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Projected rotational velocities of some δ Scuti and γ Doradus stars

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Abstract

We present the projected rotational velocities of some δ Scuti or γ Doradus stars as derived from high-resolution spectrograms. For 6 stars the values are the first determinations.

In the past years during our campaigns of monitoring of some selected δ Scuti stars (see for example Mantegazza & Poretti 2002 and references therein) we obtained spectra of a few δ Scuti or γ Doradus stars in order to estimate their projected rotational velocities. Most of the spectra were taken with the Coudé Echelle Spectrograph attached at the Coudé Auxiliary Telescope at La Silla Observatory (ESO) in the 90's. These spectra have a resolution of 60000 and cover the spectral range between 4490 and 4525 Å; their typical S/N in the center is usually better than 200 at the continuum level. Few more spectrograms were taken with the FEROS spectrograph, then attached at the ESO 1.5 m telescope of La Silla Observatory in the years 2001-2002. These spectrograms have a resolution of 48000 and cover the spectral range 3600-9300Å. For the present work the useful lines between 4400-4600Å were considered. All the spectrograms were normalized to the continuum, defined by selecting a set of continuum windows star by star and fitting them with a low-degree polynomial. The unblended lines were then fitted by means of a non-linear least-squares routine with a rotational profile convolved with a Gaussian intrinsic one taking also into account the limb darkening. Limb darkening coefficients were derived from the paper by Diaz-Cordoves et al. (1995). The number of useful lines varies from 2 to 7, depending upon rotational velocity, spectral type and spectrograph. The typical rms uncertainties, resulting by averaging the values obtained form different lines and/or spectrograms, are between 1-2 km/s. The

results are reported in the following table, where for each star we give name, spectral type, our $v \sin i$, the number of spectrograms and a letter identifying the spectrograph (C=CES, F=FEROS). In the 3 successive columns we give for comparison the values derived by Royer et al. (2002), Abt & Morrel (1995), and in the third those reported in the δ Scuti star catalog by Rodriguez et al. (2000) or in other recent papers. The references are given in the next one. There are only three γ Doradus stars in the sample: QW Pup, BT Psc, BU Psc.

The agreement among the estimates of different authors is generally satisfactory with a few exceptions. The most striking is that regarding QQ Tel. We observe that the estimate by Koen et al. (2002) is based on the correlation profile (not directly on the line profiles), computed on spectrograms with a lower resolution than ours (39000 vs. 60000), and maybe these are the causes of the discrepancy.

Acknowledgments.

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Table 1: Measured $v \sin i$ and comparison with other determinations

HD	Name	Sp.Type	$v \sin i$		previous values			
			km/s		(1)	(2)	others	ref.
2724	BB Phe	F2II	83	1F	–	–	83	(3)
3326	BG Cet	A5m	91	1C	110	98	98	(3)
4849	AZ Phe	A9.5III	92	1C	–	–	–	
4919	ρ Phe	F2III	84	1C	–	–	–	
8511	AV Cet	F0V	190	1F	212	195	141	(3)
"	"		188	55C				
9065	WZ Scl	F0IV	33	1C	–	–	–	
11413	BD Phe	A1V	126	1C	139	–	124	(3)
11522	BK Cet	F0V	129	2C	133	120	120	(3)
15634	TY For	A9V:n	128	1C	146	141	141	(3)
"	"		124	3F				
16723	BS Cet	A7IV	52	1C	–	–	–	
55892	QW Pup	F0IV	56	2C	51	–	–	
66853	BI CMi	F2	78	1F	–	–	76	(4)
160589	V703 Sco	A9V	$\leq$10	13F	–	–	$\leq$16	(3)
182640	δ Aql	F0IV	89	2C	91	85	–	
185139	QQ Tel	F2IV	65	2C	–	–	45	(5)
208435	BZ Gru	F1III-IV	148	1C	–	–	–	
214441	CC Gru	F1III	123	1C	–	–	–	
215874	FM Aqr	A9III-IV	94	2C	110	98	100	(3)
223480	BF Phe	A9III	83	1F	–	–	80	(3)
"	"		83	20C				
224638	BT Psc	F0	19	16C	–	–	17	(6)
224639	BH Psc	F0	108	1F	–	–	110	(3)
224945	BU Psc	A3	58	26C	–	–	54	(6)

(1) Royer et al. (2002)
(2) Abt & Morrel (1995)
(3) Rodriguez et al. (2000)
(4) Breger et al. (2002)
(5) Koen et al. (2002)
(6) Mathias et al. (2004)