

BPU11 CONGRESS

The Book of Abstracts



Editors:

Antun Balaž
Goran Djordjević
Jugoslav Karamarković
Nenad Lazarević

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Preface

Dear colleagues and readers,

The Abstract book of the BPU11 Congress, which you are holding in your hands, aims to provide you with more information regarding the scientific program and the scientific contributions that are going to be presented at the Congress, as well as at the parallel and satellite events.

The BPU11 Congress is part of the series of general conferences of the Balkan Physical Union (BPU) which were firstly organized in Thessaloniki, Greece in 1991. Due to the COVID-19 pandemic, BPU11 is held now, in 2022, in a hybrid format with more than 450 registered participants, instead of being held in 2021 as it was primarily scheduled.

The scientific program is comprised out of 15 different scientific sections, 13 plenary lectures, 21 invited talks, a special FRONTIER session, 5 round tables and 2 workshops for teachers.

There will be more than 300 presentations in total. There are 109 oral presentation and 159 poster presentations which were accepted by the International Scientific Committee (ISC) for presenting.

We wish to express our sincerest gratitude to the International Advisory Committee (IAC) with 60 confirmed members, which is co-chaired by the academician Zoran Popović and professor Radu Constantinescu, the ISC with 151 members, which is co-chaired by professors Antun Balaž, Jugoslav Karamarković, and Nenad Lazarević. We would also like to thank the International Organizing Committee (IOC), country coordinators and last but not least, the Local Organizing Committee (LOC) chaired by professor Dragoljub D. Dimitrijević.

I would personally like to thank professor Luc Berge, the president of the European Physics Society (EPS) and the cochairmen of the BPU11 IOC. Additionally, I would like to express my gratitude to Mr. David Lee, Secretary General of EPS, for his continuous support of the BPU and other regional associations in the Balkans.

The BPU11 Congress would not have been made possible without the great support of our institutional co-organizers:

The main host, the Serbian Academy of Science and Arts (SASA), Faculty of Sciences and Mathematics-University of Niš, Faculty of Physics-University of Belgrade, Mathematical Institute of Serbian Academy of Sciences and Arts (National Institute of the Republic of Serbia), which are also the co-hosts of the Congress; Faculty of Mathematics-University of Belgrade, Faculty of Sciences-University of Novi Sad, Faculty of Science-University of Kragujevac, Faculty of Sciences and Mathematics-University of Pristina in Kosovska Mitrovica, the

SEENET-MTP Centre, and last but not least, Vinča Institute of Nuclear Science (National Institute of the Republic of Serbia).

We would also like to thank the Institute of Physics Belgrade, National Institute of the Republic of Serbia, for their great scientific contribution that attributed to the success of the Congress.

Furthermore, it is important to note the EPS has greatly contributed to the organization of the BPU11 Congress, as well as the previous congresses, and helped to support it financially.

The Congress, its parallel, and satellite events are internationally broadcast and financially supported by: The International Center for Theoretical Physics (ICTP) Trieste, the Central European Initiative (CEI) Trieste, Conseil Européen pour la Recherche Nucléaire (CERN) in Geneva.

We are also very much indebted to the European Physics Journal (EPJ) for the sponsorship that will provide the awards for the best the poster presentations awards at the BPU11 Congress.

We would also like to thank the Ministry of Education, Science and Technological Development of the Republic of Serbia and the Provincial Secretariat for Higher Education and Scientific Research, Autonomous Province of Vojvodina, Republic of Serbia, for the valued financial support they have provided us with so far.

Finally, we would like to share with you the brief history of the BPU and to say a few words regarding its future: The BPU was firstly initiated by professors Aleksandar Milojević and Djordje Bek-Uzarov, in 1985, and established two years later in Bucharest, Romania, in 1987. BPU is a regional Union of 10 Physics societies. I am more than pleased to say that the BPU was recently, institutionally lifted to a higher level, and that it became a legal entity in June 2022, with its Headquarters at the Department of Physics, Aristotle University, Thessaloniki, Greece. The 4th edition of the Balkan Physics Olympiad which will take place in Cyprus, this October, proves that the BPU has established a strong foundation, and that there is an excellent reason to optimistically look forward towards the future of the BPU and its cooperation with its numerous partners from Europe and all over the world.

Niš, Serbia, 18 August 2022
Prof. Dr. Goran S. Djordjević
President of the Balkan Physical Union

S12-PSSAP-200 / **Poster presentation**

Competitive Influence Diffusion Through Social Networks

Authors: Klotilda Nikaj¹; Margarita Ifti¹¹ *University of Tirana, Albania***Presenter:** M. Ifti (margarita.ifti@rambler.ru)

The dynamic of the information distribution is complex and affects everyday life, especially with the multiple ideas that are being released in social networks. These multiple ideas often have competing nature for the same nodes of the network. In this work we will discuss two competitive influence diffusion models in social networks. First, we take in consideration the competitive cascade model and at a certain point, the network will behave according to a competitive linear threshold dynamic model. We will assume that when a certain number of the nodes will have a specific information and when this number will grow up beyond a critical percentage of the active nodes, then we will reach an automatic collective change behaviour of the network. Each node in the network can be inactive or active (positively or negatively). If we can control the diffusion processes of the information in the network, we can predict the popularity of the innovation introduced. Since is a challenging task to predict the popularity of an innovation, by analyzing the dynamic of the network according to the competitive diffusion models as extended of single item diffusion. By joining the two models for the diffusion of the information on the directed networks, we will better understand the dynamic of the information distribution through the network, and how this distribution is affected from the different attitudes of the individuals when they firstly have this information. By combining and analyzing the two competitive diffusion models, extending them with two influence distribution functions, we take as a result as a better way to outperform in term of efficiency and effectiveness.

S12-PSSAP-201 / **Poster presentation**

Direct Conversion Of Ionizing Radiation Into Electrical Energy Using PIN Diodes

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The energy that comes from the source of ionizing radiation is enormous and quite unused. Using energy from ionizing radiation is a novel concept, while so far in the literature (to the best of our knowledge), only beta radiation has been treated as a possible source of energy (Quenon 2021). This paper focuses on utilizing gamma radiation energy using the Cobalt-60 radiation source. Direct conversion of radiation into electrical energy is possible using pn or pin junction-based semiconductor structures. When high-energy photons hit a semiconductor structure, a built-in electric field of pn junction can separate the generated electron-hole pairs before they recombine, creating the potential difference at the component electrodes. The PIN diodes used in this paper were made in planar technology, with three different active area surfaces: 0.8, 5 and 80 mm², at the Center of Microelectronic Technologies, Institute of Chemistry, Technology and Metallurgy, University of Belgrade, Serbia. The experiment was conducted in controlled laboratory conditions at the Department of Radiation and Environmental Protection at the Vinča Institute of Nuclear Sciences, Belgrade, Serbia. The range of gamma radiation dose rates for which the PIN diodes have been tested is from 1 μGy/h to 10 Gy/h under controlled conditions at room temperature. It is necessary for the diode to operate in a photovoltaic mode to act as a current source in an electrical circuit. Therefore, during irradiation, the characteristics of diodes: short-circuit current and open-circuit voltage were measured as the most important parameters of the current source. The lowest detected dose rate value of the PIN diode with the largest active area (80 mm²) was 5 mGy/h, while diodes with middle (5 mm²) and the smallest active area (0.8 mm²) were 100 mGy/h. The short-circuit current values of PIN diodes for all active area dimensions have a linear dependence with a given dose rate range. By calculating the short-circuit current density, we obtain that diodes with different active areas have almost the same dependence on the dose rate. This result indicates that the current generated under the ionizing radiation directly depends on the size of the active region of the PIN diode. On the other hand, open-circuit voltage values do not have a linear dependence on the dose rate, even the diode with the smallest active area (0.8 mm²) has higher values than the diode with the middle active area (5 mm²). For the highest dose rate (10 Gy/h), the short-circuit current value of the PIN diode with the largest active area is 37 nA, and the open-circuit voltage is 118 mV, which can enable power supply of the low power electric circuits by connecting diodes in series and parallel. The research should continue in order to develop a self-powered circuit that will monitor radioactive sources and their environment.

References

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