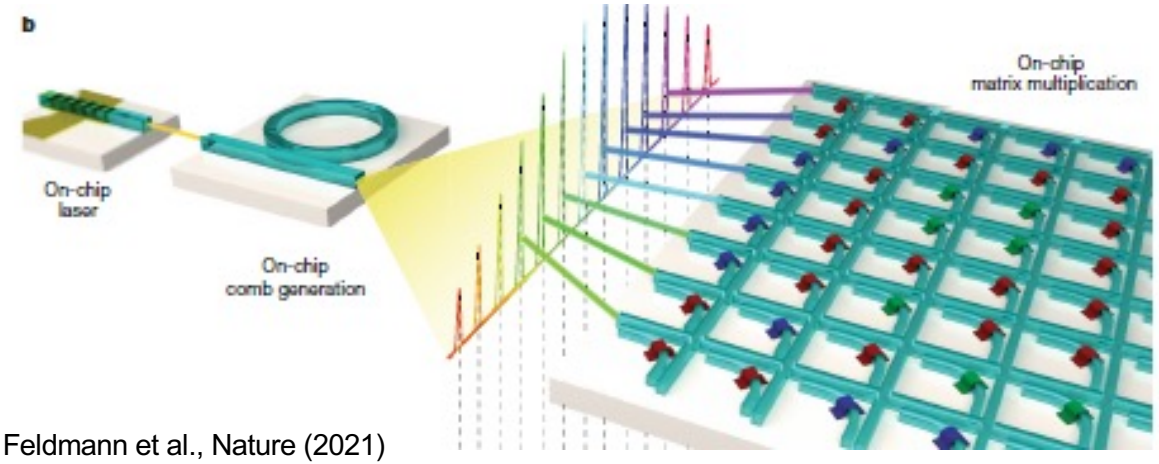
The semiconductor manufacturing loop



Integrated optics/photonics

Integrated Optics & Photonics is an active research field

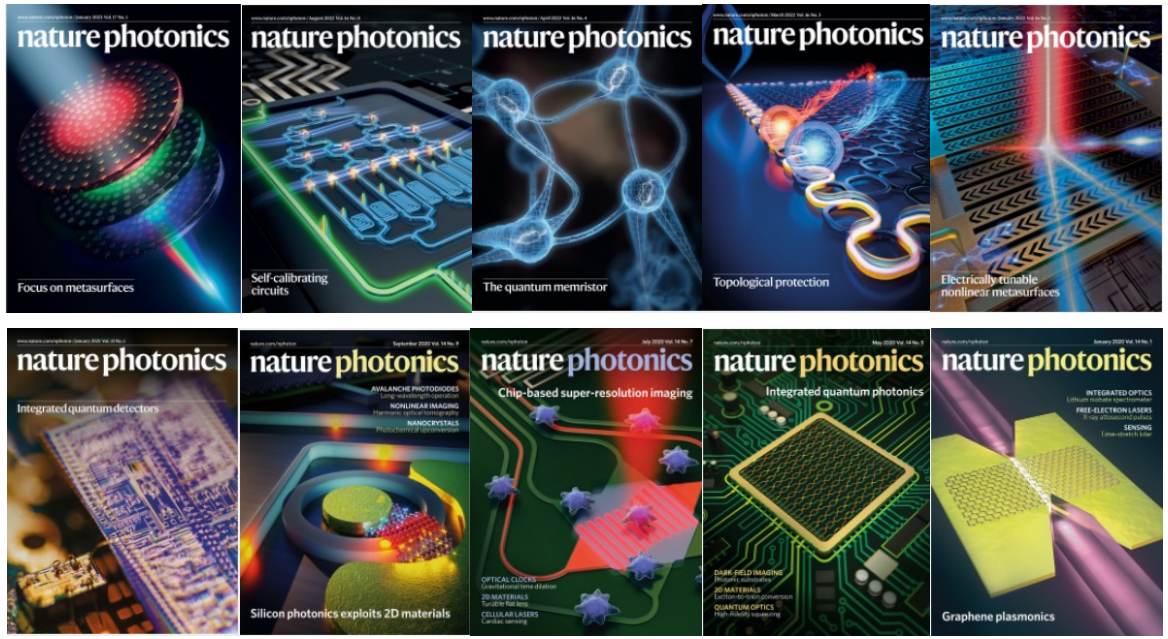




J. Feldmann et al., Nature (2021)

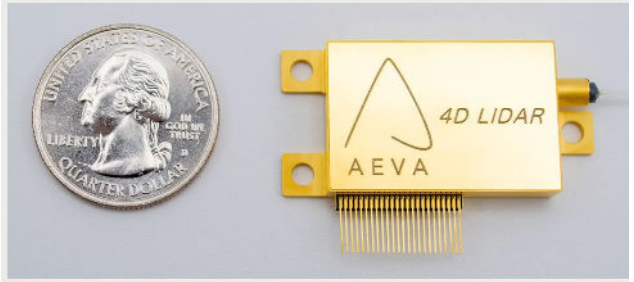
A collection of Nature Photonics covers since 2020 on integrated photonics

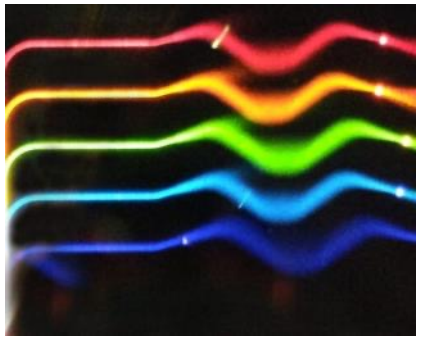
Topics cover sensing, computing, quantum optics, new materials



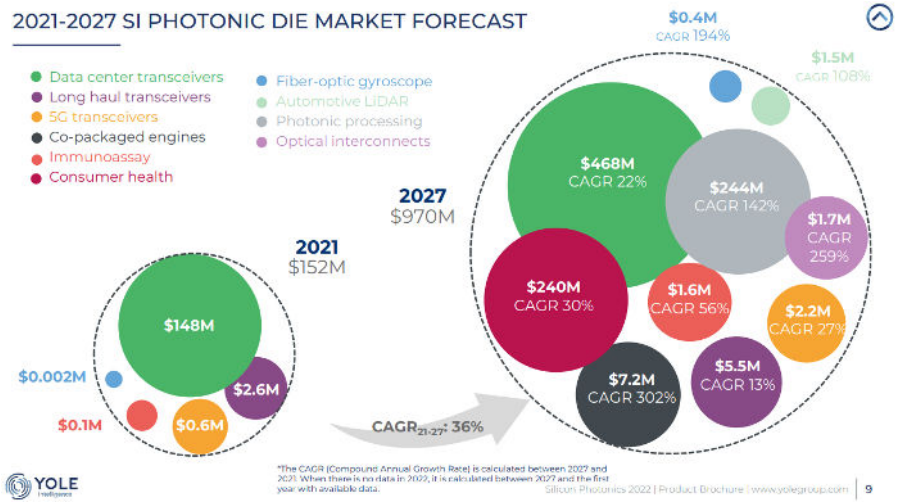
…and is growing as an industry

Aeva Unveils Lidar on a Chip ›Aeva says its high-performance lidar will sell for less than US $500; VW is buying it



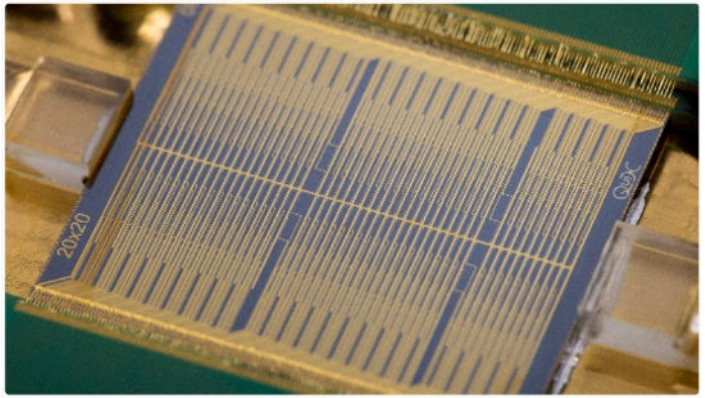


Lionix: Wavelength splitters

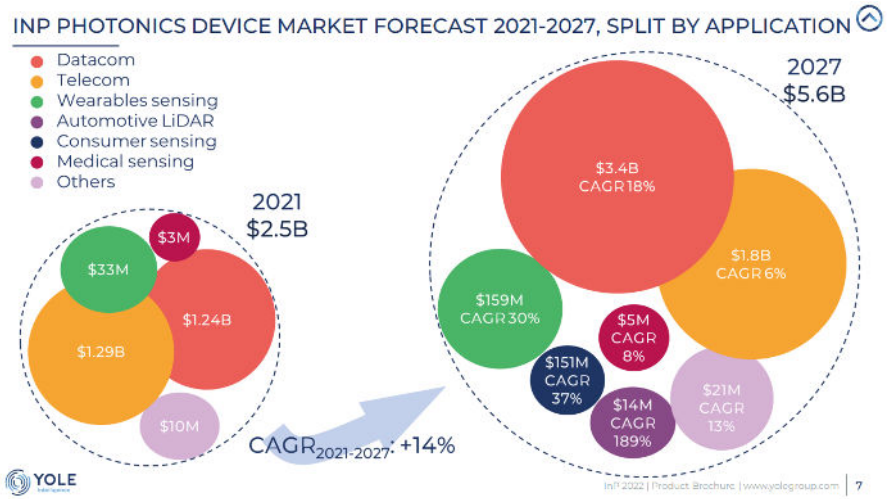


QuiX Quantum delivers a quantum photonic processor for Europe

SELECTED 12 MAY 2022



QuiX Quantum has realized the largest quantum photonic processor compatible with quantum dots for the European project PHOQUSING, says Quix Quantum in a press release.



PhotonDelta Lands €1.1 Billion To Usher in a New Generation of Semiconductor Technology

14 April 2022

Eindhoven, Netherlands - PhotonDelta, a cross-border ecosystem of photonic chip technology organisations, has, subject to conditions*, landed €1.1 billion in public and private investment to transform the Netherlands into the leader of next generation semiconductors.

Integrated optics @ ASML

- Integrated optics opens up a new design space not available in conventional optics, resulting in:
  - New applications which are possible only with integrated optics
  - Cost Of Goods / miniaturization benefits.

With academic partners, focus on long term research:

- Alternative methods of coupling light in / out of a chip broadband
- Investigate different platforms for going to lower wavelengths
- Further integration on chip, light sources, detectors,..
- Feasibility on new applications

- Coupling of light from free space into waveguide and vice versa (FreeSense, TU/e and micro mirror, UT)
- Shaping illumination properties (PICOSTAR, TU/e and UT)
- Photonic waveguides and modulators for UV radiation (UT)

We create relevant IP:

It is an emerging field, many possibilities

Collaboration with academia, published works

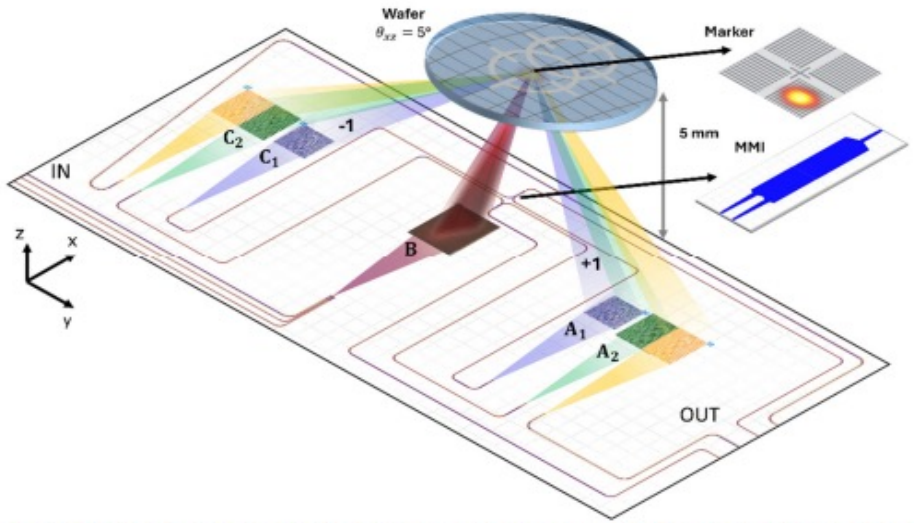
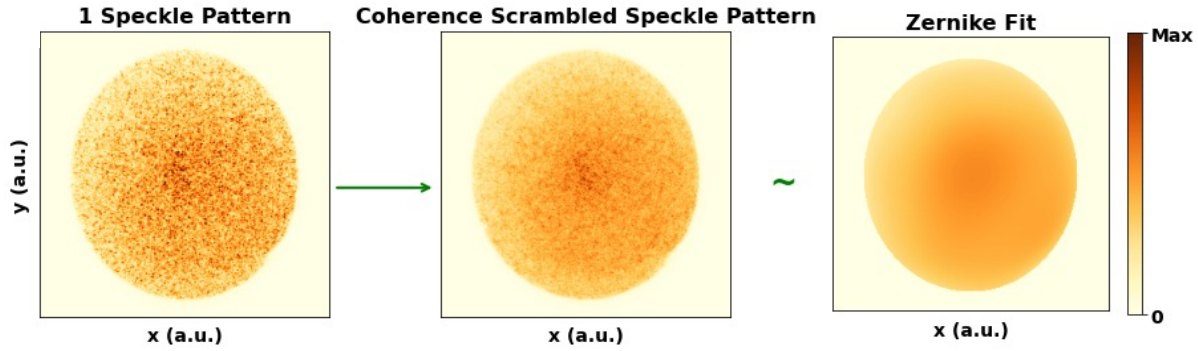


Figure 7.3 Illustration of the Alignment Sensing circuit on the TriPlex platform. A tri-wavelength emitter focuses light to an alignment marker on a wafer for 635 nm, 780 nm and 850 nm. The alignment marker reflects a +1 and -1 diffraction order. Multiple receivers capture the light for each wavelength. An MMI interferes the light from the diffraction orders to obtain the y-position of the marker.

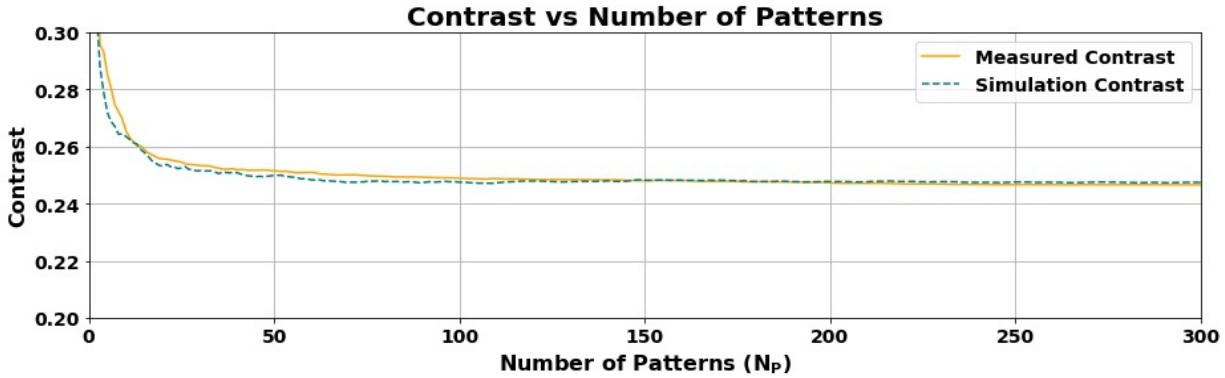
[Photonic Integrated Multi-Wavelength Free-Space Couplers for Gas and Metrology Sensors]

D De Vocht - 2025



Speckle contrast: from 1 to 0.25 for monochromatic case---decreases with bandwidth as $1/\sqrt{\Delta\nu}$

PowerHomogeneity: From 3.3 to 0.957



Source: B. Molero Agudo, I. D. Setija, and M. J. R. Heck, "Coherence scrambling using an integrated optical phased array and a multi-mode fiber," *in Proc. European Conf. on Integrated Optics (ECIO)*, 2025.

B. Molero Agudo

Masters internship and end-project opportunities at ASML

An always open, broad application link to apply

[Be part of progress]

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Photonics Career Event
Delft

Silvia Booij
Signify

ICFO

PHOTONICS21
PHOTONICS PUBLIC PRIVATE PARTNERSHIP

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Optical work at Signify

Silvia Booij

August 28th 2025

Signify is the world leader in lighting

We provide high-quality energy efficient lighting products, systems and services

Light sources	Luminaires	Systems and Services
		
No. 1 Connected, LED, Conventional	**€6.1bn** sales in 2024	**29,000** people in over 70 countries

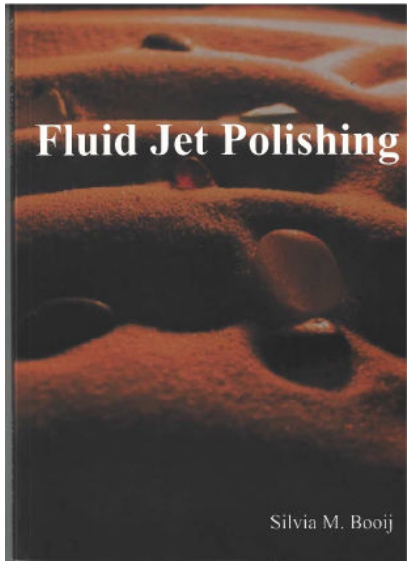
Philips Lighting 2018 Signify

Education

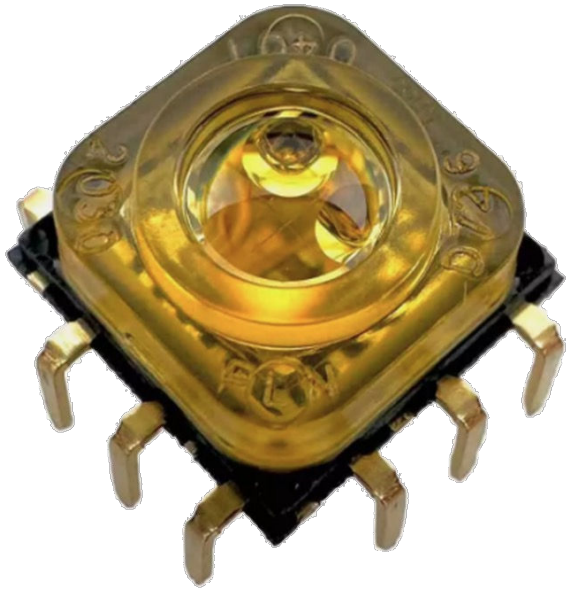
- Technical Physics, TUDelft 1994 - 1999
- PhD: ‘Fluid Jet Polishing’ 1999 - 2003

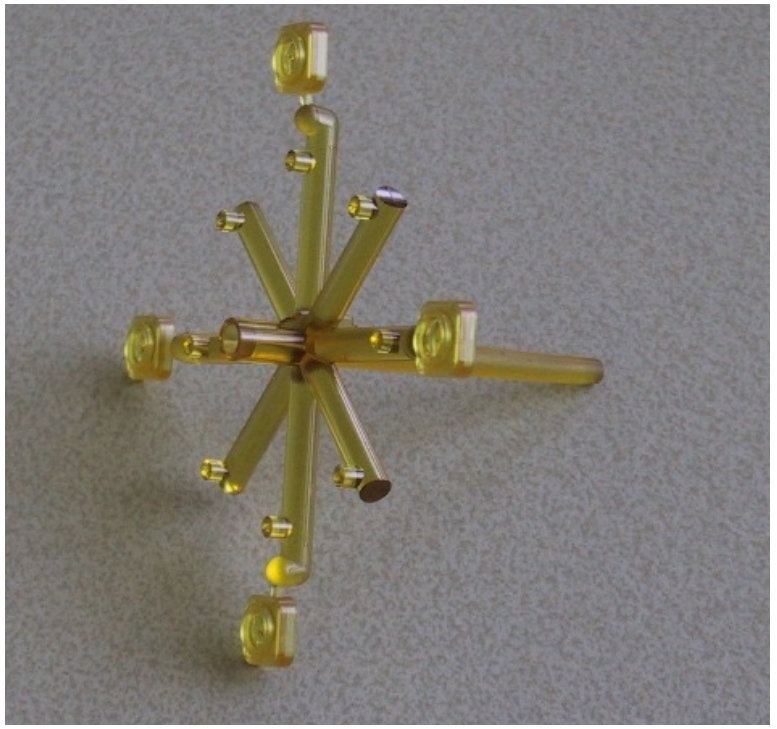
- First job 2003: Philips Center for Fabrication Technology, Optics group, Eindhoven
- Currently Signify Research

- Live in Eindhoven
- Married, 2 kids (15 and 17 yrs)



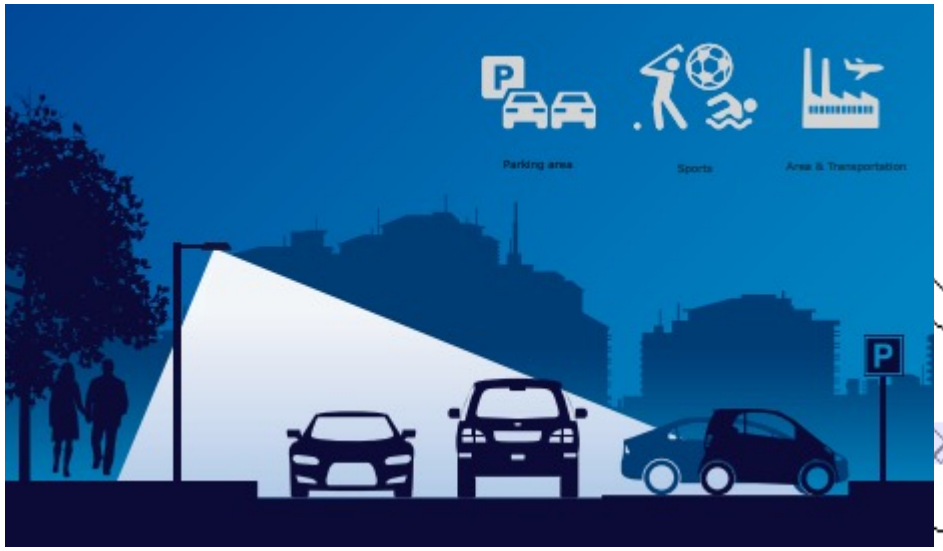
Example project 1: Laser sensor

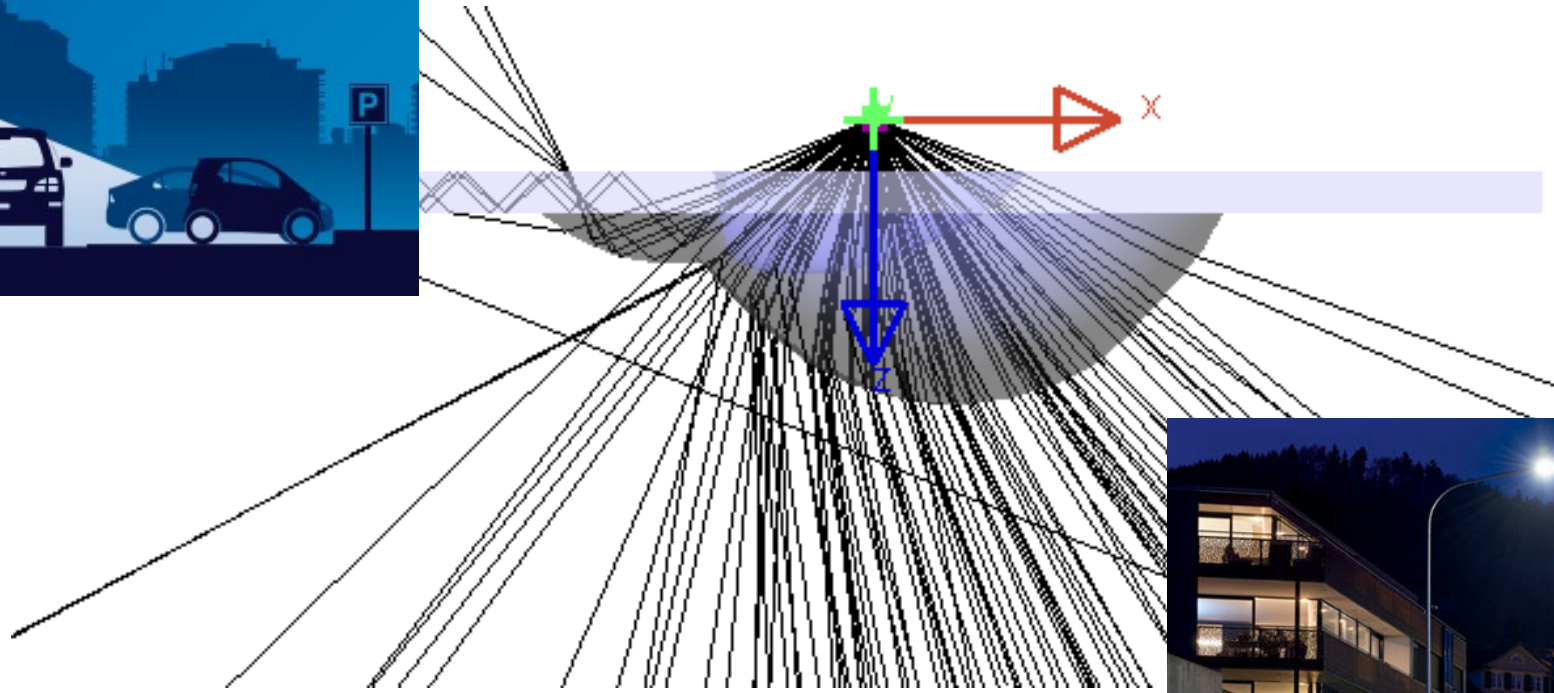




signify

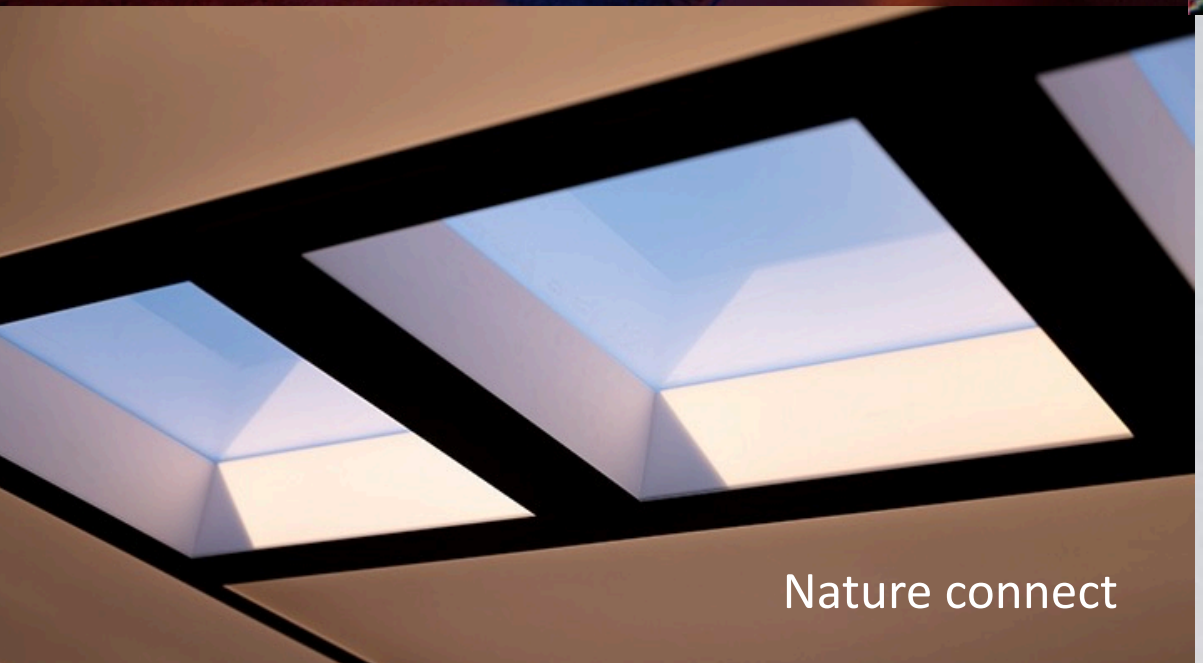
Example project 2: Outdoor lighting

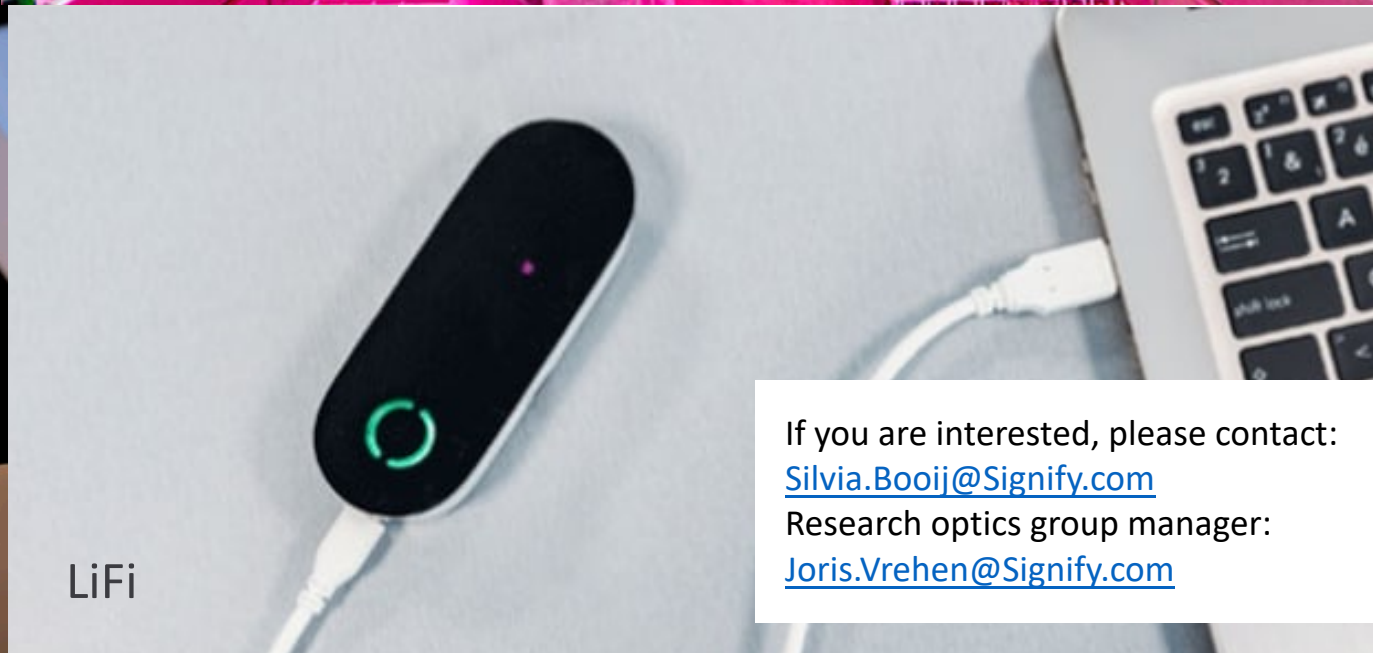




Signify

More optics within Signify





If you are interested, please contact:
Silvia.Booij@Signify.com
Research optics group manager:
Joris.Vrehen@Signify.com

My experience and advice

What I like about my work in the field of optics:

- Diverse assignments
- You can be creative
- You can cooperate with colleagues in different fields and work on your own
- You always learn new things
- Results in real product (in store)

What I advise:

- Find a job where you can do what you enjoy
- Never stop learning, try out new things

Eindhoven is a great place to be if you are interested in technology


signify

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Raj Kumar Nala

Airbus

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Optics and Photonics, Airbus Netherlands

CARLA 2025, TU Delft

Raj Kumar Nalla, Functional Specialist (Optics)

28 August 2025

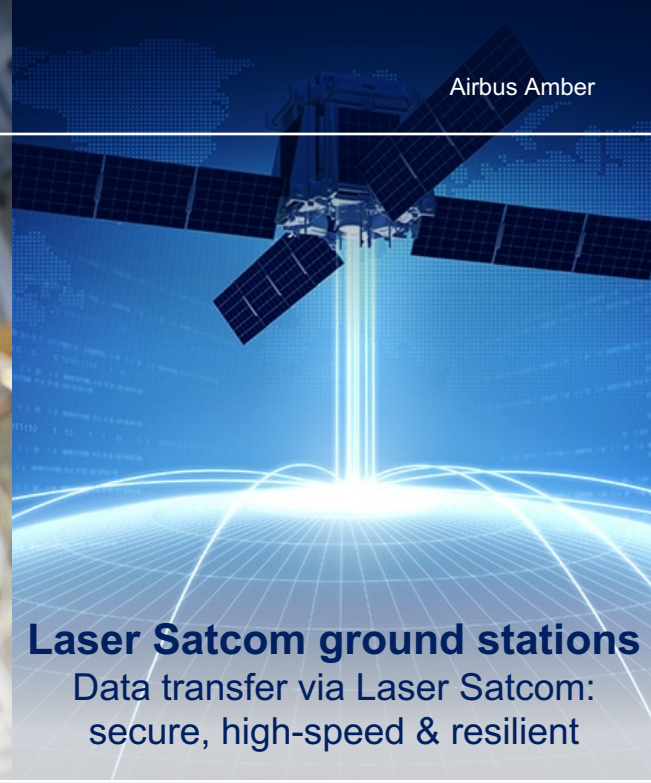
AIRBUS

Airbus NL activities

Solar Arrays
Powering space missions:
from Jupiter to the Moon

Launcher Structures
No European launcher leaves
Earth without NL high-tech

Instruments
Providing insight in greenhouse
gas emissions: worldwide & 24/7



Laser Satcom ground stations
Data transfer via Laser Satcom:
secure, high-speed & resilient

Embedded Training NL Airforce
& Airbus defence portfolio

Multinational MRTT Unit:
operating base @Eindhoven

Critical Mobile Broadband: modern
communications for smart airports

Pioneering
Sustainable Aviation

AIRBUS

Smart people, smart high-tech

>225
employees & contractors

17
different nationalities

17% = ♀

83% = ♂

24%
female in top management

+40%
= younger than 45

75%
bachelor / master level

AIRBUS

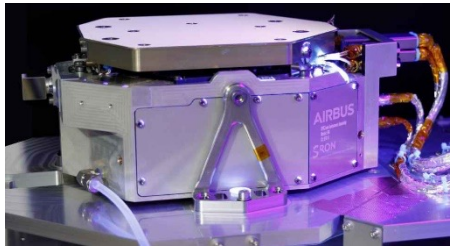
Personal information

- **Name** : Raj Kumar Nalla
- **Nationality** : Indian
- **Education** : Masters in Engineering physics
- **Specialization** : Applied optics/ Photonics
- **University** : National Institute of Technology, Warangal, India.
- **Work experience** : ~16 years
- **At Airbus NL** : Since 2017 (8 years)
- **Current role** : Functional Specialist (Optics)

- **Why Optics & Photonics ?**

- **First optical instruments I built:** A periscope and a Kaleidoscope as a student, for a science fair at the school.

- **Latest optical instrument:** SPEXone, a multi-channel spectro-polarimeter for aerosol monitoring.
  - A Dutch contribution payload to the NASA's PACE mission that was launched in Feb' 2024.
  - Developed by a consortium of Airbus NL and SRON with support from TNO.



AIRBUS

Internships and early career

Internships:

Organization: Bharat Electronics Limited, Machilipatnam, India.

Position: Engineer trainee (2 months)

- An organization, with end-to-end capabilities to design, manufacture, assemble and test optical systems for defense applications.
- Offered exposure to all aspects of optical systems design and development.

Organization: Laboratory for Electro-optics systems/ Indian Space Research Organization (ISRO), Bangalore.

Position: Intern(6 months)

- A key organization under ISRO, responsible for all the optical technologies for Indian Space missions.
- My first introduction to space optical instrumentation, challenges and opportunities.

First Job:

Organization: Indian Institute of Astrophysics, Bangalore.

Position: Optical Engineer (2009-2017)

- A research organization in the field of Astrophysics and instrumentation.

Projects:

Ultra Violet Imaging telescope (UVIT) onboard Astrosat-I mission, launched in 2015.

Visible Emission Line Coronagraph (VELC), onboard Aditya-I mission, launched in 2023.

Career at Airbus NL

At Airbus NL, two key business units employs the optics and photonics technologies.

- **Instruments and Information:** Develops high performance earth observation instruments to monitor earth's atmosphere for various green house gases. **Heritage:** OMI, Tropomi, SPEXone etc.
- **Communications and Control Systems:** Develops optical ground stations to facilitate future high-capacity free-space optical communication links with LEO and GEO satellites through earth's atmosphere. **Projects:** CREOLA**,** Eagle-1, HydRON.

Typical work includes:

- Design and develop optimal optical solutions to meet the customer requirements and build future products.
- Design and analysis.
- Continuous collaboration with team of experts in different fields of engineering.
- Manufacturing, procurement, integration, calibration, verification, validation.
- Collaboration with various industrial and research organizations in NL and Europe as a part of various consortia.
- Schedule, budget and quality.

What I enjoy:

- Collaboration with the team and the continuous learning all the projects offer.
- Seeing your designs come to life at the end of a project and celebrating the success with colleagues.

- Airbus NL provides the opportunity to work on developing the cutting-edge technologies and solve impactful real-world problems.

AIRBUS

Career advice

- Optics and photonics technologies continuous to offer solutions to many real-world problems and provide excellent career opportunities.
  - Space exploration
  - Communications
  - Medicine
  - Manufacturing etc.

- Good knowledge of the following will be a great asset to posses,
  - Optical design
  - Optical manufacturing technology
  - Optical metrology

- Focus on upcoming technologies like meta-optics, adaptive optics, quantum communications, high power laser amplifiers, integrated optics.

- Do not hesitate to walk into the lab and experiment with lasers, optics, sensors and build things.
- Internships, student projects in the industry is always a good launchpad to your career.

- Develop multi-disciplinary skills, it is highly valued in industry. Offers you the flexibility and provides a unique advantage.
- Developing entrepreneurial mindset, will benefit the individual and the organization one works for. Can tremendously accelerate ones career.

Thank you

AIRBUS

360 Carla
Manufacturing
Industry 4.0

Photonics Career Event
Delft

Angelica Presenti

Single Quantum

ICFO

PHOTONICS21
PHOTONICS PUBLIC PRIVATE PARTNERSHIP

This project has received funding from the European Union Horizon Europe research and innovation program under grant agreement No 101135838.

CARLA 2025

Career pitch

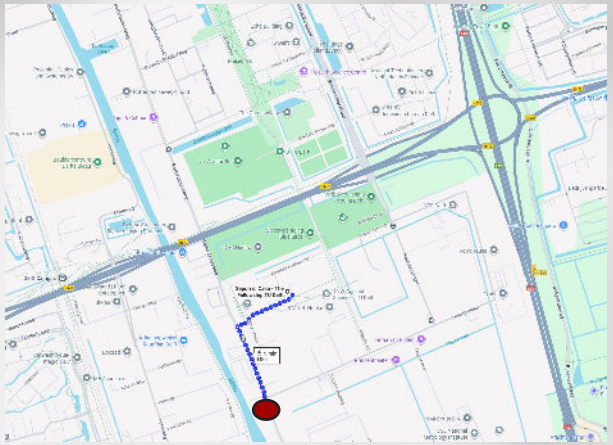
Angelica Presenti
System Test Engineer at Single Quantum

SINGLE QUANTUM
Excellence in photon detection

Overview

- Single Quantum SNSPDs
- My background & what brought me here
- How can I help you?

Single Quantum
(Rotterdamseweg 394, 2629 HH Delft)

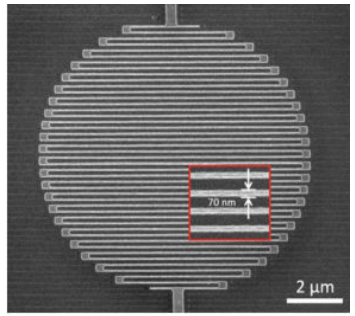


Mission:

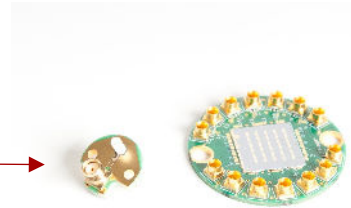
To make the world's fastest and most sensitive light sensors limited only by the laws of physics.

Superconductive Nanowire Single Photon Detectors (SNSPDs)

Nanofabrication



Mounting & Bonding

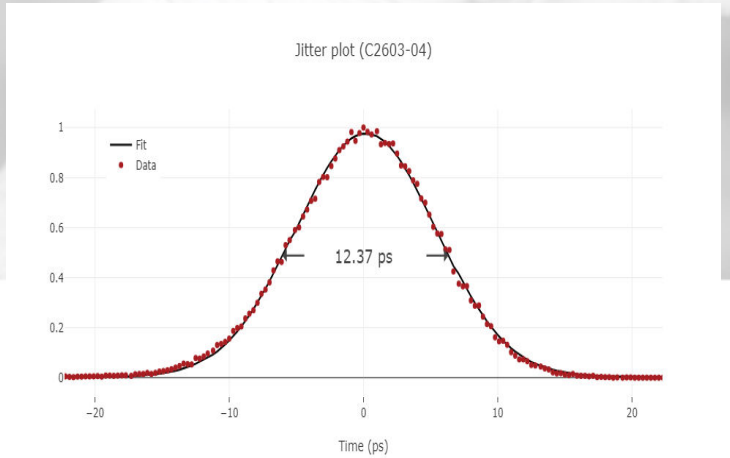


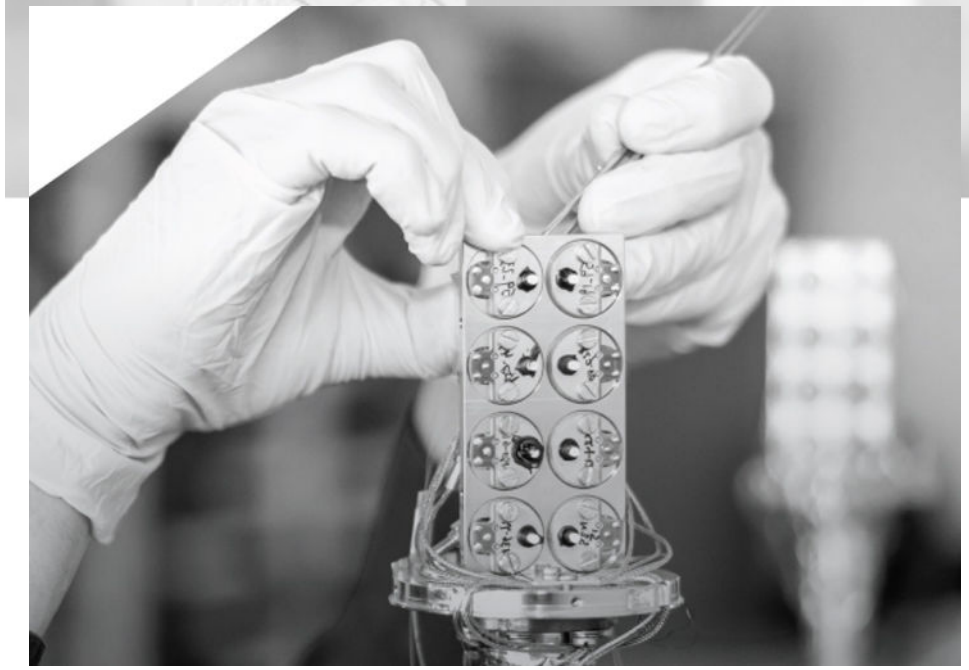
Assembly & Testing

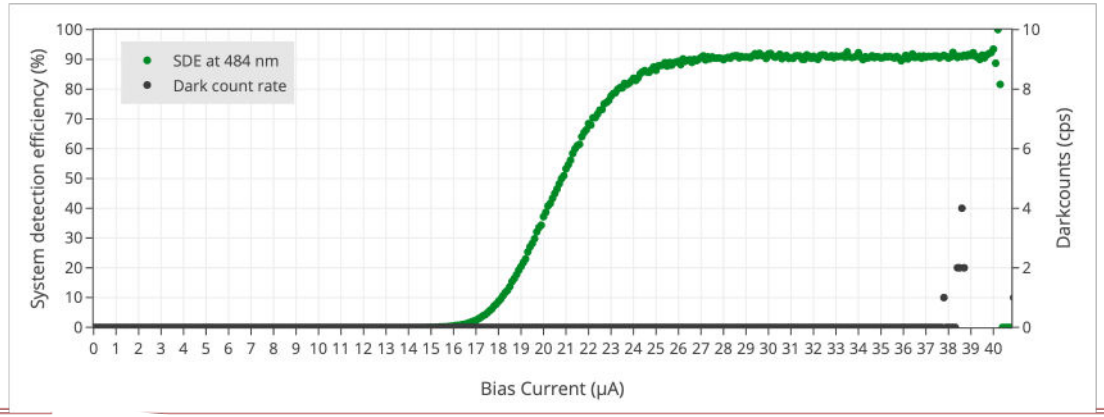
SINGLE QUANTUM

System Test Engineer

- (some) Day – to – day tasks:
  - Test Efficiency of the detectors: measuring the ratio between the photons detected by the detectors and the number of photons at the input, at a specific bias current
  - Jitter measurements: the variation in delay between the absorption of a photon and the generation of an output electrical pulse
  - Troubleshooting (and a lot of it!): laser setups calibration, electrical noise, mechanical issues (pumps, cryostats), transmission losses
  - Research (& Development)
  - Spend a lot of time in the dark ☺







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How did I end up here? I GENUINELY HAVE NO IDEA SOMEBODY SAVE ME

- Background: Master in Electronic Engineering with Nanotechnology at the University of York (England)

➢ Placement Year: Nanofabrication Engineer of Graphene Devices in Delft (because, you know, Brexit) at *Applied Nanolayers*

Else Kooi Laboratory

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Why Photonics (and testing of SNSPDs)

- Desire to see the other end of production: I learned nanofabrication, how do different processes and designs affect the performance of devices?
- Photonics has some of the coolest application of engineering: medical imaging, deep space communication and photonic quantum computers (photonic qubits)

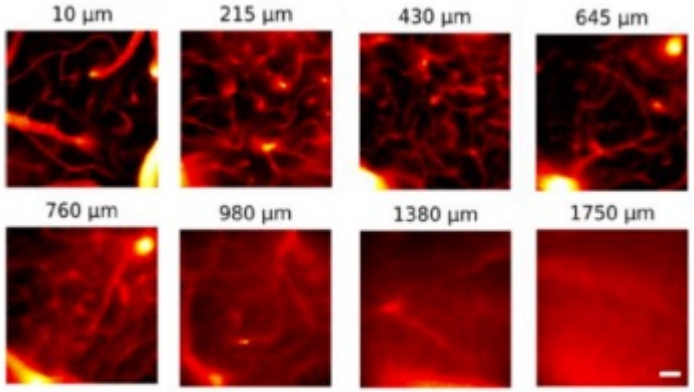
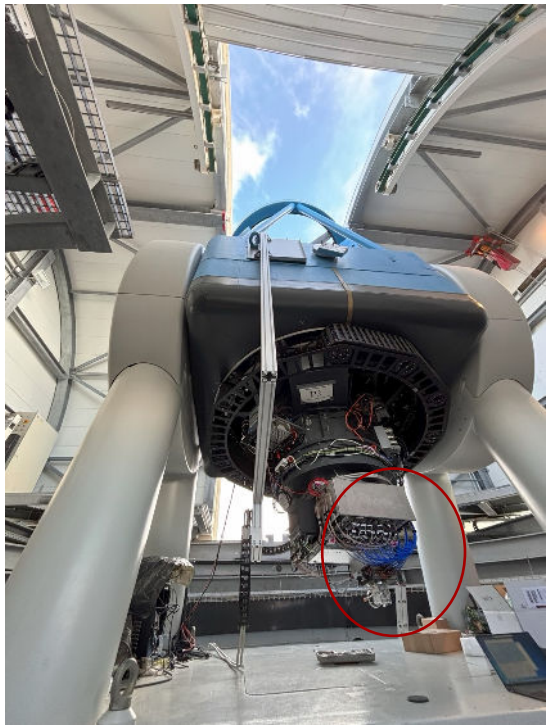


*Fig.2: **Imaging the brain at SWIR range**. Confocal images of the intact mouse brain using SNSPDs as detectors. Scale bar: 50 µm. Reprinted (adapted) with permission from [1]. Copyright 2021 American Chemical Society.*

Detecting faint fluorescence signals from deep within the brain (nerves structure)

NVIDIA is reportedly in talks to invest in PsiQuantum, a company focused on building a photonic quantum computer



The Ground Laser Receiver at the Helmos Observatory

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How can I help you?

- Read papers on Photonics!
  - F. Xia, et. al. "Short-Wave Infrared Confocal Fluorescence Imaging of Deep Mouse Brain with a Superconducting Nanowire SinglePhoton Detector". ACS Photonics 2021, 8, 9, 2800–2810 (2021).
  - Huang, C., Sorger, V. J., Miscuglio, M., Al-Qadasi, M., Mukherjee, A., Lampe, L., … Shastri, B. J. (2021). Prospects and applications of photonic neural networks. *Advances in Physics: X*, *7*(1).
- Learn about lasers and how fun they can be!
- I'll be happy to answer questions!

Laser Cut Vin Diesel Ham and Cheese Sandwich
William Osman (go to 5:35)

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