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Coherent and PTB join their expertise in Terahertz laser power measurement

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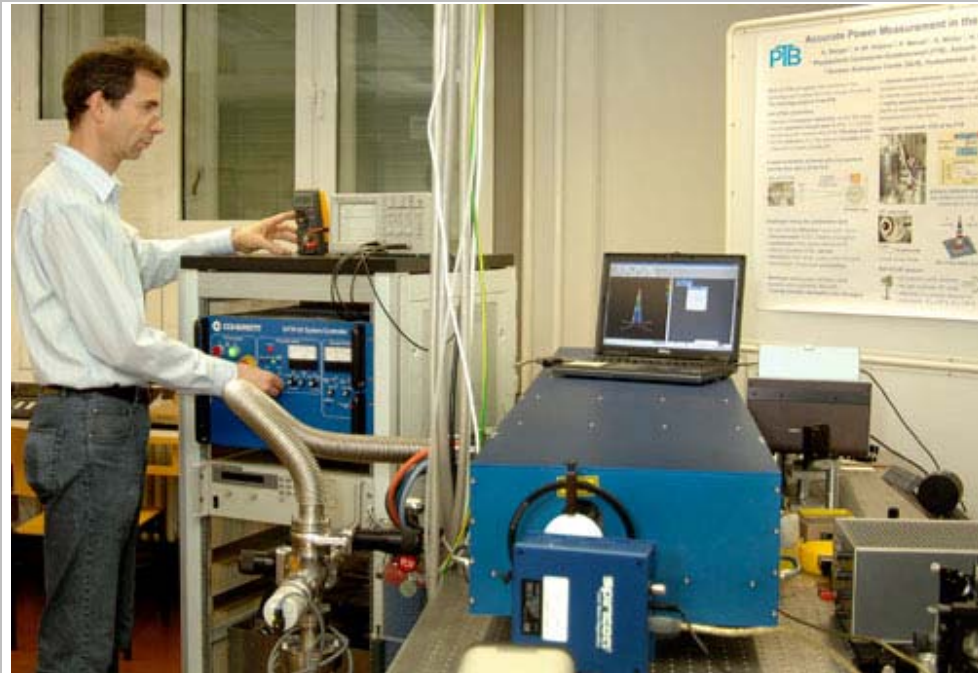
Coherent and the PTB, Germany's National Metrology Institute, have joined their expertise in Terahertz (THz) technology.

A Coherent SIFIR 50 THz laser running at 2.5 THz (corresponding to a wavelength of 118 μm) was the source for an outstanding power measurement. This measurement was performed by one of the world's first and unique in the THz range traceably calibrated power meters. This power meter has been calibrated with a cryogenic radiometer, PTB's primary standard for power measurements of electromagnetic radiation. Therefore Coherent's SIFIR 50 is the first THz laser in the field with proven reliability in power measurement due to traceability to the international system of units (SI) given by PTB.

THz radiation typically refers to frequencies from 0.3 THz to 10 THz. It has long been studied in fields such as spectroscopy, analytical science and astronomy. Recent technological innovations have noticeably improved the generation and detection of THz radiation.

Today, THz technology finds use in an increasing number of applications: non-destructive materials testing, homeland security, biology and medical sciences, quality control of food and agricultural products, global environmental monitoring and information and communications technology. All of these applications benefit from a reliable power measurement in the THz region.

According to Dr. Steiger at PTB Berlin, "The core instrument of a new facility for the determination of the THz radiant power in SI units and for the calibration of THz detectors is a Coherent SIFIR-50 FPL, a far-infrared molecular gas laser pumped by an integrated, frequency stabilized, tunable 50 W CO₂ laser. The unique feature of the system is its Fabry-Perot lock used to control the operating frequency of the CO₂ laser which is optimal for pumping the vibrational transitions of the gas molecules. Combined with its thermally-compensated THz resonator and pump optics design, the SIFIR-50 delivers stable THz-radiation from 1 THz to 7 THz and is tunable to several rotational transitions of the molecules in use. The wide tuning range is four times larger than the whole visible spectrum and contains a variety of discrete THz lines in many different gases. The excellent performance of the SIFIR-50 enables PTB to take a large step to bridge the metrological gap between ultra high-frequency electronics and far-infrared optics in the near future."



Pic.: Andreas Steiger, head of the Working Group "Terahertz Radiometry", checks the beam profile of the Coherent SIFIR-50 laser operated at the new THz calibration facility of PTB. (fig.: PTB)

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