

RADIATIVE ION-ATOM COLLISIONS IN STELLAR ATMOSPHERES

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In this lecture, we will present results of our investigations of the influence of the processes of radiative charge exchange in symmetric and strongly non-symmetric ion-atom collisions on the opacity of solar and stellar atmospheres in UV and VUV regions. We considered several ion-atom systems ($H + H^+$, $He + He^+$, $He + H^+$ and $H + A^+$, where $A = Li, Na$ etc.) and determined some characteristics, such as molecular potential curves and dipole matrix elements. They were used for the determination of coefficients of spectral absorption due to examined processes, together with the corresponding molecular photo-dissociation processes, in the atmosphere of the Sun and some DB white dwarfs. It was found that the influence of the considered processes should be taken into account for modeling of stellar plasma and analysis and synthesis of stellar spectra, since for example these processes generate rather wide and firm molecular absorption bands in the UV and VUV regions, which neglectation will introduce errors in the interpretation of the observational data.

MINI PROJECTS

OPTICAL MONITORING OF HIGH ENERGY EMITTING GALACTIC NUCLEI

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Approximately 20% of nearby galaxies show hints of energetic activity in their nuclear regions, through the presence of appreciable amounts of ionized gas. The source of activity is most often identified either with very young stellar populations, dominated by hot, massive stars, or with non-thermal processes occurring in the galactic nuclei.

Nowadays it has been realized that both possibilities take an important part in the evolution of galaxies. Indeed, there is increasingly strong observational evidence suggesting that nuclear activity and star formation are likely to be physically connected. However, to investigate whether there is a cause-effect relationship between these two phenomena, we have to investigate the properties of galaxies, the masses of which are in the critical range where starburst activity and AGN activity are more likely to be found (Rafanelli et al. 2011). In this project, we propose to operate the newly upgraded 1.22m telescope in Asiago to start a monitoring campaign of a list of such objects selected also on the basis of their high energy emission (X and gamma rays). Variable high energy emission, indeed, is considered as an effective track of AGN related processes. Our idea is to exploit the Asiago observatory as an optical facility to perform observations of objects, which are studied at high energies, too. Taking advantage from multiple frequency observations, it is our aim to improve the current understanding of nuclear activity in galaxies, investigating the dynamics of AGN central engines, as well as the properties of galaxies where ongoing star formation is probably overlapping with nuclear activity.

VALIDITY OF THE VIRIALIZATION APPROXIMATION OF THE BROAD LINES IN AGNS

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The broad lines of AGNs are used to measure the mass of black hole, supposed to be in their center. Here we are going to check validity of virilization approximation of broad lines in AGNs. We measured widths of broad lines at 1/10, 1/5, 1/2 and 3/4 of the maximal intensity, and plot their ratios as a function of full width at maximal intensity. Using this plots we will be able to conclude how much is emitting gas gravitationally bounded.