Leibniz Ferdinand Braun Institut

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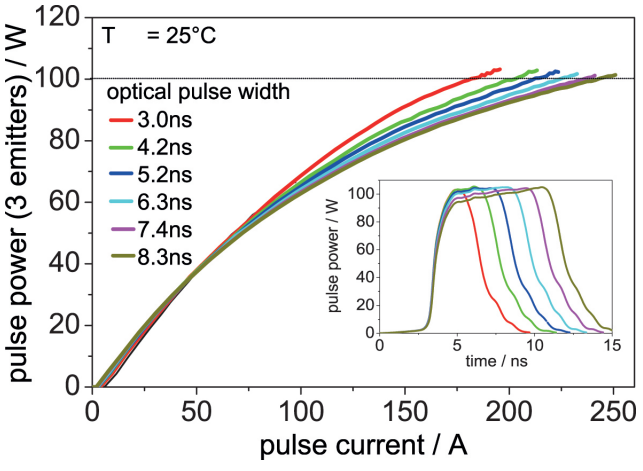
Pulse laser sources for LiDAR systems

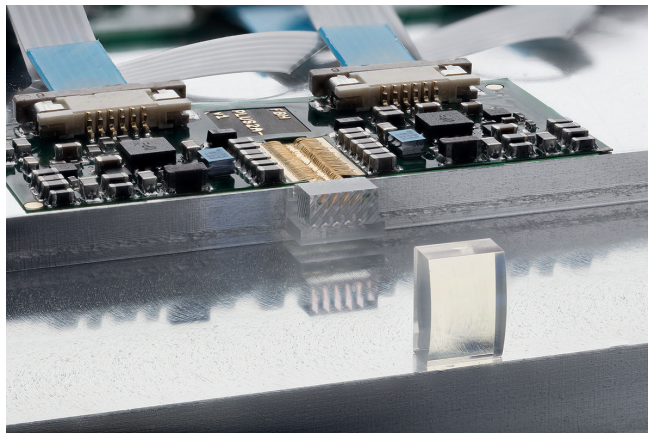
Lasers generating short optical pulses with widths in the range from 200 ps to 20 ns are key components for a broad range of applications including LiDAR (Light Detection and Ranging), e.g., for autonomous driving, 3D object detection, laser scanning (airborne, satellite, and terrestrial) as well as fluorescence spectroscopy and micro-machining systems.
The sources use a tailored design for pulse generation from diode laser technology as well as optimized RF components from microwave electronics as electronic drivers. Both are core competencies of the FBH. The design of the output circuit is optimized for high peak current, short optical pulse width, high repetition rate, and high power efficiency. Pulse laser sources for different power ranges and pulse lengths have been developed.

Specifications for automotive LiDAR

- laser driver with GaN transistor in the final stage with current pulses up to 250 A
- pulse amplitude and width can be controlled
- current pulse width 3 ns - 20 ns
- optical pulse durations 3 ns - 20 ns
- wavelengths 620 nm - 1180 nm
- pulse peak powers up to 40 W (one emitter) and 100 W (three emitters)
- temperature range up to 85°C



Optical pulse power vs. driver pulse current width from a three emitter bar for different pulse lengths. Inset: optical pulse power in dependence on current pulse width



FBH high current ns laser driver with integrated ridge-waveguide laser diode – output power of three emitters is collimated into one spot by optical components from FISBA Photonics GmbH

Profil

The Ferdinand-Braun-Institut, Leibniz-Institut für Höchstfrequenztechnik (FBH) researches electronic and optical components, modules and systems based on compound semiconductors. In the field of III-V electronics, it manufactures high-frequency devices and circuits for communications, power electronics, and sensor technology. Moreover, FBH develops light sources from the visible to the UV spectral range: high-power diode lasers, UV light sources, and hybrid laser systems. Applications range from medical technology, materials processing and sensors to optical communications in space and integrated quantum technology. In close cooperation with industry, its research results lead to cutting-edge products.

The institute is a member of the Leibniz Association and part of Research Fab Microelectronics Germany (FMD).

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