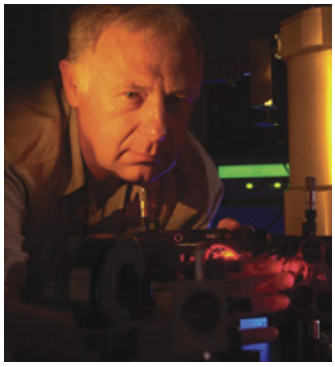
Talk's title: **Optically Generated THz Transients for Spectral Characterization of Novel Materials and Devices**

Abstract: The field of THz science and technology is still in its infancy, but has already gained a very large international interest due to its numerous applications ranging from ultrahigh speed optical transmission systems to medical diagnostics, industrial quality control, and security screening and imaging tools. In conventional terminology, it corresponds to a so-called "THz gap," i.e., a region of the radiation spectrum where it is very difficult to successfully operate either electronic or photonic devices. For even the fastest FET-type transistor structures, the THz frequency of operation is extremely high, while for lasers the THz radiation wavelength is far too long, since the energy of THz quanta is much smaller than the thermal energy at room temperature. We present here a novel approach based on integrated optoelectronic techniques that combine femtosecond laser systems with devices and materials characterized by sub-picosecond response times. We review the current state-of-the-art and advancement in THz photonics aimed towards implementation of THz signals (sub-picosecond electrical transients) for time-resolved (THz-bandwidth) characterization of novel, nanostructured materials and devices. We present unique capabilities of our THz-bandwidth electro-optic sampling system for time-resolved characterization even the fastest devices, ranging from ultrafast GaAs photodetectors to room-temperature ballistic carrier transport in 2-dimensional electron gas nanostructures.



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Dr. Sobolewski's current interests are concentrated on ultrafast phenomena in condensed matter, novel nanostructured electronic and optoelectronic semiconducting and superconducting materials and devices, single-photon quantum detection, and on generation and detection of THz radiation transients. He has published almost 400 peer-reviewed publications and communications, and presented over 200 invited conference talks, lectures, seminars, and colloquia worldwide. He is the Representative of Poland for the EU Cooperation in Science and Technology (COST) Action: Nanoscale Superconductivity.