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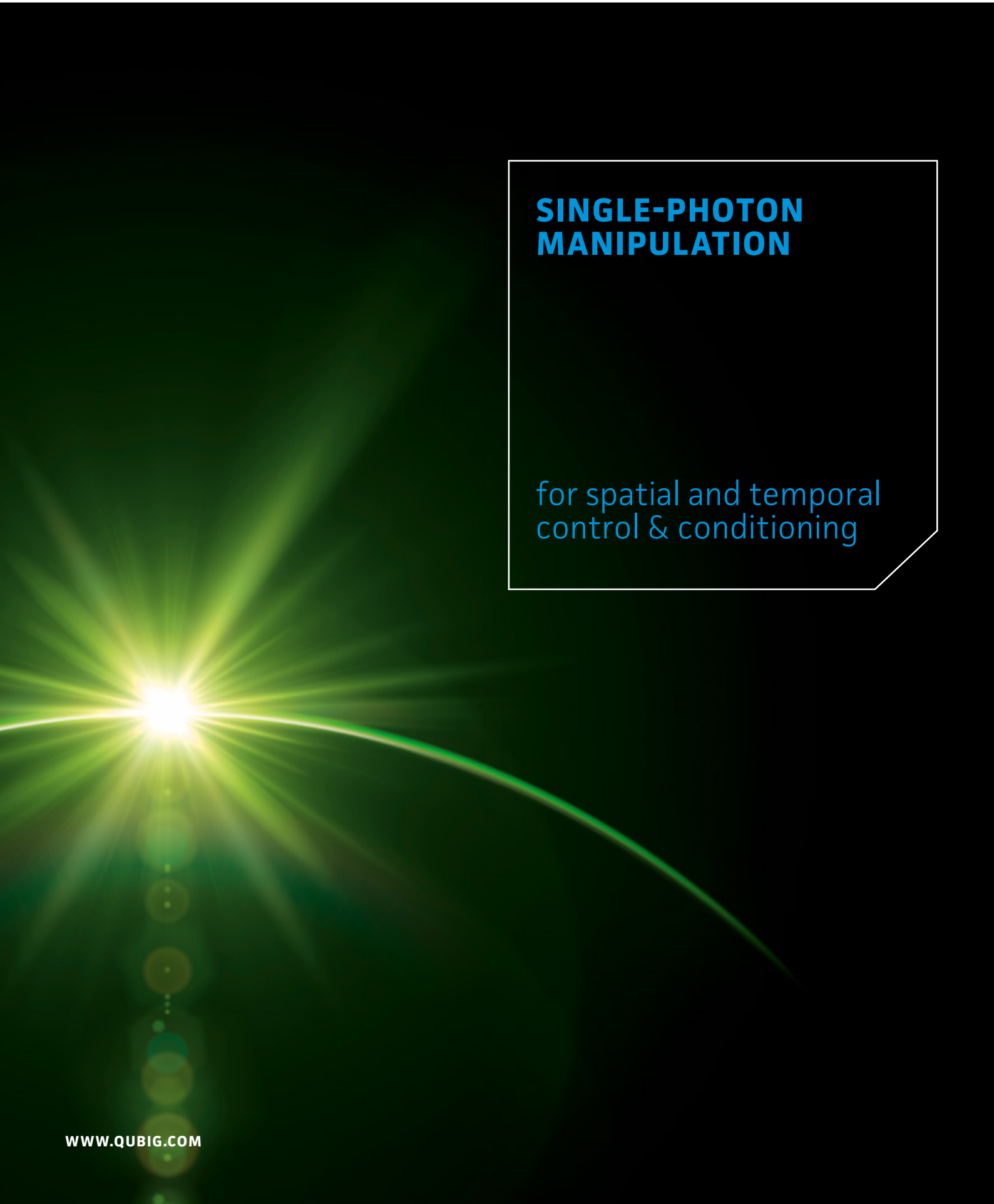
Empowering Laser Technologies

QUBIG

SINGLE-PHOTON MANIPULATION

for spatial and temporal control & conditioning



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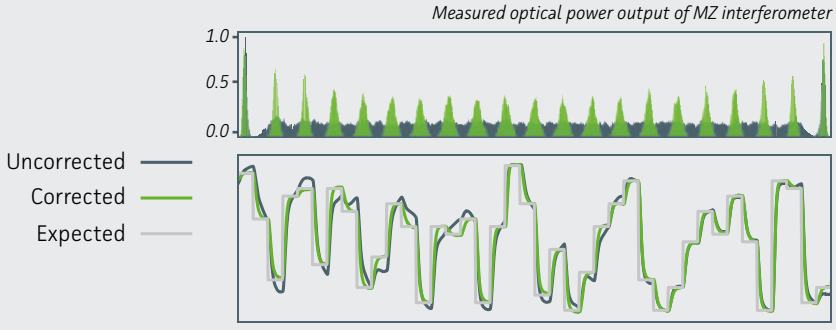
KEY FEATURES: DMX-SERIES

- *Avg. power transmission ~ 80% @ 1550 nm*
- *8 / 16 channel versions*
- *Laser repetition frequency up to 640 MHz*
- *Available wavelengths 795 | 925 | 1030 | 1550 nm*
- *Input polarization clean-up*
- *19" rack mount (HE3)*
- *Bundled with RF-driver*
- *Pre-aligned and configured*

KEY FEATURES: HVOC-SERIES

- *High transmission: >99.5% (ER>300:1)*
- *Arbitrary polarization & phase state generation with > 30 points resolution*
- *Pulse width: >=100ns | rise time: < 50 ns*
- *Active compensation of acoustic resonances*



Key prospect:

Quantum technologies take advantage of quantum mechanical effects to solve problems limited by current classical alternatives. Single photons are promising candidates for a broad range of applications in quantum information, quantum metrology, and, perhaps one of the most promising technologies, the realization of a quantum computer. The objective of QUBIG is to provide complete systems for single photon manipulation that brings photonic quantum technologies to the next level. To this end, QUBIG has developed in recent years electro-optic devices and tailored electronic drivers specifically for the manipulation of the physical properties of individual photons.

SINGLE PHOTON CONTROL

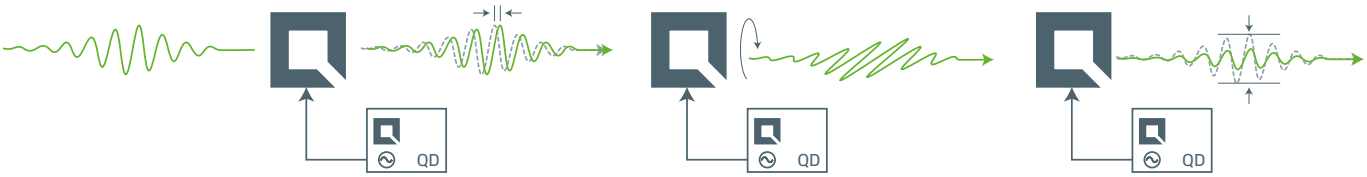
DMX- & HVOC - Series

Systems designed for photonic quantum computers

QUBIG

SINGLE PHOTON MANIPULATION

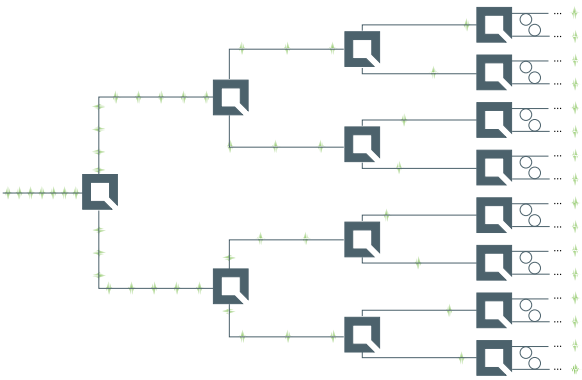
QUBIG is a world-leading expert in the field of light modulators and has dedicated significant effort to the development of high-performance electro-optic devices and matching driver electronics for precision manipulation of the Phase, Amplitude, and Polarization of individual photons with unprecedented accuracy. Our unique high-voltage technology and active mitigation of piezo-electric resonances allow us to reach rise times down to 5ns and up to 31-point accuracy for phase, polarization, and amplitude while keeping a very high transmission.



SPATIAL MULTIPLEXING

Quantum computing with light requires multi-photon interference and relies on indistinguishable single photons arriving simultaneously at the input ports of a photonic circuit. The isochronal photons distributed over N channels can be created by multiplexing a periodic train of photons from a single channel into multiple outputs.

QUBIG provides full systems for spatial demultiplexing of single photons based on our unique resonant electro-optic modulation technology. Our high-performance devices are compatible with single photon sources with repetition rates up to 160 MHz for demultiplexing into 2,4,8, and 16 channels [1,2].



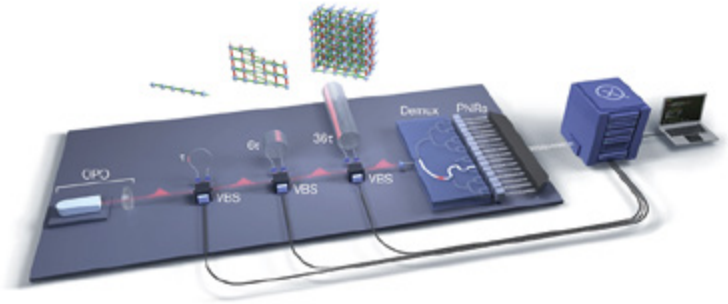
KEY FEATURES:

- *795nm, 935nm and 1550 nm*
- *High transmission (>99.5% per unit)*
- *High fiber coupling efficiency > 90 %*

TIME DOMAIN MULTIPLEXING

Time-domain multiplexing offers a simpler hardware architecture for building fault-tolerant quantum computers. A small number of active components allows for the processing of a large number of modes. Key elements of this architecture are variable beam splitter (VBS) which consists of a programmable phase shifter and a programmable amplitude modulator [1]

QUBIG offers its unique programable VBS technology tailored for quantum computing applications.



Fully programmable photonic processor [1].

KEY FEATURES:

- *Rise time < 50 ns*
- *> 30 set point accuracy*
- *Active compensation of acoustic resonances*
- *High transmission (>99.5%)*
- *High fiber coupling efficiency (> 90%)*

REFERENCES

[1] XANADU Quantum computational advantage with a programmable photonic processor, **Nature** 606, 75–81 (2022)
[2] MPQ: Efficient generation of entangled multiphoton graph states from a single atom. **Nature** 608, 677–681 (2022)
[3] CNRS: Interfacing scalable photonic platforms: solid-state based multi-photon interference in a reconfigurable glass chip, **Optica** Vol. 6, Issue 12