Report on the outcomes of a Short-Term Scientific Mission[1]

Action number: CA20129

Grantee name: Milan Dimitrijevic

Details of the STSM

Title: STARK BROADENING OF Cu II SPECTRAL LINES

Start and end date: 15/04/2024 to 24/04/2024

Description of the work carried out during the STSM

Description of the activities carried out during the STSM. Any deviations from the initial working plan shall also be described in this section.

(max. 500 words)

Grantee enters max 500 word summary here.

Befor the start of the STSM, we completed the literature about investigations of Stark broadening of Cu II spectral lines, and its interest for laser-induced periodic surface structures (LIPSS) and laser ablation research, as well as its significance in technology, laboratory plasma research and other applications, in order to better write the article. During STSM we made the corresponding model of Cu II ion i.e. the system of energy levels to which the dipoly allowed transitions from the upper and lower atomic energy level of the considered transition are possible. Than we calculated, using the modified semiempirical theory (see Ref. 1 and references therein) Stark broadening parameters for 15 spectral lines of Cu II. Using the obtained results, we analyzed regularities and systematic trends of Stark broadening parameters within multiplets and supermultiplets, which might be useful for the interpolation and extrapolation of new data and for critical evaluation of published results or, results obtained during the theoretical or experimental work. Also, we worked on the preparation of obtained data in XSAMS (XML Schema for Atomic, Molecular and Solid Data) format for the implementation of results in the international, on-line database STARK-B, a part of VAMDC (Virtual Atomic and Molecular Data Center). Also, we discussed and analyzed the obtained results and started to write the corresponding article.

1. Dimitrijević, M. S., 2020, Forty years of the applications of Stark broadening data

1 This report is submitted by the grantee to the Action MC for approval and for claiming payment of the awarded grant. The Grant Awarding Coordinator coordinates the evaluation of this report on behalf of the Action MC and instructs the GH for payment of the Grant.

determined with the modified semiempirical method, Data, 5, 73.

Description of the STSM main achievements and planned follow-up activities

Description and assessment of whether the STSM achieved its planned goals and expected outcomes, including specific contribution to Action objective and deliverables, or publications resulting from the STSM. Agreed plans for future follow-up collaborations shall also be described in this section.

(max. 500 words)

Grantee enters max 500 word summary here.

All planned goals and expected outcomes of the STSM have been achieved. As the main result, we obtained Stark broadening parameters, FWHM (full widths at half intensity maximum) for 15 spectral lines of Cu II ion, using the modified semiempirical theory. Also, we used the obtained results for the investigation of regularities and systematic trends of Cu II Stark broadening parameters within multiplets and supermultiplets, which might be useful for the interpolation and extrapolation of new data and for critical evaluation of published results or, results obtained during the theoretical or experimental work. Results for broadening by electron collisions are obtained for a greed of temperatures. As the contribution to deliverables, the results obtained during this STSM will be presented in an article in an international journal with impact factor. They will be also implemented in the international STARK-B database, which is a part of european Virtual Atomic and molecular data center - VAMDC. The results for Stark broadening of Cu II spectral lines, obtained during this STSM contribute to the WG1 working group of CA20129. Namely, profiles of Cu II spectral lines are useful for diagnostics, spectral analysis, modelling and optimization of laser produced plasma in front of coper target in photon and ion irradiation of metal nanoparticles, or investigation of radiation-induced morphology changes and other copper-based NPs experiments, as well as for optimization of such experiments, since the line profiles enter in the calculation of absorption coefficient which is important for investigation and modelling of laser produced plasma.