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Title:Laser air photonics: beyond the terahertz gap

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Abstract:Through the ionization process, the very air that we breath is capable of generating terahertz (THz) electromagnetic field strengths greater than 1 MV/cm, useful bandwidths of over 100 THz, and highly directional emission patterns. Following the ionization of air, the emitted air-plasma fluorescence or acoustics can serve as an omnidirectional, broadband, THz wave sensor. Here we review significant advances in laser air photonics that help to close the "THz gap," enabling ultra-broadband THz wave generation and detection, for applications including materials characterization and non-destructive evaluation. The feasibility for remote sensing, as well as the remaining challenges and future opportunities are also discussed. [All rights reserved Elsevier].

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Inspec controlled terms:laser beams - measurement by laser beam - plasma properties - terahertz spectroscopy - terahertz wave detectors

Uncontrolled terms:laser air photonics - ionization process - terahertz electromagnetic field - directional emission pattern - emitted air-plasma fluorescence - emitted acoustics - terahertz wave sensor - ultrabroadband terahertz wave generation - materials characterization - nondestructive evaluation

Inspec classification codes:A0765 Optical spectroscopy and spectrometers - A0762 Detection of radiation (bolometers, photoelectric cells, i.r. and submillimetre waves detection) - A4260H Laser beam characteristics and interactions - A4262E Metrological applications of lasers - A5225P Emission, absorption, and scattering of radiation in plasma

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