[ST06] A Monte Carlo Study of Polarization Structures in the Thomson Scattered Line Radiation

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Thomson scattering is often invoked to explain broad wing features that are seen in various objects including active galactic nuclei and symbiotic stars. Despite the the wavelength independent scattering cross section of Thomson scattering, the line flux may exhibit wavelength-dependent linear degree of polarization, because various parts of emission wings are contributed by photons with different scattering numbers. Specifically more scattered and hence more weakly polarized photons tend to fill the wing parts that are far off from the line center, while the neighborhood of the line center is dominated by less scattered photons with higher degree of polarization. Using a Monte Carlo technique, we investigate the polarization structure of Thomson scattered line radiation. Significantly varying degree of polarization is obtained when the scattering medium has Thomson optical depth $\tau_{TH} \geqq 1$. A detailed analysis of polarization structure formation is conducted by investigating the dependence of the polarization and profile width on the scattering number for a finite electron scattering slab with $\tau_{TH}=1$. We present our high resolution spectrum around Hα of the symbiotic star V1016 Cygni obtained using Bohyunsan Optical Echelle Spectrograph, which is well fitted by Thomson scattered wing with $\tau_{TH}=0.5$ and the electron temperatur $T_e = 6.2 \times 10^4 K$. We tentatively propose that characteristic polarization structures may be expected in this system if Thomson scattering is responsible for the wing formation.

[ST07] Cu and Zn abundances in Metal-Poor Halo Stars

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Abundances of elements in metal-poor halo stars are important clues for the description of the chemical evolution of our Galaxy. Since the work by Sneden et al.(1991) it have been known that [Cu/Fe] ratio declines with decreasing metallicity but this trend is not repeated for the neighboring element Zn. The Cu can be made in e-process (SN II & SN I) or s-process(massive and intermediate stars). The Cu trend with metallicity would give clues on that what type of nucleosynthesis mechanism had played the important role. We obtained the high signal to noise (S/N>200 at 5000Å) and high resolution(R=45,000) echelle spectra with BOES mounted at the 1.8m telescope at BOAO. Cu and Zn abundances for metal-poor halo stars were derived using equivalent widths and comparing observed and synthetic spectra.