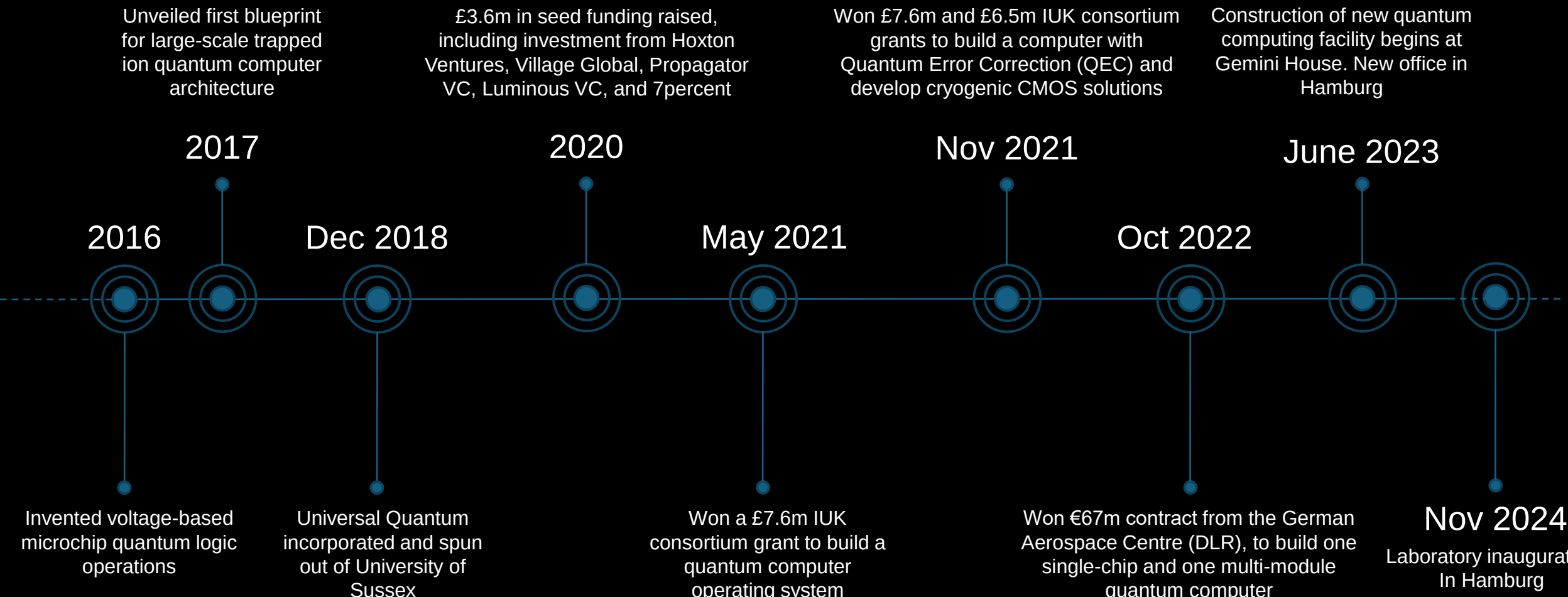
Universal Quantum

Our mission is to build scaled quantum computers to solve the world's most complex problems

TQCI Seminar

November 2024

Our story is lead by passionate scientists and engineers

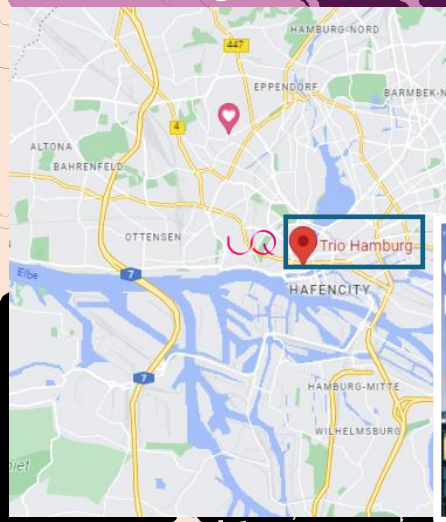


We are now a team of 70+ across Europe and the US

US
- Currently located in Palo Alto

UK
- UQ headquarter in Haywards Heath
  - Easy access to London, Brighton and airports
- Additional facilities in Brighton (Sussex University)

Germany
- Universal Quantum Deutschland based in Hamburg
- Building two quantum computers for DLR in Hamburg



The UK trusts us to build them the first error corrected quantum computer

Consortium grant value(1)	**£7.6m**	**£6.5m**	**£7.6m**
Scope	Developing the first truly scalable error corrected quantum computer	Development of cryo-CMOS to enable the next generation of scalable quantum computers	Building the quantum operating system for every quantum computer worldwide
Consortium partners/ suppliers	Rolls-Royce, SIA Partners, QURECA quantum resources & careers, University of Sussex, Imperial College London, river lane, Diamond Microwave, Edwards	surecore, Synopsys, Emiwise, Oxford Instruments, University of Glasgow, seeqc	arm, Hitachi Inspire the Next, oxford ionics, OQC, NPL, river lane, seeqc

(1) Universal Quantum receives £4.1m in cash and ~£13m in 3rd party development costs spent across various consortium members

GERMANY

Germany is the second government that has backed our iQPU and the first to purchase a multi-module quantum computer

Value	**€30m**	**€37m**
	iQPU based single module quantum computer • Up to 100 qubits • 99.9% two qubit gate fidelity • 99.99% single qubit gate fidelity • Error correction capability including working logical qubits	iQPU based **multi-module** quantum computer • >2 modules with up to 25 qubits each • 99% two qubit gate fidelity • 99.9% single qubit gate fidelity • Error correction capability

Our technology is a result of pioneering industry leadership to enable scalability

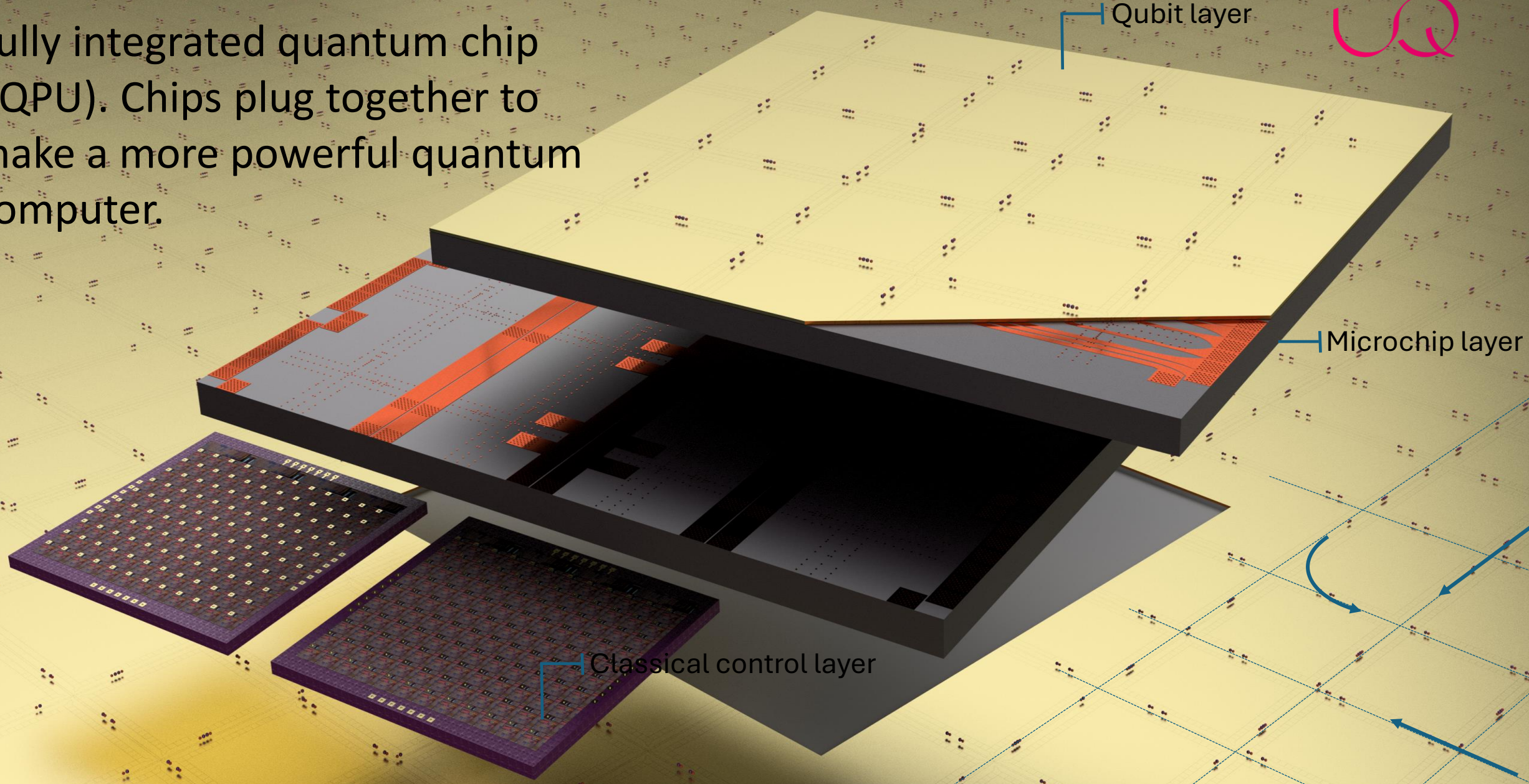
1. **Versatile Microchip**
   Fully connected qubits for more powerful computing vs nearest neighbour architecture competition
2. **Scalable gate technology**
   Voltages applied to a microchip and handful of microwave fields for millions of qubits
3. **Superior interconnects**
   Ultra-fast electric field links between modules facilitating extreme scalability

Our technology combined forms the integrated Quantum Processing Unit (iQPU)

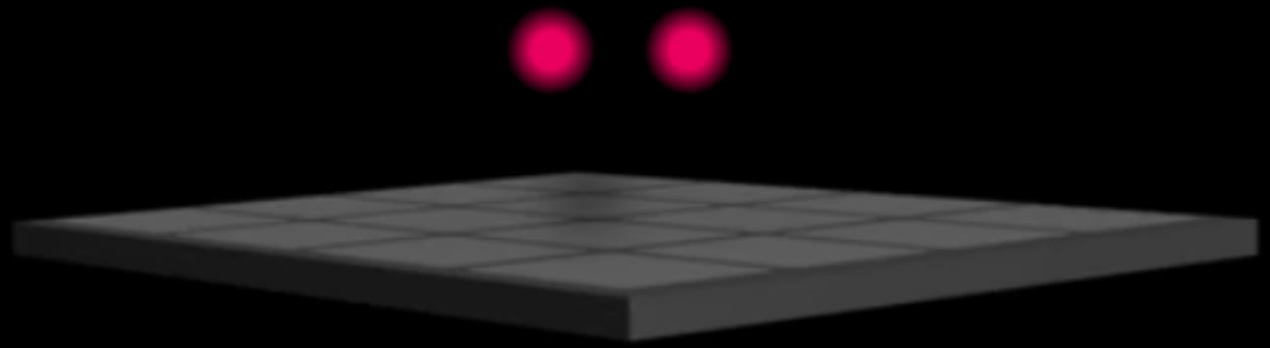
The iQPU can act as a standalone quantum computer or as a piece of a larger ensemble of iQPUs

Our iQPU enables true scalability

Fully integrated quantum chip (iQPU). Chips plug together to make a more powerful quantum computer.



Global Fields Local Gradients



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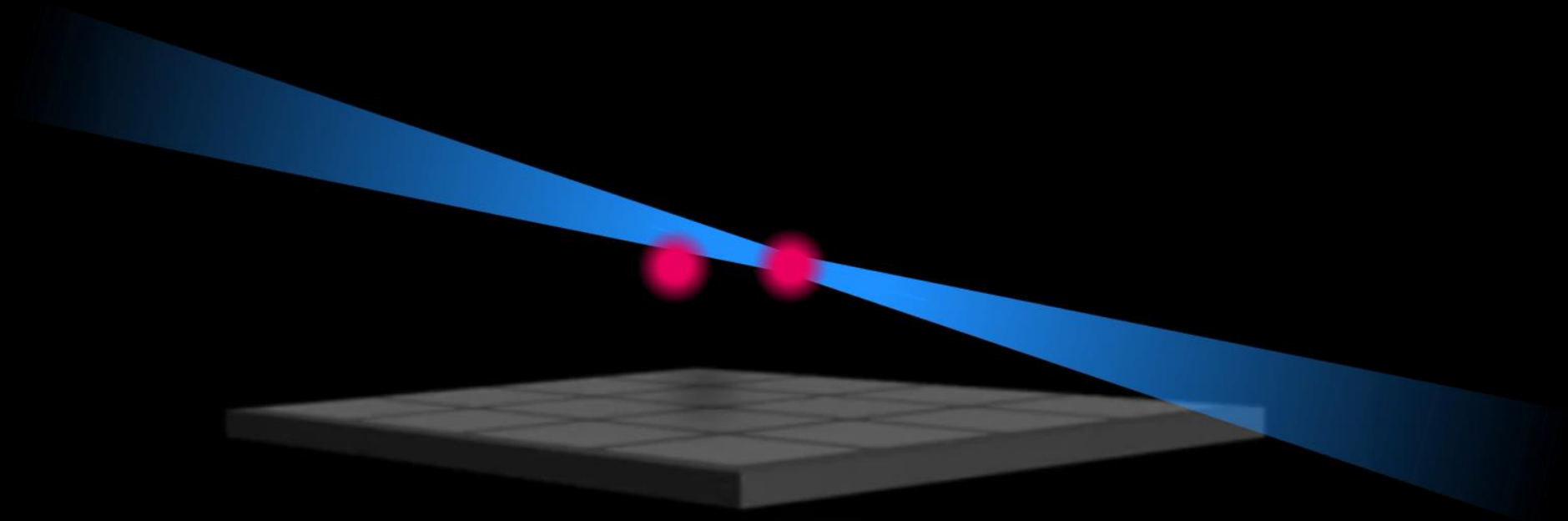

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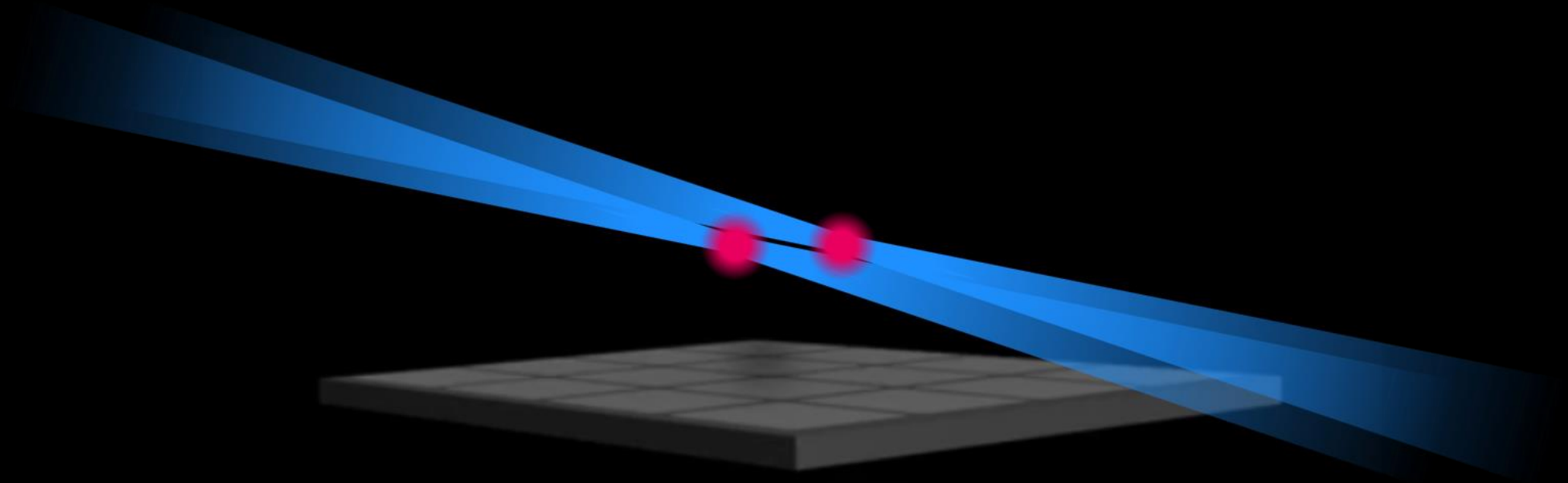

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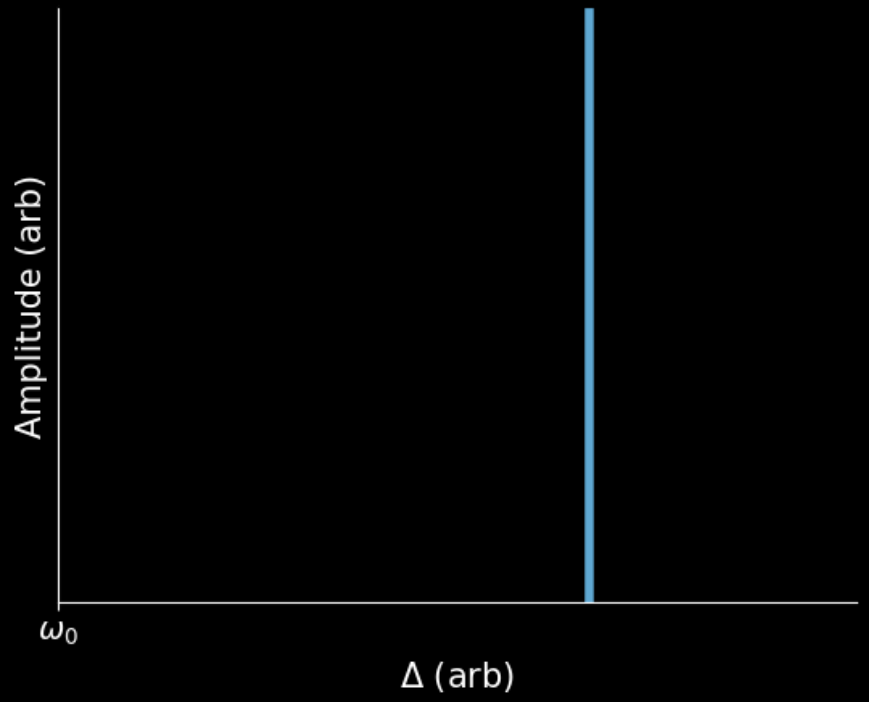

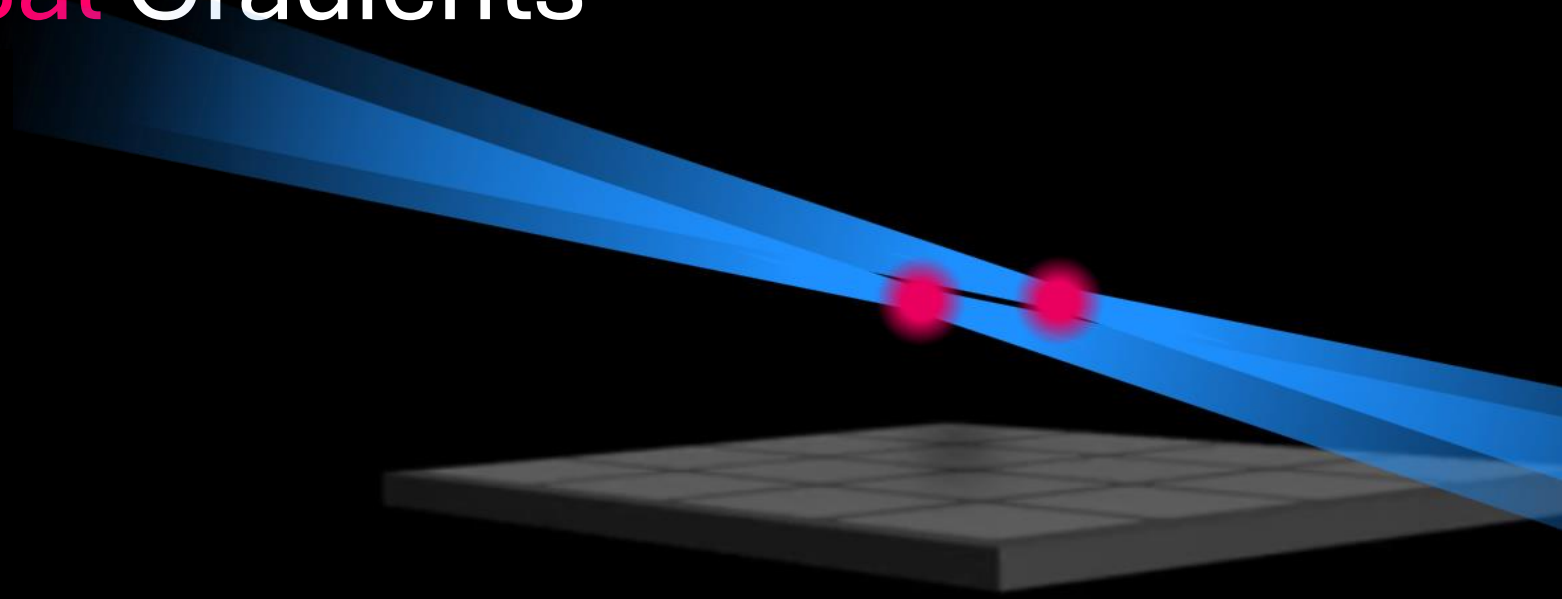

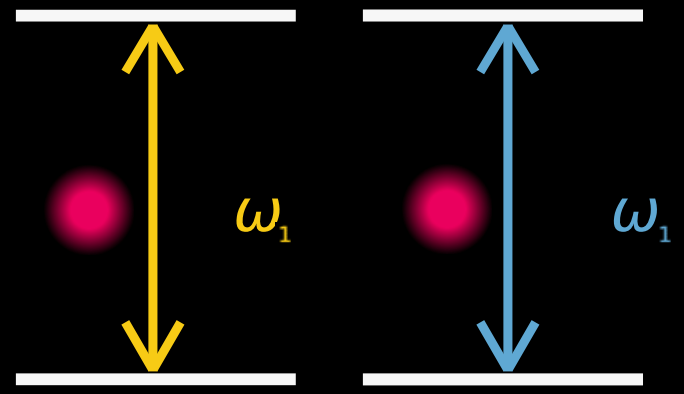

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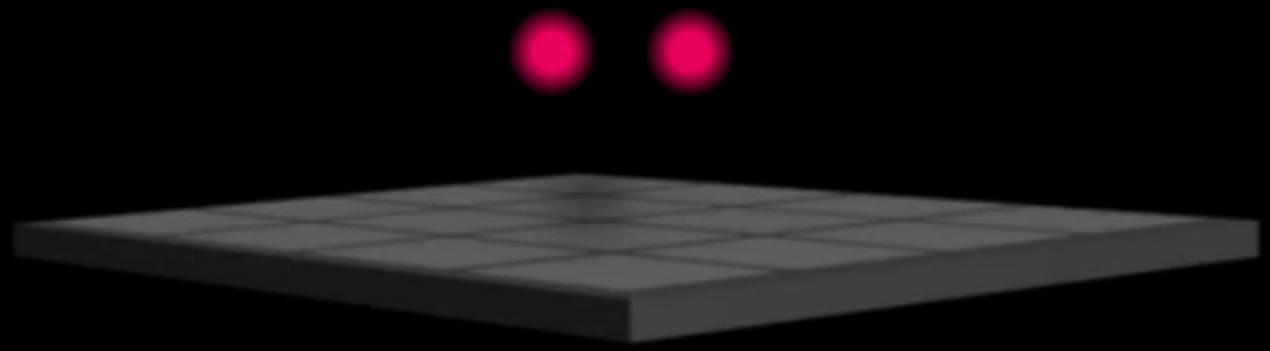

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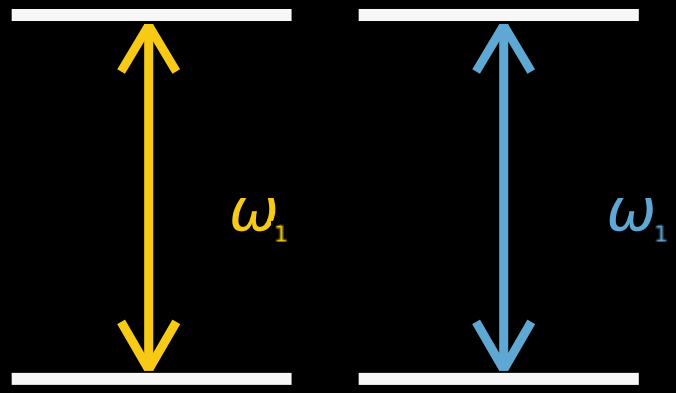

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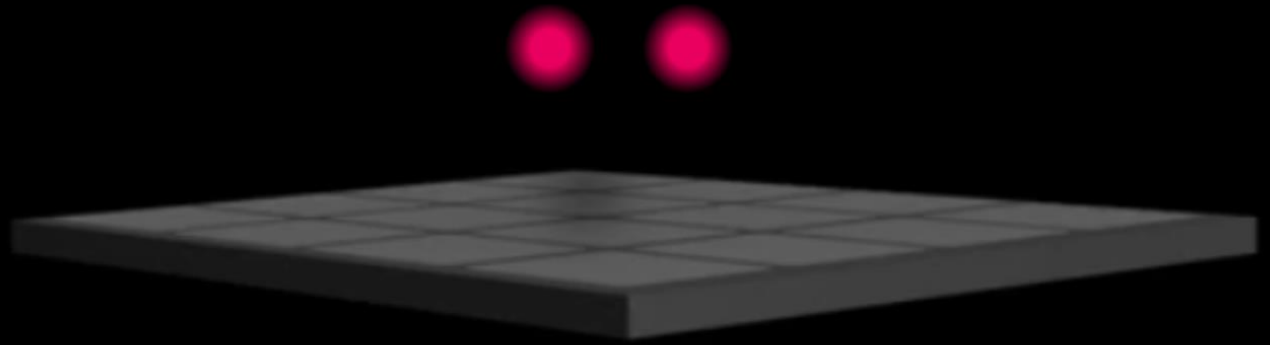

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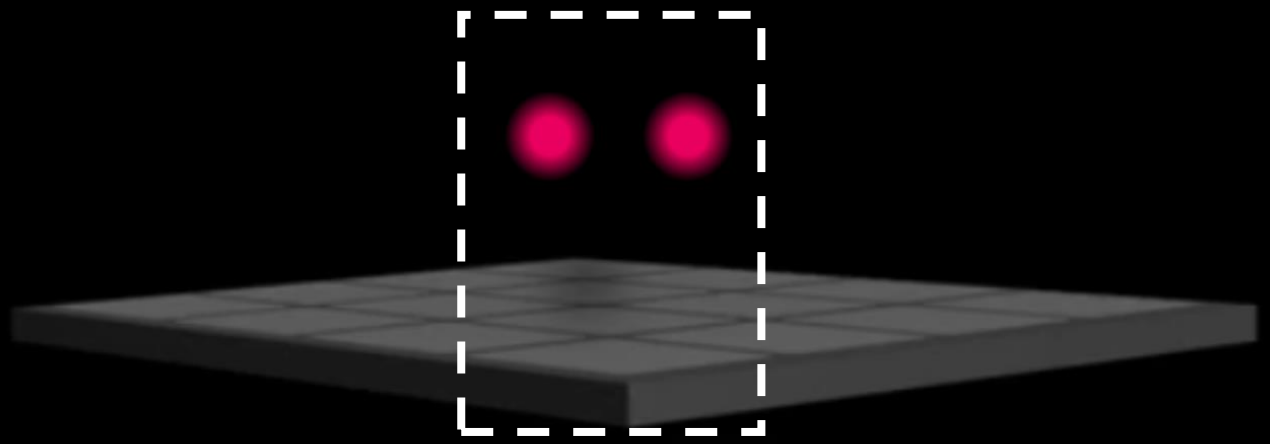

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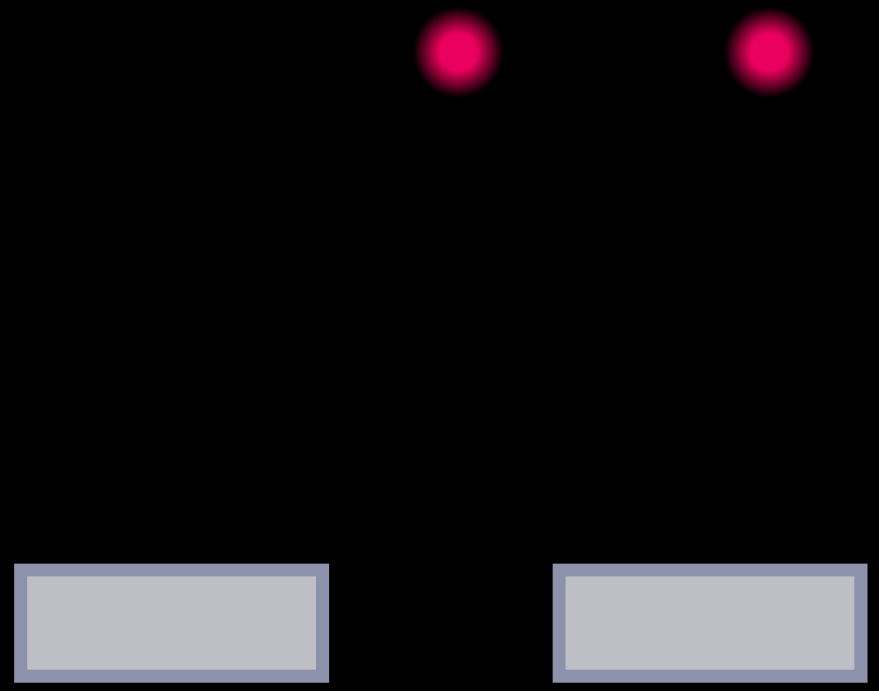

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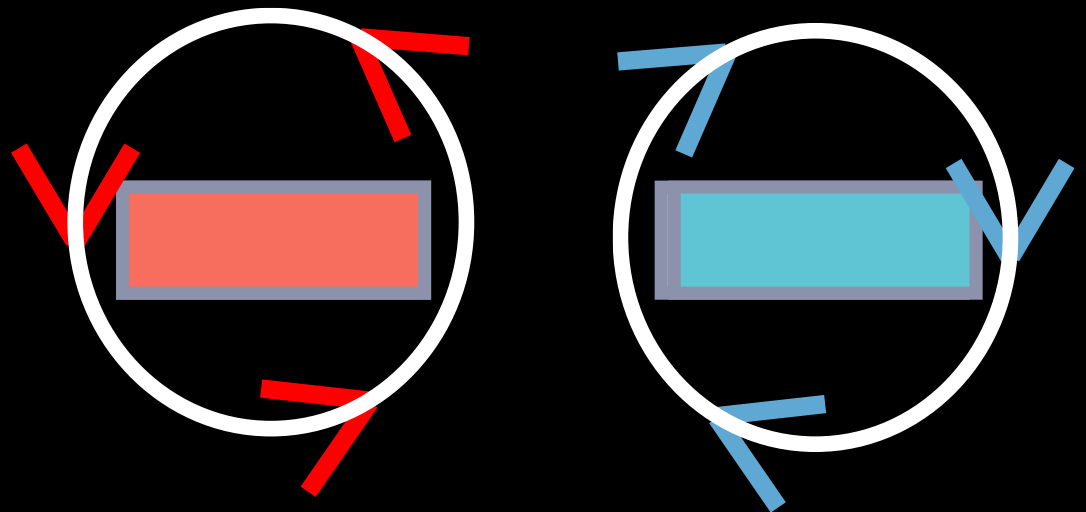

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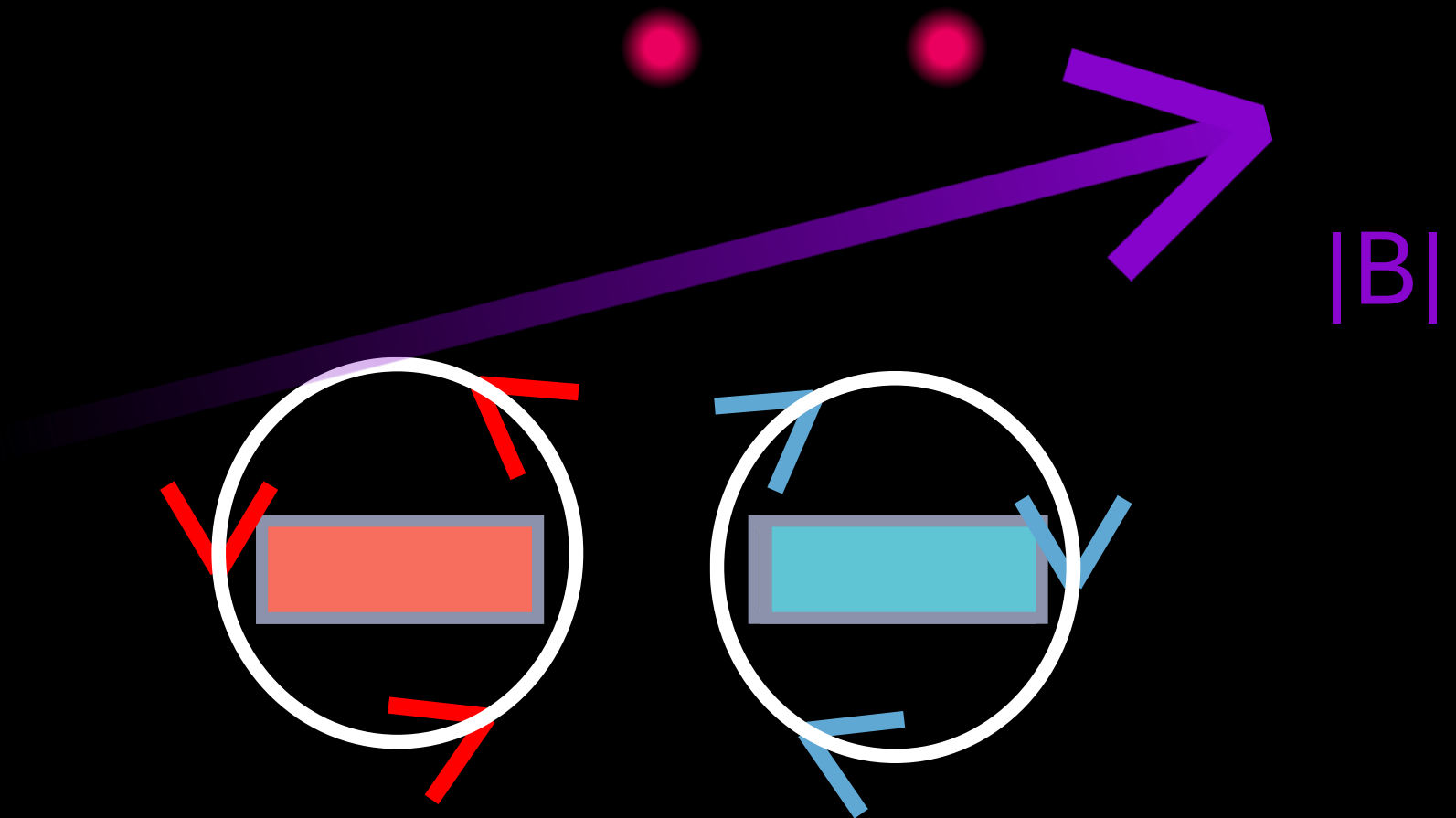

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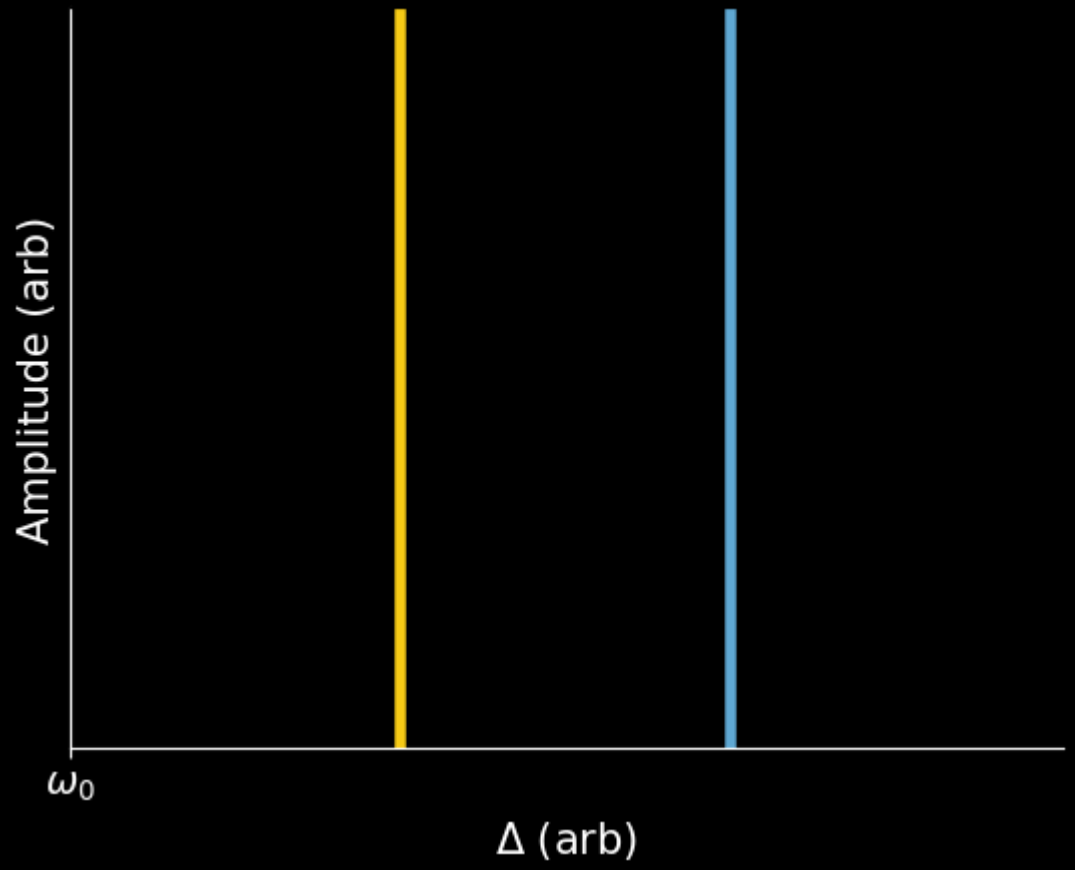

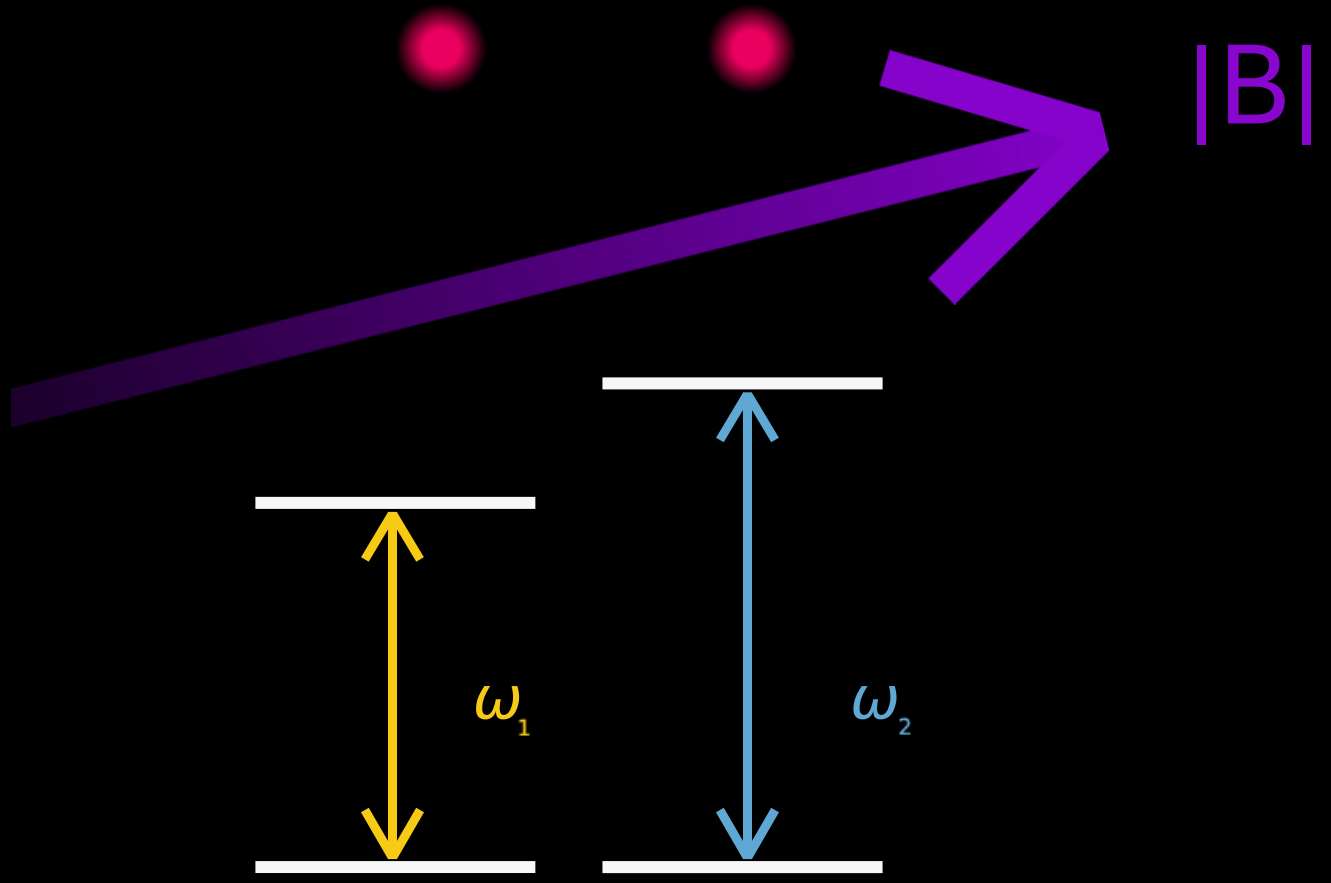

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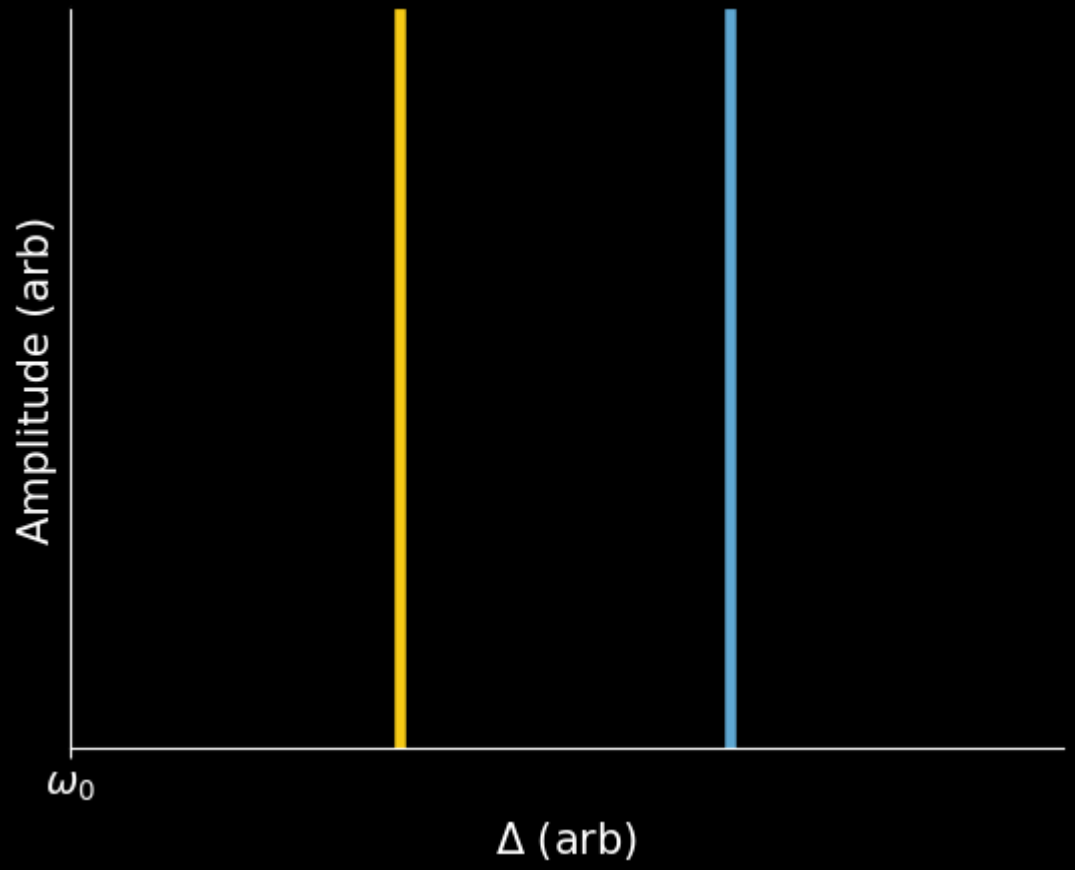

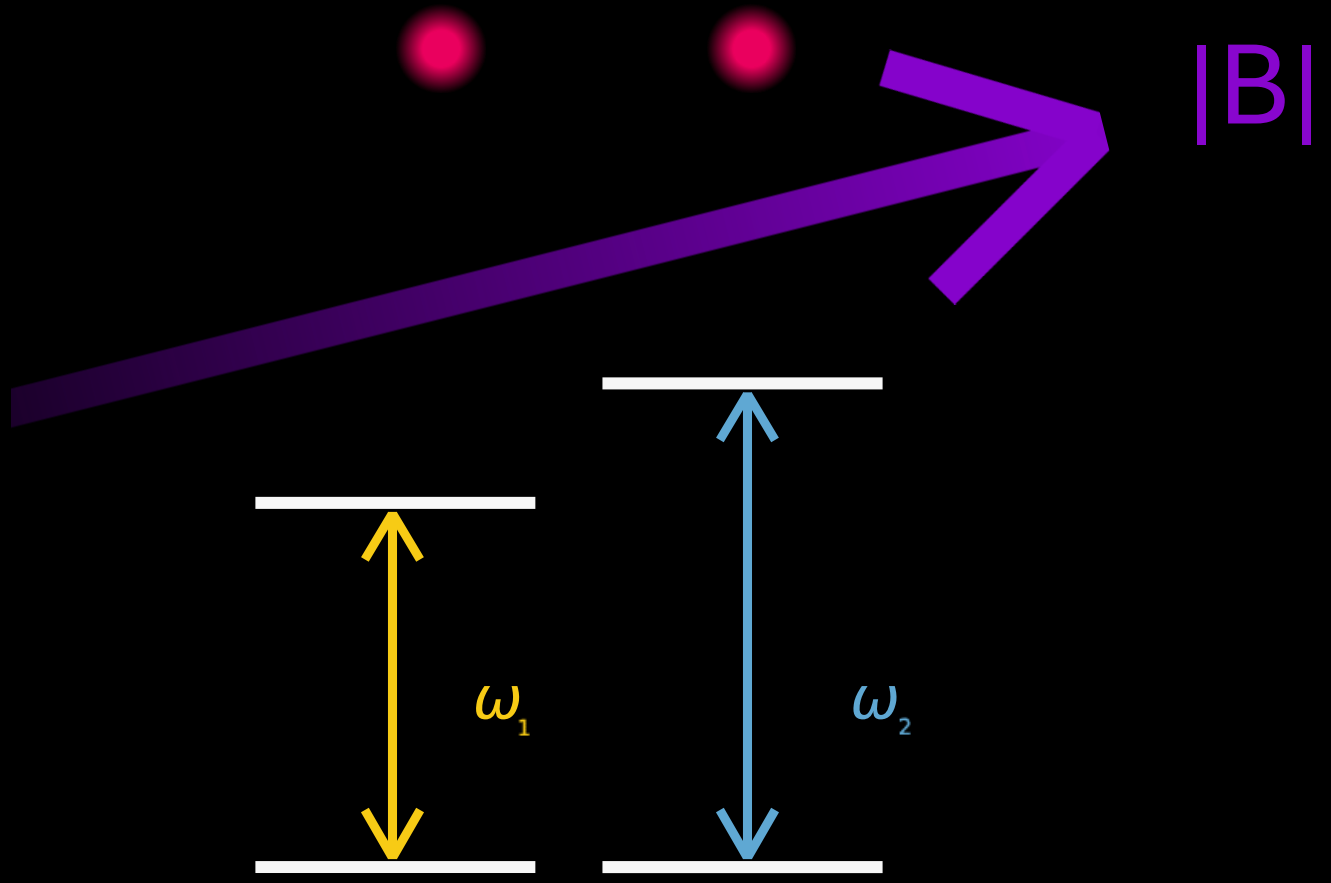

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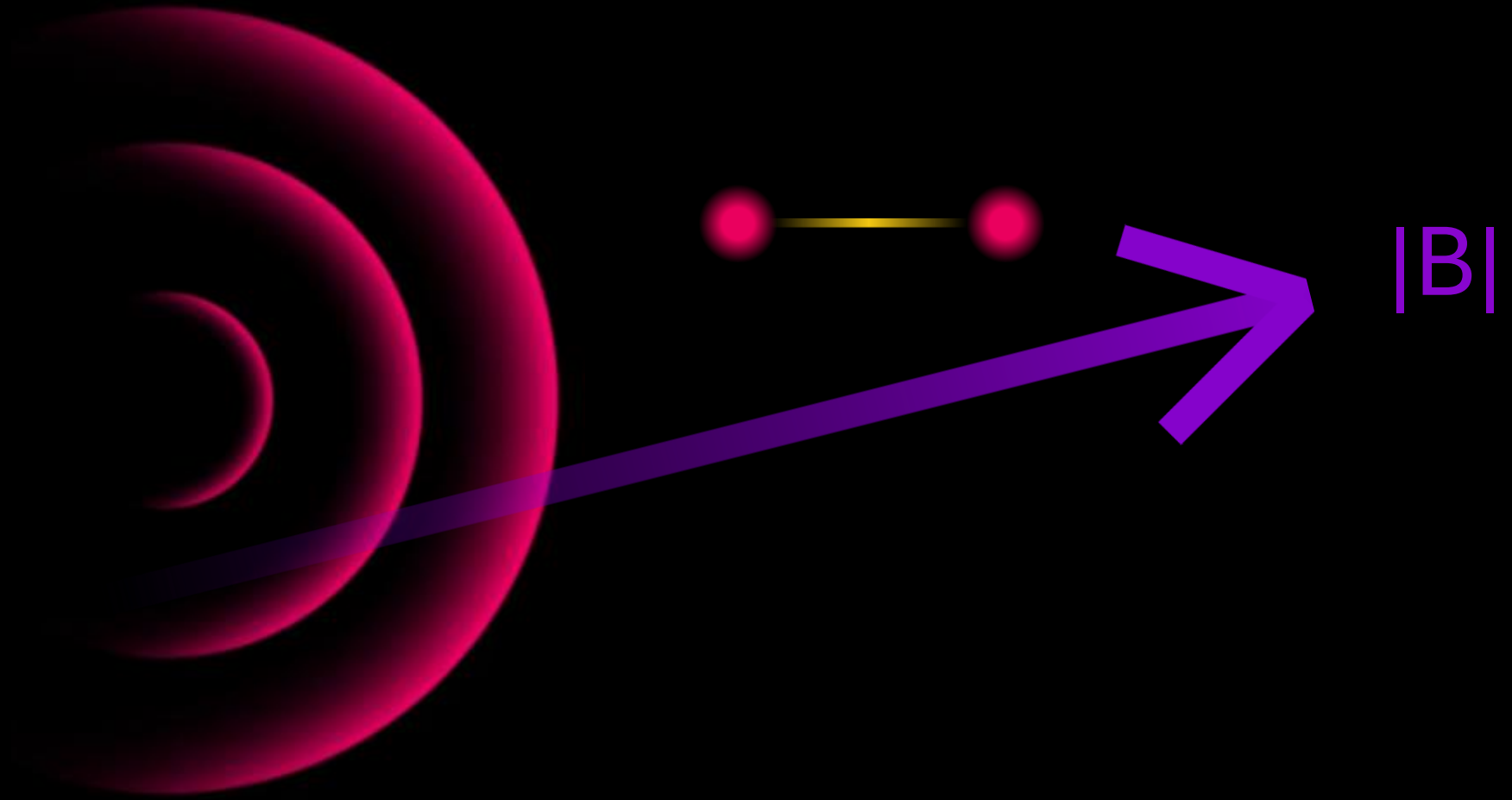

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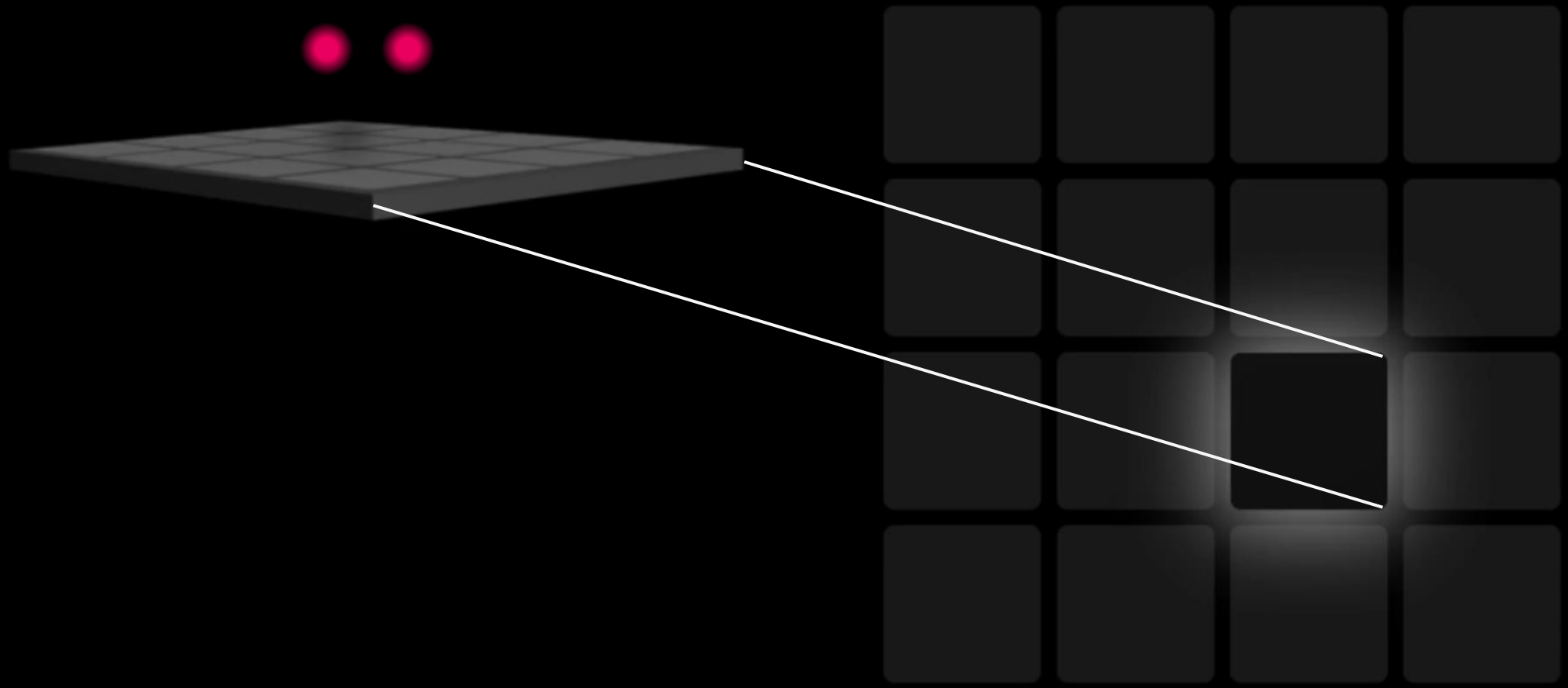
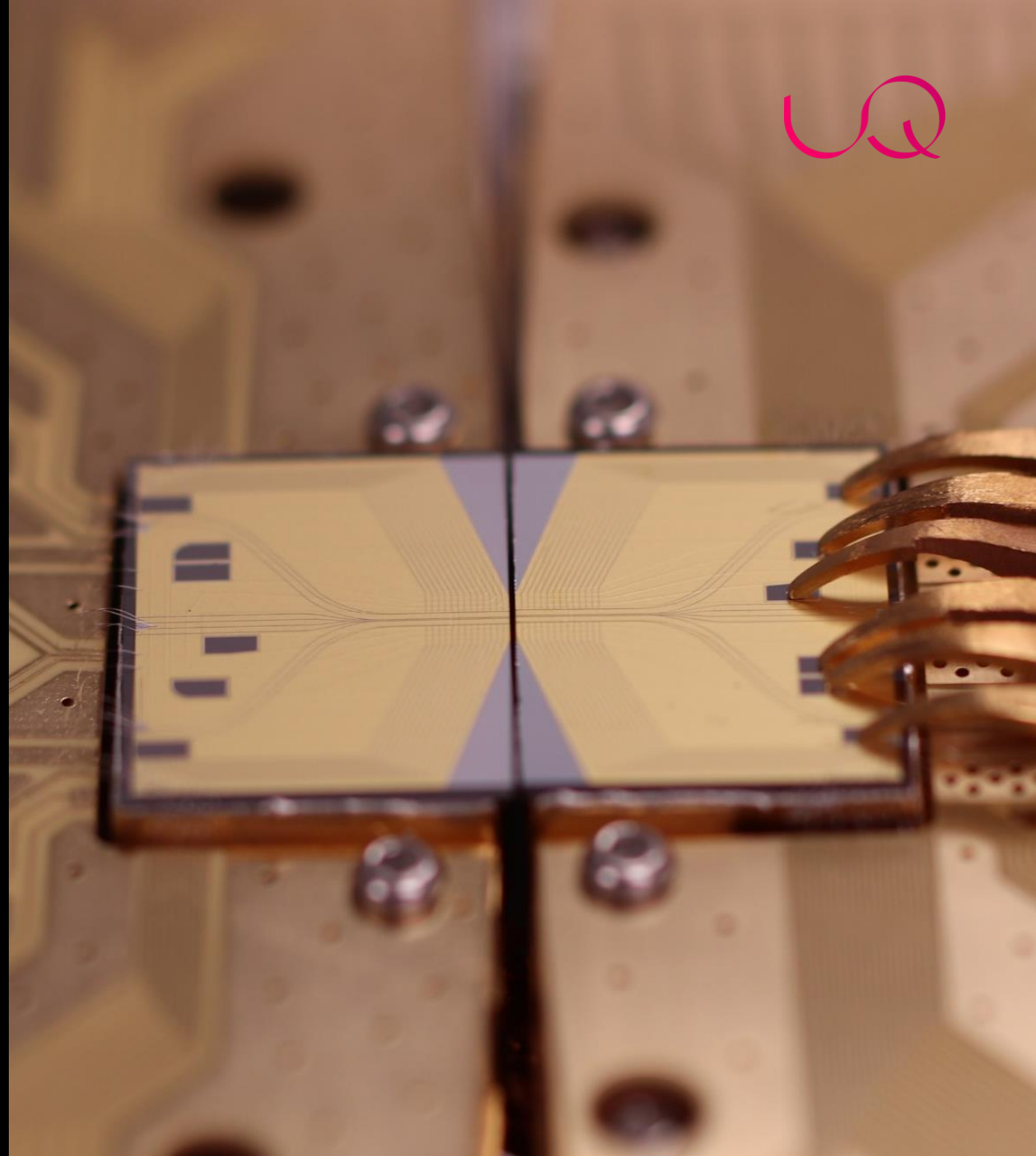


UQConnect: World record connection between quantum chips

Connection speed between chips: 2,424 s^{-1}

Success probability of connecting chips: 99.999993%



A High-Fidelity Quantum Matter-Link Between Ion-Trap Microchip Modules

… and will be accessible via the cloud, to enable ubiquitous quantum computing

Users

Amazon Braket
AWS Quantum Computing Service

Quantum Cloud

Azure Quantum

Direct Access

Universal Quantum Cloud Services

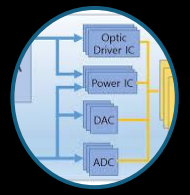
Customer Installation

Universal Quantum

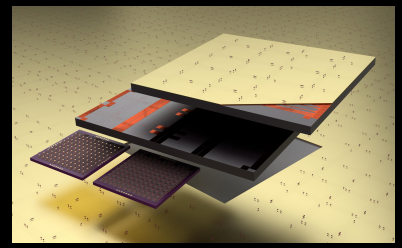
Quantum Applications & Frameworks

Qiskit

Cirq



iQPU Control Hardware & Software

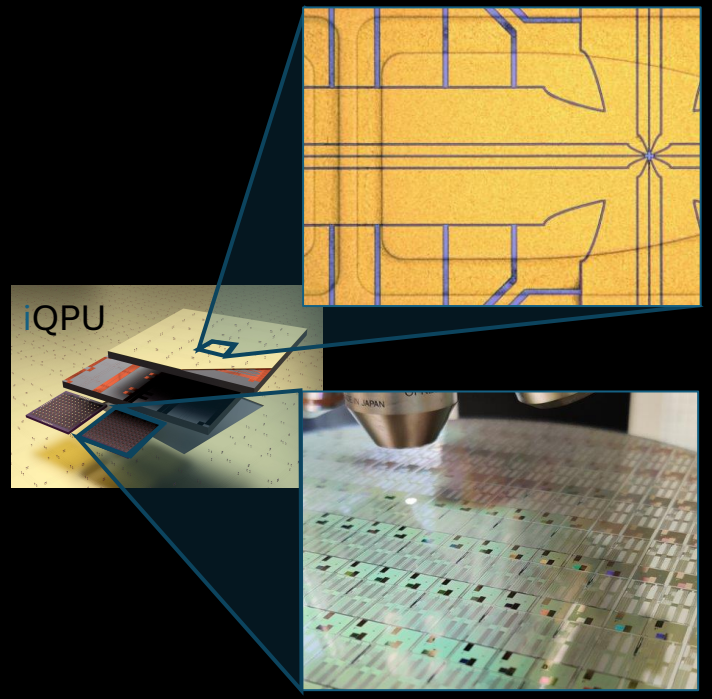


iQPU

Our iQPU is built on standard manufacturing processes …

Executable fabrication

We use standard silicon-based fabrication techniques to manufacture our iQPU

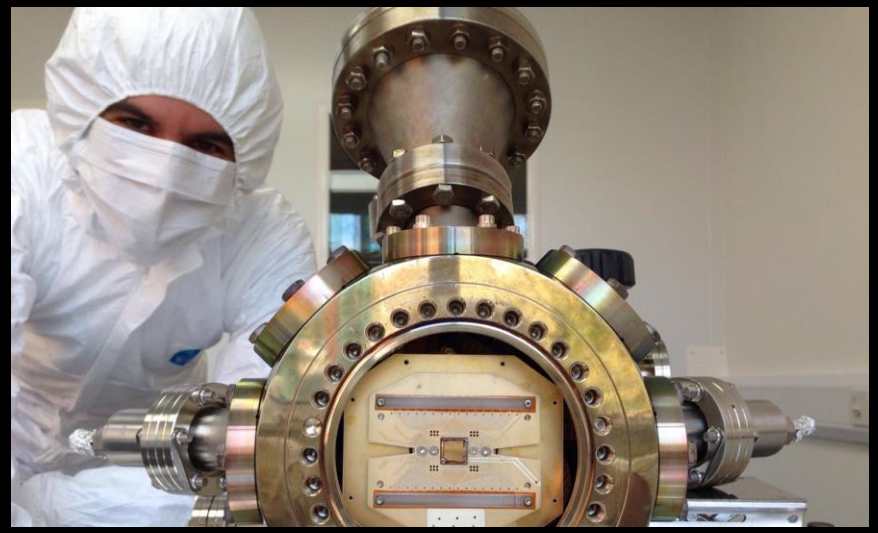


X-junction ion microchip enables fast shuttling of qubits for full connectivity

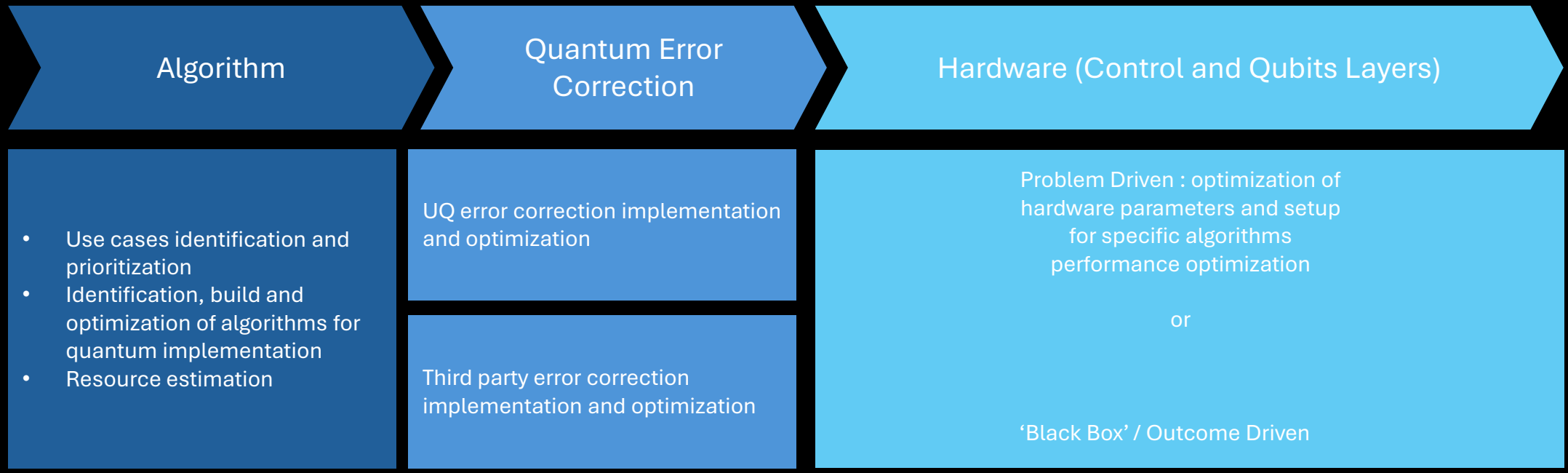
ASIC includes a UQ developed low noise DAC architecture for precise ion shuttling and gate operations

No mK temperatures

Our iQPU sits inside of a vacuum system. Only mild cooling is required to operate the QC – there is no need for millikelvin temperatures



Our client engagement approach allows to solve business problems optimally



Advisory – based on the maturity and the ambition of the client organization

Education, based on the maturity of the client organization and existing quantum compatible skills – delivered through UQ, U. Sussex or partners

The combination of these levers can provide significant improvement in the performance of use cases by providing a consistent end-to-end approach

We are a team of 70+ focused on one single mission

Prof. Sebastian Weidt
Co-founder/ CEO

Prof. Winfried Hensinger
Co-founder/ Chairman/ CSO

Unmesh Sahasrabuddhe
VP of Engineering and Product

Dr. Ilan Elson
VP of Operations

Luc Gerardin
Global Head of Business Development

Our expertise spans the entire quantum computer architecture and includes a world class system design team

Engineering	Quantum	Software	Operations
217	65	55	85

alcatel, Agilent Technologies, Analog Devices, Apple, Fujitsu, Google, Intel, Oxford Nanopore Technologies, Philips, Texas Instruments, Thales, University of Cambridge, University of Oxford

BT, NPL, Qualcomm, NIST National Institute of Standards and Technology, Q-CTRL, Quantum Delft, University of Sussex

Apple, Huawei, IBM

Google, Qualcomm, Wharton University of Pennsylvania

Apple, airbnb, Bain & Company, BAE Systems, cnet, IBM, Thomson Reuters, Harvard University, University of Cambridge, University of Oxford

Questions?