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SLOVAK ACADEMY OF SCIENCES

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**SPECTRAL LINE SHAPES IN
ASTROPHYSICS AND RELATED
ATOMIC DATA**

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AND RELATED ATOMIC DATA**

Edited by

Milan S. Dimitrijević, Paola Marziani, Djordje Savić
and Luka Č. Popović

Based on lectures presented at
**15th Serbian Conference on
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June 9 - 13, 2025, Niš, Serbia

Astronomical Observatory of Belgrade

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PREFACE

The special issue of Contributions of the Astronomical Observatory Skalnaté Pleso: Spectral Line Shapes in Astrophysics and related Atomic Data focuses on research concerning the spectral line properties and the corresponding atomic and molecular data. Namely, the analysis of spectral lines, their widths, and, more generally, their shapes, is a powerful diagnostic tool for probing emitting/absorbing gas, enabling to use the observed spectra for analysis and modelling of various astrophysical objects from interstellar clouds of molecular and ionized hydrogen to neutron stars and quasars. It is well known, that atomic and molecular spectroscopy is a key method for plasma studies not only in astronomy but also for laboratory plasma, lasers and laser produced plasma, fusion research, atmospheric investigations, applied physics and industry. Therefore, interaction between astrophysicists and laboratory physicists who produce various atomic and molecular data and investigate spectra originating from different cosmic sources can provide a boost to our understanding of the Universe. Accordingly, stating from 1995 to 2025 we have organized 15 conferences on Spectral line shapes in astrophysics, in order to bring together astronomers and physicists from Serbia and other countries to review and present their current research.

In this Special Issue there are 15 selected papers written by participants of XV Serbian Conference on Spectral Line Shapes in Astrophysics, June 9-13, 2025, Niš, Serbia, where 65 colleagues from 19 countries attended. The participants were from Algeria, Bangladesh, Belgium, Bulgaria, Chile, China, Dominican Republic, France, Germany, Iran, Israel, Italy, Mexico, Romania, Russia, Serbia, Slovenia, Spain, and USA. The conference sessions have been dedicated to *Databases and spectral line shapes from laboratory to space plasma*, *Spectral line shapes and astrophysical phenomena*, *Emission lines in active galaxies and nebulae*, *Spectral line phenomena in plasmas from diffuse to dense states*, *Spectral lines in astrophysical and laboratory plasma*, *Surveys and spectral line variability in extragalactic objects*, *Atomic parameters and spectral line shapes*, *Spectral line phenomena in extragalactic objects*, *Spectral line shapes in different space conditions*, *Spectral line research: new frontiers* and *Spectral line variability and other characteristics in AGNs*. More informations could be found on the official website of the conference: <http://servo.aob.rs/scslsa/>. All materials (programme, talks, presentations, photos, etc.) from the previous meetings are available at <http://servo.aob.rs/eeditions/SCSLSA.php> through Serbian Virtual Observatory (<http://servo.aob.rs/scslsa/>).

All papers, selected for this special issue, were subjected to a strict refereeing process. We are thankful to the reviewers for their valuable time to ensure the strict scientific standard of the articles.

Milan S. Dimitrijević, Paola Marziani, Djordje Savić and Luka Č. Popović
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