Prize Talk PV IX Tue 17:00 U A-Esch 2

Laser filamentation and terahertz pulse generation — •Luc Bergé — CEA, DAM, DIF - 91297 Arpajon - France — Laureate of the Gentner-Kastler-Prize 2018

Laser filamentation is actively studied for its rich variety of applications, from supercontinuum generation to lightning control. In air, femtosecond filaments result from the self-focusing of ultrashort light pulses that couple to their own plasma channel and stay self-guided upon long distances at high intensity levels. Driven by strong nonlinearities, these optical structures are able to promote broadband terahertz (THz) radiation when using laser fields composed of two colors, e.g., a fundamental frequency and its second harmonic. Terahertz emitters have many promising applications in security screening, cryptography, material sciences, medical imaging, time-domain spectroscopy and remote detection. This plenary talk will recall the main mechanisms involved in both laser filamentation and laser-driven THz pulse generation, such as plasma generation and ponderomotive forces, photocurrents induced by air ionization, Kerr self-focusing and optical rectification by four-wave mixing, and their respective range of occurrence in terms of the optical pump intensity. The last part of the talk will be devoted to recent results on the THz spectroscopy of various solid materials based on air plasmas, obtained in the framework of the project ALTESSE involving German, Danish and French researchers.