Beyond Silicon: Photonics as the Key to Europe's AI Leadership

Michael Förtsch, CEO, 15.05.2025

SITUATION

The current state of AI can be well grasped by the AI trend of individualized action figures

How long does it take to generate an AI picture with today's compute infrastructure?

A ~0,5 s

B ~2 s

C ~10 s

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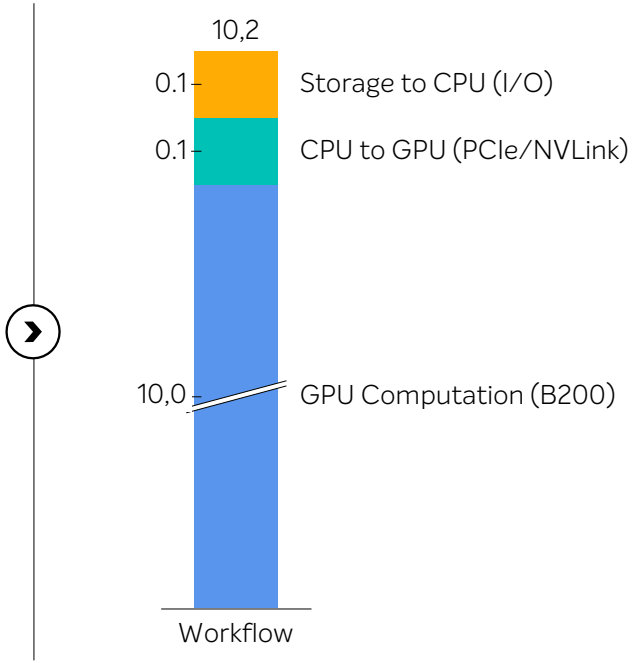


CHALLENGE

This AI trend might bring some fun for Social Media ...

How much can you charge your smartphone with the energy for this AI generated action figure?

A 20 %

B 50 %

C 100 %

CHALLENGE

… but they are for sure not sustainable

How much can you charge your smartphone with the energy for this AI generated action figure?

- A 20 % ✗
- B 50 % ✗
- C 100 % ✓

34 million pictures per day

=

Energy of a midsized city
(~680 MWh)

CHALLENGE

The introduction of AI has demonstrated the scaling limits of classical semiconductors: Energy consumption and performance

Several bottlenecks will become major obstacles

1. **Performance**: The digital compute architectures are at the end of their technology cycle.
2. **Energy**: The energy demand of data centers will bring existing power infrastructure to its limits.
3. **Geopolitics**: Limited production capacity gives oligopoly power to a handful of companies.

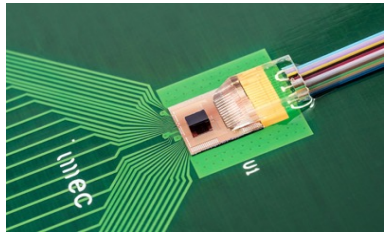
Photonics is the solution to all three limitations.

SOLUTION

Integrated Photonics is the key technology to reduce energy consumption and push performance of AI systems

Data transport …

…Shift to Optical Interconnects (TRL 8)



Source IMEC

- Co-Packaged photonics enable a significant higher data bandwidth than traditional copper
- Integration from 2026/27 in data centers is taken for granted

Performance

- 8-10x bandwidth on the optical I/O compared to copper

Energy efficiency

- > 3,5 x energy reduction to copper

Compute core …

… Shift to analog Photonic Computing (TRL 6)

Source Q.ANT

- Analog computing realized by photonics processors opens doors for advanced algorithms.
- First co-processor integration for AI acceleration is expected for 2028/29.

Performance

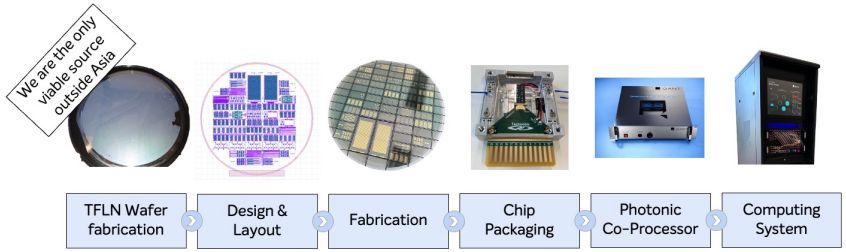
- 50x better performance in 2028 compared to state-of-the-art GPUs

Energy efficiency

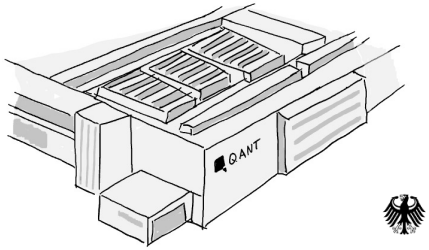
- > 30x energy reduction per Co-Processor for AI

SOLUTION

Q.ANT already demonstrated Europe's capability with its own Thin-film lithium niobate (TFLN) pilot line and the world-first photonic AI processors



We have our own pilot fabrication line running in Stuttgart, Germany



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Federal Ministry of Education and Research

We "upcycled" a 90nm CMOS Foundry to become our pilot line for TFLN Chips – Opening Feb 2025

We demonstrated the first photonic AI processor, which is already operating in first data centers.

CONCLUSION

We cannot change the user habits …

The New York Times
Human Made': Arti…

Perfect Corp.
AI Action Figure: How to Turn Yourself into …

The New York Times
Human Made': Arti…

Mint
How to create free …

RS Real Simple
How to Make Your Own AI-Generated A…

Good Things Guy
Play to Purpose: The AI Action Figure T…

The Verge
ChatGPT is transformi…

Yahoo! Tech
I can't get enough of this amazing AI act…

Perfect Corp.
AI Action Figure: H…

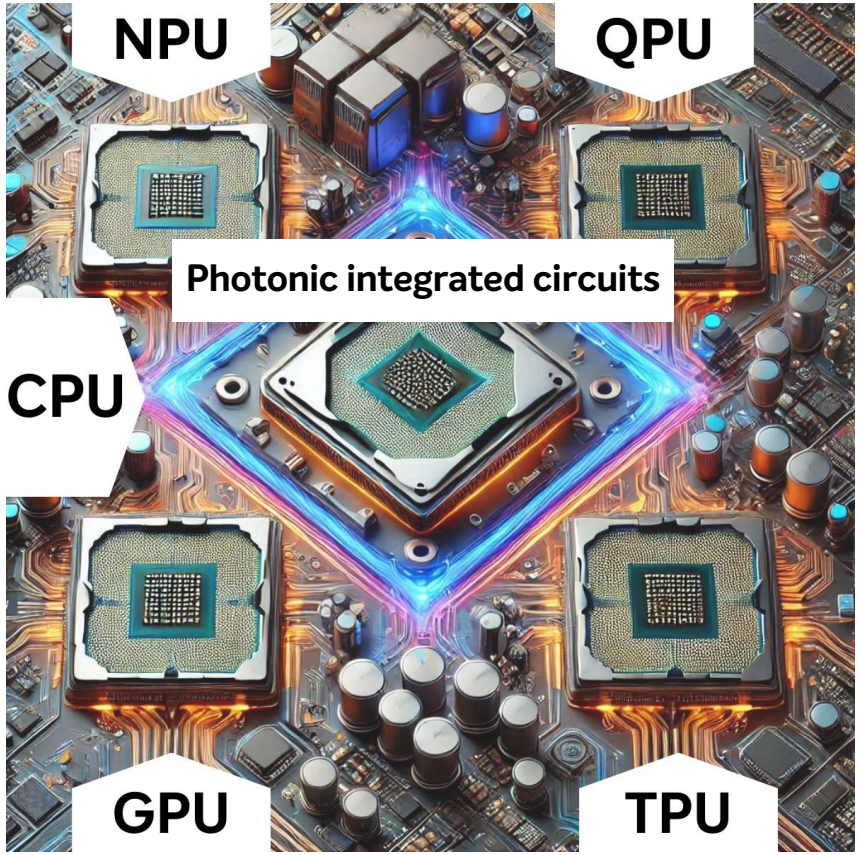
TNW
LinkedIn's AI action figure fad is 'obviou…

Instagram
NIGHT OWL GALLERY …

Mint
How to create free action figure AI imag…

CONCLUSION

… but we can change the Compute Architecture to more energy efficiency and better performance – by Photonics made in the EU



1. Electronics will continuously be replaced by photonics in the compute architecture.

2. Photonic based data transport and computing will define the next generation of high-performance computing.

"Once in a lifetime" chance to re-strengthen Europe's importance in the compute industry.

Let’s Q.ANT it
Let’s do energy-efficient high-performance computing

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