GRAVITIES AND METALLICITIES OF STARS WITH PROTOPLANETARY DISKS

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We present here the motivation and methodology of an ongoing study of a sample of Herbig Ae/Be and Vega stars surrounded by disks. Stellar gravities and metallicities are computed by comparing the observed spectra with synthetic models. These parameters, together with the effective temperature, will allow us to compute the age and hence, the evolutionary stage of the objects.

The determination of absolute parameters and properties of PMS stars with protoplanetary disks is a necessary condition to model accurately the disk themselves. The mass, radius and effective temperature of the central star will determine the energy received by the disk and therefore its geometry, energy balance and contribution to the spectral energy distribution. The metal abundance of the star is also an important factor because the gas contained in the disk will have, in a first approximation, a similar metal content, which, in turn, will have an influence on its evolution and the potential formation of planets.

In the last few years we have carried out a systematic determination of absolute parameters for a sample of T Tauri, Herbig Ae/Be and Vega stars in order to model their protoplanetary disks. The stars were observed during the EXPORT campaings (Eiroa et al. 2000) and their spectral classification, projected rotational velocities and variability have been already studied (Eiroa et al. 2001, 2002; Mora et al. 2001; Merín 2004a; Merín et al. 2004b).

Stellar gravities are being determined using mid-resolution ($R \sim 6000$) spectra of the Balmer lines Hβ, Hγ and Hδ, obtained with the CAFOS instrument on the 2.2-m telescope at Calar Alto (Almería), by comparing the wings with synthetic profiles. Metal abundances are detemined by comparing observed profiles extracted from echélle spectra ($R \sim 50,000$) taken with the UES instrument on the 4.2-m telescope WHT at La Palma, with synthetic spectra computed using the ATLAS9 code by Kurucz (1993) (see an example of the latter in Figure 1).

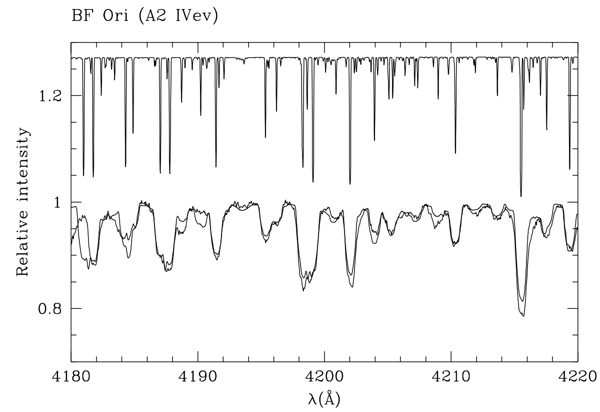

Fig. 1. Example of the determination of the stellar abundance for BF Ori. At the top, a synthetic spectrum computed with $T_{\rm eff} = 8970$ K, $\log g_* = 3.83$ and [M/H]=0.20. At the bottom, the synthetic spectrum broadened with $v \sin i = 38$ km/s (black) superimposed to the observed spectrum of the star (grey).

Provided the effective temperature is known, the determination of the gravity and metallicity allows to place the star in the HR diagram and superimpose the appropriate set of evolutionary tracks and isochrones. This leads to a determination of the stellar age. The results of this study will be published elsewhere (Montesinos et al., in preparation).

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