28th Summer School and International Symposium on the Physics of Ionized Gases

Aug. 29 - Sep. 2, 2016, Belgrade, Serbia

CONTRIBUTED PAPERS
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ABSTRACTS OF INVITED LECTURES, TOPICAL INVITED LECTURES, PROGRESS REPORTS AND WORKSHOP LECTURES

Editors:
Dragana Marić, Aleksandar Milosavljević,
Bratislav Obradović and Goran Poparić

University of Belgrade,
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Serbian Academy
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PREFACE

This publication of Faculty of Physics, University of Belgrade contains the Contributed papers and abstracts of Invited Lectures, Topical Invited Lectures, Progress Reports and associated Workshops' Lectures that will be presented at the 28th Summer School and International Symposium of the Physics of Ionized Gases – SPIG 2016. The symposium will be held at the Serbian Academy of Sciences and Arts in Belgrade, Serbia, from August 29th to September 2nd, 2016. The symposium is organized by the Faculty of Physics, University of Belgrade and Serbian Academy of Sciences and Arts, with the support of the Ministry of Education, Science and Technological Development, Republic of Serbia.

The SPIG conference covers a wide range of topics, bringing together leading scientists worldwide to present and discuss state of art research and the most recent applications, thus stimulating a modern approach of interdisciplinary science. The Invited lectures and Contributed papers are related to the following research fields: Atomic Collision Processes (Electron and Photon Interactions with Atomic Particles, Heavy Particle Collisions, Swarms and Transport Phenomena), Particle and Laser Beam Interactions with Solids (Atomic Collisions in Solids, Sputtering and Deposition, Laser and Plasma Interaction with Surfaces), Low Temperature Plasmas (Plasma Spectroscopy and other Diagnostic Methods, Gas Discharges, Plasma Applications and Devices) and General Plasmas (Fusion Plasmas, Astrophysical Plasmas and Collective Phenomena). The 28th SPIG includes two workshops that are closely related to the conference topics: the workshop on X-ray Interaction with Biomolecules in Gas Phase (XiBiGP) and the 4th International Workshop on Non-Equilibrium Processes (NonEqProc).

The Editors would like to thank the members of the Scientific and Advisory Committees of SPIG 2016 for their efforts in proposing the invited lectures and review of the contributed papers, as well as the chairmen of the associated workshops for their efforts and help in organizing the workshops and selection of invited talks. We particularly acknowledge the support of all members of the Local Organizing Committee for their help in the organization of the Conference. We are grateful to sponsors of the conference: RoentDek Handels GmbH and the European Physical Journal D.

Finally, we would like to thank all the invited speakers and participants for taking part in 28th SPIG and to wish them a pleasant stay in Belgrade, inspired and valuable moments and a very successful conference.

Editors: Dragana Marić, Aleksandar Milosavljević,
Bratislav Obradović and Goran Poparić

Belgrade, 2016.

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SPIG 2016

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1.2. Heavy Particle Collisions
1.3. Swarms and Transport Phenomena

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PARTICLE AND LASER BEAM INTERACTION WITH SOLIDS

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Section 3.

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INTERACTIONS OF CHARGED PARTICLES WITH DOUBLE-LAYER GRAPHENE

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Nowadays we are witnesses of a development of one promising branch of applied physics, called plasmonics. Especially interesting issue is plasmonics in quasi-two-dimensional (q2D) crystals deposited on various dielectric substrates. Here arise the main questions: how to increase the 2D plasmon propagation length and how to excite 2D plasmon most efficiently. We will focus on describing the interaction between electronic excitations in two graphene layers with phonons in aluminium oxide (Al_2O_3) slab on which the graphene layers are deposited. Special attention will be paid to explain the hybridization between 2D plasmons and surface (TO) phonons. Because of multiple intersections of 2D plasmons and TO phonons the 2D plasmon moves to lower energies which allows it to be excited by charged particles moving at subthreshold speeds, $v < v_F$ [1]. We will present the results for wake potential induced by a charged particle which moves parallel to the graphene/dielectric interface. It will be shown how various substrates modify the efficiency of particle/plasmon coupling. The electronic excitations in graphene are obtained by using plane waveab initio approach where we have addressed the problem of calculation of EELS spectra in the optical limit ($Q \to 0$) and how to avoid intersupercell Coulomb interaction [2].

REFERENCES

[1] T. Marinković, I. Radović, D. Borka, Z. L. Mišković, Plasmonics **10** 1741-1749 (2015).
[2] V. Despoja, D. Novko, K. Dekanić, M. Šunjić, L. Marušić, Phys. Rev. B **87**, 075447 (2013).

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