

[ST11] Effects of Collisional De-excitation on the Flux Ratio of
Resonance Doublets in Symbiotic Stars

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Resonance doublets including OVI 1032, 1038, NV 1238, 1243 and C IV 1548, 1551 constitute prominent emission lines, displayed in the spectra of symbiotic stars. Arising from $S_{1/2} - P_{3/2}$, $P_{1/2}$ transitions, these lines are expected to be generated with the fixed ratio of 2:1, which is inconsistent with spectroscopic studies of many symbiotic stars from IUE and FUSE data. With our adopted values for typical emission nebulae in symbiotic stars having physical dimension of $R \sim 10^{13}$ cm and electron number density $n_e \sim 10^{10} \text{ cm}^{-3}$, the collisional de-excitation time scale is 10^{-3} s, for which the line center optical depths for major resonance doublets are of order $\tau_0 \sim 10^5$ and the probability P_{coll} of collisional de-excitation per scattering is $\sim 10^{-5}$. Using a Monte Carlo technique, we investigate the collisional de-excitation effect on the resonantly scattering media, which eventually leads to various flux ratios for resonance doublets. We find that various line ratios are obtained in media with the product P_{coll} and τ_0 of order unity, which appears to be pertinent in the emission nebulae of symbiotic stars. In particular, the flux ratio decreases linearly on the parameter $P_{coll} \log \tau_0$. We briefly discuss the IUE observations of symbiotic stars.

[ST12] Disentangling of composite spectra using synthetic code

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We introduce examples of disentangling of composite spectra using the synthetic code SPECTRUM which was developed by Richard O. Gray. It computes LTE synthetic spectra using atomic and molecular line list for the optical spectral region 3000Å to 6800Å. We use ODF (opacity distribution function) grids from Robert Kurucz for a stellar atmosphere model. Effective temperature for synthetic spectra is initially guessed by a spectral type or a color. The samples of disentangling of composite spectra in a binary with an accretion disk and in a multiple system are shown in this work.