



33rd SUMMER SCHOOL AND
INTERNATIONAL SYMPOSIUM ON
THE PHYSICS OF IONIZED GASES

August 25-28, 2026
Belgrade, Serbia

BOOK OF ABSTRACTS

Editors

Dragana Marić · Saša Dujko · Sanja Tošić
Jelena Marjanović · Bratislav Obradović



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FUNDAMENTAL COLLISION PROCESSES IN ATOMIC AND MOLECULAR SYSTEMS: INTEGRATING EXPERIMENT, THEORY, AND NUMERICAL MODELLING WITHIN THE ATMOLCOL PROJECT

Jelena B. Maljković¹, Jelena Vukalović^{1,2}, Bratislav P. Marinković¹, Vladimir Srećković¹, Hristina Delibašić-Marković³, Sanja Tošić¹ and Violeta Petrović³

¹*Institute of Physics Belgrade, University of Belgrade, 11080 Belgrade, Pregrevica 118, Serbia*

²*Faculty of Science, University of Banja Luka, Mladena Stojanovića 2, 78000 Banja Luka, Republic of Srpska, Bosnia and Herzegovina*

³*University of Kragujevac, Faculty of Science, Radoja Domanovića 12, 34000 Kragujevac, Serbia*

jelenam@ipb.ac.rs

Understanding the interactions of electrons, photons, and ions with atoms and molecules is essential for describing processes relevant to plasma physics, astrophysics, atmospheric chemistry, radiation physics, and biophysics. The ATMOLCOL project brings together complementary experimental, theoretical, and computational approaches to investigate collision-driven phenomena occurring on ultrashort time scales and to provide reliable cross-section data for a wide range of atomic and molecular targets.

The project addresses fundamental processes including elastic electron scattering (Vukalović *et al.* 2026), ionization (Srećković *et al.* 2025), photoionization (Delibašić *et al.* 2024) autoionization (Jureta *et al.* 2024), electron autodetachment, and dissociative electron attachment (Kopyra *et al.* 2025). Experimental investigations are primarily based on crossed-beam techniques, enabling well-defined binary collision conditions and high-precision measurements of collision observables. Theoretical studies employ first- and second-order formalisms together with advanced numerical modelling, including the Independent Atom Model with the Screening Corrected Additivity Rule and

interference corrections (IAM-SCAR+I), providing accurate descriptions of electron scattering from complex molecular systems.

By integrating experimental measurements with predictive theoretical models, ATMOLCOL contributes to a deeper understanding of charged-particle and photon interactions with matter and to the development of comprehensive databases of collision parameters. The synergy between experiment and theory enables systematic studies of atoms and biologically relevant molecules and supports applications in radiation damage modelling, environmental science, plasma technologies, and biomedical research. The project therefore provides an interdisciplinary framework for advancing both fundamental atomic and molecular physics and its broader scientific and technological applications.

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