

**Results of the 3rd International Conference "Terahertz and Microwave radiation:
Generation, Detection and Applications" (TERA-2018)**

at the Institute of Applied Physics, Russian Academy of Sciences, Nizhny Novgorod, from
October 22 to October 25, 2018

This meeting was the 3rd Conference in sequence which was originally organized by Budker Institute of Nuclear Physics (Novosibirsk), Moscow State University and Institute of Applied Physics (Nizhny Novgorod) according to the plan of the fundamental research and international collaboration. The workshop was held at the IAP RAS in Nizhny Novgorod. More than 200 participants (almost one third of them being young scientists) were attending the Conference sessions. 212 reports from 12 countries were presented and discussed. To enable new cooperation with industry and institutes interested in THz development and applications exhibitions of several companies was organized for presentation and discussion.

All the relevant theoretical and experimental activities were reviewed, the goals which have been already reached were identified, the state-of-the-art of the various topics was thoroughly discussed and updated goals were defined. Many aspects of THz science (generation, detection and applications) were discussed.

Opening talk present information the Nobel Prizes in physics awarded in 2018, as well as the development of high-power laser complexes at the IAP RAS. The section "Electronic sources of terahertz and microwave radiation, synchrotron radiation, free electron lasers" was the largest at the conference. The development of sources of terahertz radiation is still being pursued by methods of quantum electronics and classical vacuum electronics. The significant progress in free-electron lasers and gyrotrons was demonstrated.

The recent results of the use of terahertz pulses for studying the laws of dispersion of charge carriers in the volume and on the surface of topological insulators were given. Other interesting topic was an overview of the history of the development of infrared and terahertz quantum cascade lasers from the beginnings to the latest breakthroughs and discussed the strengths and weaknesses of their use in scientific and industrial applications, same as recent advances in the development of intensive sources of broadband THz radiation in the filamentation of high-power laser studies in liquid gas-like media.

One of the key topics of the THz biomedical applications was study biological effects of THz radiation, in particular study of the structure and dynamic properties of water and dynamics of hydration in various biomedical systems. There was presented a number of

promising results connected with diagnosis using this spectral range waves, including non-invasive imaging based on resonant near-field microwave technology. A new line of biological research based on terahertz ultrasound, generated by the transformation of a femtosecond optical pulse into a broadband acoustic pulse was presented, which opens up the possibility for non-invasive clinical imaging with atomic-scale resolution.

The influence of Russian scientists on THz science looks significant, but improvement of experimental based is needed. We hope that this conference will promote support of THz activity by Russian government and funds.

The Conference committees, same as all participants note the remarkable progress achieved in the THz science. We are completely satisfied with the fruitful discussions which have led to an extensive exchange of knowledge in the different fields of THz activity. We express their wish for further exchange of knowledge and further strengthening of the collaboration between the different institutes. We enjoyed both the high level scientific program and the great social events. We are very thankful to all participants for nice reports and fruitful discussion.

We expressed to extend the collaboration with respect to new activity and looking forward to the next TERA conference in Tomsk in 2020.

TERA 2018 Conference co-chairs

M.Glyavin

B.Knyazev

A.Shkurinov

TERA 2020 Conference chairman

Yu.Kistenev

More information about TERA 2018

<http://tera2018.ipfran.ru/>

http://www.iapras.ru/news/Tera_2018/news.html