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Short overview of laser physics and applications research activities of Institute of Electronics – Bulgarian Academy of Sciences

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In this report would be presented a short overview of the recent research activities in the field of laser physics and applications of the Institute of Electronics at the Bulgarian Academy of Sciences (IE-BAS).

The Institute was established in 1963 as a non-profit state organization conducting research, education and dissemination of scientific knowledge in the fields of physical electronics, photonics and quantum electronics and radio sciences. Soon, IE-BAS evolved as a leading scientific institution in these areas of applied physics and engineering within the Bulgarian Academy of Sciences and in the country.

The IE-BAS was where the first Bulgarian laser, lidar, micro-channel electron-optical converter, optical magnetometers, laser therapeutic and diagnostic systems for biomedical applications were built, followed by the development of several advanced e-beam technologies, novel types of optical gas sensors, pioneering achievements in laser nanostructuring and nanoparticle formation, laser and plasma high technologies, biomedical photonics and applications.

IE-BAS is a host and main organizer of a biannual International School on Quantum Electronics “Laser Physics and Applications”, which has more than 38-years history and become a well-known scientific event for training of young researchers and PhD students, covering different aspects of laser-matter interactions, laser spectroscopy and metrology, laser remote sensing and ecology, lasers in biology and medicine and laser systems and nonlinear optics.

Through the years, the Institute’s research field and structure have developed dynamically in response to the changes taking place in the main trends in applied physics and technologies: materials science and technologies, physics of nano-sized objects and nanotechnologies, nanoelectronics, photonics, opto-electronics, quantum optics, environmental physics and monitoring, biomedical photonics and biomedical applications. Nowadays, IE-BAS is a leading research organization in Bulgaria in the field of laser physics and applications. The research in photonics and quantum electronics comprises theoretical and experimental studies on the interaction of short and ultrashort lasers pulses with matter; development of novel nano-structuring technologies; laser thin-films deposition and treatment; light-induced absorption and transmission in alkaline vapors; development of complex laser systems for analysis and modification of semiconducting and superconducting materials; theoretical and experimental investigation of non-linear optical phenomena and biomedical photonics.

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