To illustrate the method, we consider a δ Scuti star for which several frequencies are observed, for instance $\nu_{0,1}$, $\nu_{0,2}$, $\nu_{0,3}$ (fundamental radial mode and first and second radial overtones) and the frequency of a "mixed mode" ν_{G1} (see Unno *et al.*, 1989). The accuracy on the frequency measurements is high ($0.1\,\mu$Hz), but the uncertainty on the position of the star in the H-R diagram (luminosity and effective temperature) can be important.

By means of theoretical models it is possible to estimate the unknown parameters of the star (mass, age, composition, physics) provided a sufficient number of observables (frequencies) is available. However as shown by Brown *et al.* (1994) and by Lebreton *et al.* (1994), some of the observables are not independent and the set of observables has to be carefully chosen. By choosing as independent observables $\nu_{0,1}$, $\nu_{0,3}/\nu_{0,1}$ and ν_{G1} we try to solve for the most important physical unknown, the overshooting parameter O_v. We find that, with the actual precision on the measured frequencies, O_v could be determined with a precision of 20 % (0.03 H_p, where H_p is the pressure scale-height) which is quite good since presently O_v is estimated to be 0.15 ± 0.15 H_p.

Unfortunately, the uncertainty on the helium abundance of those stars is high since it cannot be obtained by observations. So, in order to get estimates of both the overshooting distance and the helium abundance, it will be necessary either to observe more frequencies for a given star, or to observe several stars in the same cluster in order to increase the number of independent observables with respect to the number of unknown parameters. We have found that disregarding effects of fast rotation, for these stars, would lead to a misidentification of the modes.

Finally, we consider the effect of fast rotation. Fast rotation induces a frequency shift in the oscillation spectrum (Saio, 1981; Dziembowski & Goode, 1993; Soufi *et al.*, 1994). If this shift was neglected in the previous example, this would lead to erroneous values of the overshooting parameter. Rotation also modifies the position of a star in the H-R diagram with respect to a non-rotating star. The displacement in the H-R diagram has been estimated by Maeder and Peytremann (1970, 1972).

16. Observations of deep-seated structure in the stellar winds of OB stars (R. K. Prinja)

High-resolution, time-resolved spectroscopy in both optical and UV wavebands has shown that the outer layers of luminous OB stars vary on time scales of hours-days. Spectroscopic monitoring with the IUE satellite provides evidence that the stellar winds of luminous, hot stars are not smooth and steady, but are frequently disrupted by the presence of time-dependent structures. In addition, variability is often present in optical photospheric line profiles; these variations are likely due to the influence of photospheric velocity fields, especially those from one or more modes of nonradial pulsation (NRP). The process (or processes) responsible for the formation of time-dependent wind structure is (are) not known. Issues concerning potential connections between NRPs, variations at the base of the outflow, and the development of wind structure pose some of the greatest challenges to our understanding of mass-loss via radiatively driven stellar winds.

We have recently gathered UV data from IUE plus high-quality ground-based spectroscopy in order to constrain the formation mechanism of wind structure via the key issue of the location in the stellar wind at which structure—as diagnosed by variability—is first detectable. An important place to search for such deep-seated variability is in the optical spectrum, where all the wind features (*e.g.* Hα, He I λ5876) are due to recombination and hence preferentially formed in the high density regions of the wind; where extended time series of high S/N spectra can be readily obtained. We have obtained extended, high S/N ($\sim$200) optical time series observations of He I λ5876 and Hα for the extreme O supergiant, HD 152408 (Prinja & Fullerton, 1994). Systematic variability is evident in the P Cygni absorption trough of He I λ5876 at velocities as low as -50 km/s.

In a separate study, Massa, Prinja & Fullerton (1994), have carried out ultraviolet spectroscopy of the intermediate luminosity B-type supergiant, HD 64760. Continuous wind activity is documented over 6 consecutive days, with unambiguous evidence for the presence of structures deep in the supersonic wind. Substantial variability evident in the Si III λ1300Å triplet lines, which correlates with the strongest perturbations in the wind-formed resonance lines, provides firm evidence for a link between wind activity and the subsonic photospheric layers of the atmosphere. The observations also point to the long term, large scale spatial coherence of the wind structures.

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