Physics

J. Šafránková and J. Pavlů (editors)
Contents

Preface ................................................................. 5

Physics
M. Birosˇ, Search for New Physics with the ATLAS Detector, f9 ............................... 7
B. Bezdˇekov´a, J. Biˇc´ak, and V. Balek, On the Light Rays Propagating
in Plasma Medium Around Relativistic Objects, f1 ................................. 13
J. Podgorn´y, M. Dovˇciak, F. Marin, R. Goosmann, G. Matt, and A. R´o´za´nska,
X-ray Polarization of Black-hole Accretion Disks in Active Galactic Nuclei, f1 .............................. 21
T. ˇDurovcov´a, J. ˇSafr´ankov´a, and Z. Nˇemˇeˇcek, Study of Alpha Particle Properties
Across Rarefaction Regions, f2 ............................................... 27
A. Salohub, J. Safr´anková, and Z. Nˇemˇeˇcek, Statistical Study of ULF Waves
in the Upstream Region: THEMIS Observations, f2 ................................ 34
S. Kamaletdinov, I. Vasko, and A. Artemyev, On Slow Electron Holes
in the Earth’s Magnetosphere, f2 ........................................ 41
S. Gohl, F. Nˇemec, and M. Parrot, Variations of Energetic Particle Fluxes Around
Significant Geomagnetic Storms Observed by the Low-altitude DEMETER Spacecraft, f2 .......................... 48
A. Kol´ınsk´a, I. Kolmaˇsov´a, O. Santol´ık, E. Defer, and S. Pedeboy,
Properties of Electromagnetic Signals Generated During the Development
of Natural Lightning Discharges, f2 ........................................ 58
M. Liaskoni, L. Bartik, and P. Huszar, Modeling Wind-blown Dust Over Europe
and Their Impact on the PM2.5 Concentrations, f8 ................................ 67
L. Bartˇık, P. Huszár, O. Vlˇcek, and K. Eben, Sensitivity of Secondary Inorganic
Aerosol Concentrations to Precursor Emissions and Inorganic Aerosol Modules
in CAMx over Central Europe, f8 ........................................... 77
Z. W. Shilenje and T. Halenka, Observed Changes in Surface Air Temperature
During 1979–2020 over Central Europe, f8 .................................. 85
S. Dhib and T. Halenka, Projected Climate Change Indices over Prague Using
Dynamically Downscaled CMIP5 Models, f8 .................................... 90
J. Palacký, S. Rednyk, Š. Roučka, R. Plašil, and J. Glosík, Ion Trap Study
of the Isotope Exchange Reaction of OH− with HD, f2 .......................... 98
L. Uvarova, S. Rednyk, R. Plašil, Š. Roučka, P. Dohnal, and J. Glosík,
Study of Rotational Populations of OH− Anions in 22-pole Radiofrequency Ion Trap
in the Temperature Range of 50–200 K, f2 .................................... 102
Z. Turek and P. Kudrna, Study of Nanoparticles in the Hollow Cathode System
with Laser Beam Scattering, f2 .............................................. 107
H. Mishra, P. Kudrna, and M. Tichy, Analytical Evaluation of Plasma Parameters
by Optical Emission Spectroscopy in Low-Pressure Hollow Cathode Plasma Jet
and Planar Magnetron System by DC and Pulsed DC Excitation Source, f2 .............................. 112
A. Kapran, Z. Hubička, and M. Tichy, Diagnostics of Reactive HiPIMS Discharge
Assisted by ECWR Plasma, f2 ................................................... 120
A. Tuholukov and V. Stelmashuk, Facilitation of the Underwater Discharge Initiation with the Use of a Marx Generator, f2  ................................................................. 127

P. Pschotnerová, Physics Education in Upper Secondary Schools, f12  ......................... 134
Due to the COVID-19 pandemic, the anniversary 30th Annual Conference of Doctoral Students was slightly postponed and was held in Prague, at the Charles University, Faculty of Mathematics and Physics from June 15 to 17, 2021 as a hybrid meeting. The oral talks were presented online but the poster section took place as a live event. In this year, 81 students of physics study branches have registered as active participants to the meeting. The traditional WDS Proceedings is compiled from 19 student manuscripts finally accepted (from 22 originally submitted) for publication in this difficult year.

All submitted manuscripts were reviewed by two referees because we believe that it helps students to learn how to prepare the written presentation of their results in a foreign language and how to respond the referee’s notices. They should take into account their comments and prepare a new submission including letters to referees where they explain their reaction and this format is a standard publication procedure in scientific journals. In our concept, one of referees is a doctoral student, thus he/she can learn review writing, which is the knowledge they will need in the future. The subject of the paper under review is often slightly different from his/her field of research, so the student’s referees should investigate a new problem and another style of writing. They can see that a good and comprehensive review is sometimes a very difficult task. Therefore, a level of student’s reports is often different — from a formal review only to precise reports with a number of comments and suggestions.

The second referee is selected from the experienced senior researchers and, in this year, their list includes over 33 % of foreign experts because they feel the importance of such a method of teaching. We would like to express many thanks to all of 45 referees for the understanding and great help. Their effort significantly contributed to a traditionally good quality of the Proceedings and you can find over 830 citations to articles published in previous volumes in the database of Web of Science.

Editors thank to following referees:
Finally, we would like to express our thanks to all speakers and other participants for helping us to keep a fruitful and friendly atmosphere during the whole meeting as the photo from the joint poster session in a faculty atrium also demonstrates. Last but not least, we would like to thank our colleagues and many cooperative students who assisted us greatly both prior to and through the conference.

Pleasant reading

Jana Šafránková and Jiří Pavlů
Editors