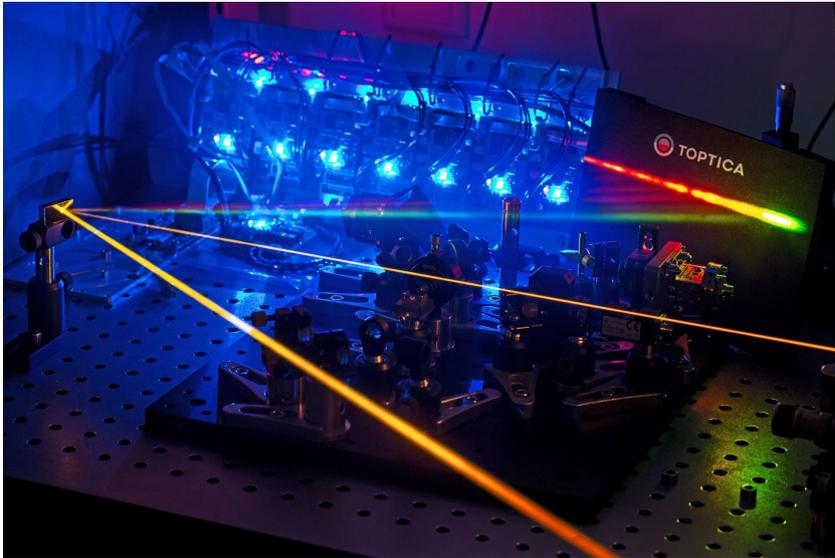


Terahertz Enables Wireless 6G Communication

New laser architectures to utilize the terahertz frequency range for 6G communications



The integration of photonics into communications technology opens far-reaching possibilities for 6G systems. Image: TOPTICA

Graefelfing | 28-Nov-22

Sixth-generation mobile communications (6G) will enable completely new application scenarios in industry, medical technology and everyday life. This will be accompanied by new requirements in terms of latency or the transmittable data rate, which cannot be met by current communication systems.

A promising technological solution to enable the highest data rates is the development of new frequencies up to the terahertz (THz) range. For the development of 6G, it is therefore important to develop THz transmission sources that have high signal quality and cover as wide a frequency range as possible. This goal can be achieved in the future by integrating optical technologies and electronics. If successfully developed, such THz components can also be used beyond the communications sector, as they can be applied in sensor technology or imaging in addition to data transmission.

6G-ADLANTIK Project goals and procedure

In the 6G-ADLANTIK project, components for the THz frequency range are being developed based on photonic-electronic integration. Signal sources and detectors are to be created that cover almost the entire targeted frequency range of 6G mobile radio. For this purpose, it is planned to develop stabilized laser systems and optical frequency combs and to build THz signal sources from these components. In a further step, innovative waveguide structures will be designed and manufactured for the targeted frequency range. These waveguides will then be integrated with the photonic components to form transmitter and receiver units. Finally, the individual components will be brought together for the demonstration of a high-performance radio transmission system.

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New extensive possibilities for 6G systems

The integration of photonics into communications technology opens far-reaching possibilities for 6G systems. The developed components can be used not only for fast data transmission, but also for innovative measurement technology. Such THz measurement technology makes it possible to precisely characterize components and concepts of novel 6G systems and to optimize performance parameters. Thus, the entire mobile communications sector can benefit from the project's developments. By providing the THz components at the German site, the project makes a valuable contribution to technological sovereignty in Germany and the European economic area.



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About TOPTICA Photonics

TOPTICA has been developing and manufacturing high-end laser systems for scientific and industrial applications for more than 20 years. Our portfolio includes diode lasers, ultrafast fiber lasers, terahertz systems and optical frequency combs. TOPTICA today has 450 employees in 6 commercial entities with a consolidated group revenue of 100 Mio € (about 107 Mio \$).