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A&M DATA

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SCIENTIFIC RATIONALE

Spectroscopy is a powerful tool for the analysis of radiation from different plasmas in astronomy, laboratory, fusion research, atmospheric research and industry. Efficacy theoretical analysis, synthesis and modelling of stellar spectra as well as the spectra from other plasma sources, depends on atomic data and their sources. In particular, for the modeling of stellar atmospheres and opacity calculations a large number of atomic data is needed, since we do not know a priori the chemical composition of a stellar atmosphere. Consequently, the development of databases with atomic data and astoinformatics is important for stellar spectroscopy.

The Conference is planned as an opportunity to consider above mentioned aspects of spectroscopic research on plenary sessions and then to work on the special mini-projects, which will result in common papers to be published in international astronomical journals after the Conference.

Venue

Hotel "President", Palić, Serbia

Electron-metal atom vapor cross sections maintained within BEAM database

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Belgrade Electron-Atom/Molecule (BEAM) database [http://servo.aob.rs/emol] has been created in order to curate cross sections for electron interactions with atomic and molecular particles and with the aim to be a part (node) of other portals, as well as to fulfil a broader task of maintaining A/M data in a comprehensive way. It became an integral part of two portals: RADAM (Radiation Damage) database [1] and VAMDC (Virtual Atomic and Molecular data Centre) [2,3]. A significant number of entries within BEAM belongs to electron cross sections for metal vapor atoms. Elastic cross sections (Mg, Hg, Ag, Yt, Bi, Rb, Pb, Sb, Cd) and excitation cross sections (Mg, Hg, Ag, Yt, Na, Ca, Bi) have been compiled from the published refereed sources. Data entries within BEAMD follow IAEA classification scheme for processes [4] and use their standards for labelling of atomic states according Pyvalem as a Python package [5].

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Excitation of silver atoms from the ground S state to the first excited P state by electron impact

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Silver is extensively employed in various scientific, technological and practical applications [1-3]. In our previous papers we reported results (differential DCSs and integrated ICSs cross sections) of combined experimental and theoretical study of excitation of the silver atom from the ground $4d^{10}5s^2$S state to the first combined resonant $4d^{10}5p\ ^2P_{1/2,3/2}$ state (fine-structure doublet with total angular momenta of J = ½ and 3/2 and energies of 3.664 and 3.778 eV, respectively) [4, 5]. Recently, we published results for electron impact excitation of the $4d^95s^2\ ^2D_{3/2}$ (4.304 eV) and $4d^{10}6s^2\ ^2S_{1/2}$ (5.276 eV) states [6]. Since McNamara *et al.* in their relativistic convergent close coupling (RCCC) computation [7] raised queries about the validity of our DCSs for resonant excitation, we have reanalyzed the earlier experimental DCS data. We have found that DCSs at 20 and 40 eV need to be renormalized due to incorrectly splicing our very forward-angular distributions onto our middle and backward-angular distributions. The new appropriate renormalization factor were applied and here we present new experimental DCSs results and the comparison with calculated relativistic distorted wave (RDW) and nonrelativistic atomic optical potential model data.

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Integrated cross sections for electron impact excitation of atomic silver

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Here we present integrated (integral Q_I, momentum transfer Q_M, and viscosity Q_V) cross sections (ICSs) for electron-impact excitation of the $(4d^{10}5s)\ ^2S_{1/2} \rightarrow (4d^{10}5p)\ ^2P_{1/2,3/2}$, $(4d^{10}5s)\ ^2S_{1/2} \rightarrow (4d^95s^2)\ ^2D_{3/2}$ and $(4d^{10}5s)\ ^2S_{1/2} \rightarrow (4d^{10}6s)\ ^2S_{1/2}$ transitions in atomic silver at impact energies E_0 from 10 to 100 eV.

ICSs for all states were derived from the corresponding differential cross sections DCSs at each E_0. We extrapolated our experimental DCSs to 0^o (using the measured results at small scattering angles for resonant transition [1] and corresponding theory for other two states [2]) and 180^o (using the RDW calculations for the given energy [2,3]), performed an interpolation, and then undertake the appropriate integration. The new renormalized experimental DCSs for resonant excitation at 20eV and 40 eV were used (see abstract Excitation of silver atoms from the ground S state to the first excited P state by electron impact by S. D. Tošić *et al.*).

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Analysis of laser initiated electric discharge spark in atmosphere: clustering classification method

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Time resolved analysis of spectra of laser initiated electric discharge spark in atmosphere is presented here. Spectral images of optical emission of atmospheric plasma are obtained by a streak camera. Machine learning (ML) techniques are used more and more for analysis of LIBS data [1-6]. Here, large set of measured spectra are classified using Principal component analysis and clustering algorithms. For machine learning approach to data analysis we use Solo software package (Version 8.8, Eigenvector Research Inc, USA) [7].

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