By comparison with the absolute fluxes of the solar coronal lines which were measured when the sun was in a quiescent state we got the result that for 10 stars the upper limit of the scaling factors are between 2,000 and 8,000. We have got higher values for the other 4 stars because we have spectroscopic data only for the λ 6375 line, the intensity of which in the sun is smaller by a factor of 4.5 compared to the λ 5303 line. Since these results are for the quiet sun, we would get even lower values if we took the absolute solar line fluxes for a more active sun.

These results lead us to the conclusion that the intensity of any 10^6 K corona is less than 8,000 times that of the sun, while lines forming in 10^4 to 10^5 K gas are 10^4 to 10^6 times stronger than those of the sun. From this one may conclude that T Tauri stars in general do not have an extensive corona.

Paschen and Balmer Lines in Active Galactic Nuclei

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1. Introduction

If there is substantial disagreement between an observational result and its expectation from established theory, astronomers tend to speak of a "problem". One of those problems which bothered optical and UV astronomers during the past years is the discrepancy of the observed ratio of the Lyα and Hβ line intensities with the value of this ratio predicted by simple recombination theory for a photoionized hydrogen gas.

In this process, ionization electrons are recaptured into higher levels and excited atoms formed this way decay to successively lower levels by radiative transitions, finally reaching the ground level. Thereby the various hydrogen recombination spectra are emitted. The lowest of them are the Lyman, Balmer and Paschen spectra (cf. Fig. 1). Now, the Lyα/Hβ ratio observed in quasars and active galactic nuclei are found to be by a factor of 3 to 10 times less than the theoretically predicted value (~ 30). There may be ways around the Lyα/Hβ problem by modifying the simple theory, but the solutions are unfortunately not unique. Some theorists believe that special radiative transport effects in the spectral lines and electron collisions during the line-formation process cause enhanced Balmer line strengths and thereby depress the Lyα/Hβ ratio. If the entire discrepancy is not to be explained by such processes alone, interstellar dust within and/or around the line-emitting regions (which are up to several light years across) may help to reconcile theory with observations (cf. e.g. Davidson, K. and Netzer, H., 1979, *Rev. Mod. Phys.*, Vol. **51**, No. 4, p. 715). To explain this, we have plotted in Fig. 2 the standard interstellar extinction curve as a function of wavelength known from our Galaxy. Along the curve we indicated the locations of the various hydrogen lines. It is obvious that the influence of dust extinction on these lines must be quite different due to its strong wavelength dependence. It is also recognized that Pα and Pβ are relatively unaffected by dust as a result of the decrease (approximately $\propto 1/\lambda$) of the extinction curve towards longer wavelengths. Moreover, because Pα and Hβ originate from the same upper atomic level, the Pα/Hβ ratio may be used as a sensitive indicator for the existence and importance of reddening by dust in addition to, or instead of, Balmer line enhancement due to optical depth effects. Therefore the measurement of the near infrared Pα and Pβ lines at 1.88 and 1.28 μm, respectively, may help to pin down an appropriate theoretical model for the hydrogen-emission-line region.

2. IR Spectrophotometry of Pα

As a result of strong efforts at various places (Caltech, ESO, La Jolla) on the technical side, the sensitivity and spectral resolution of infrared detectors has been substantially improv-

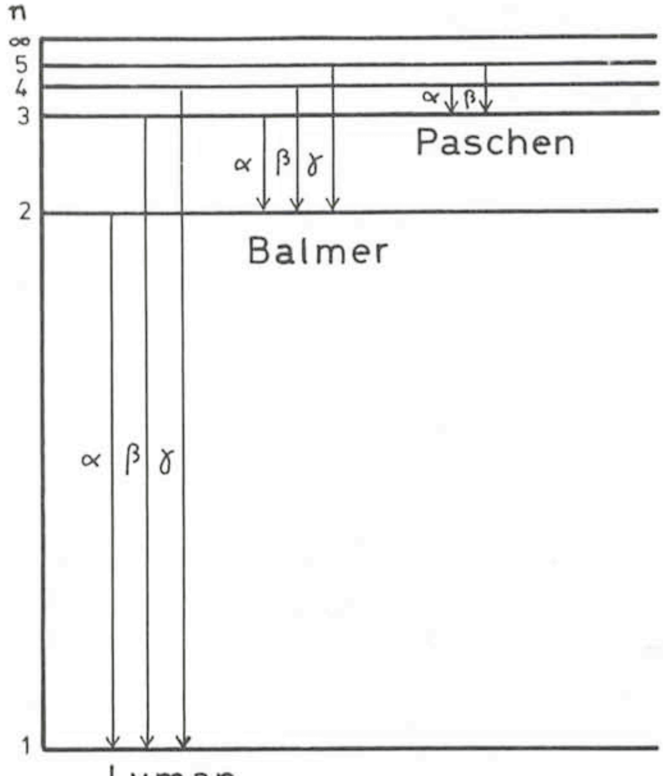

Fig. 1: *Energy-level diagram for the hydrogen atom showing the Lyman, Balmer and Paschen series. n is the principal quantum number.*