RESULTS OF A SPECTROPHOTOMETRIC SURVEY OF WHITE DWARF SUSPECTS IN THE SOLAR NEIGHBOURHOOD

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OBSERVATION

320 blue stars of the Giclas and Luyten catalogues with positions $\pm 30^{\circ}$ $\delta < 15^{\circ}$ and magnitudes $12^{m} < m_{pg} < 15^{m}$ have been observed photometrically in UBVRI and Strömgren colours with the ESO 1m telescope at La Silla in order to increase the number of close-by white dwarfs. From their Strömgren colours more than 120 stars belong to the white dwarf region. But, as outlined by Rupprecht and Bues (1983), a combination of the photometric systems and the combined two-colour diagrams (R-I)/(U-V) and (R-I)/(u-b) provide additional information on binary components. Fig.1 shows a sample in the (R-I)/(u-b)diagram. For (u-b) < .2 and (R-I) > .2 a second component is present.

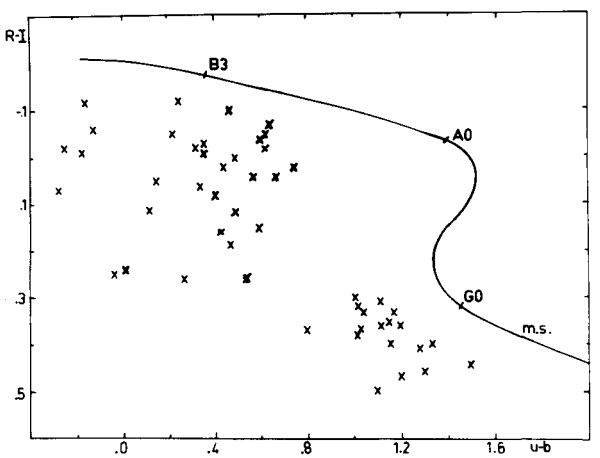

Fig.1 : combined two-colour diagram of observations

With these criteria in mind,we took 82 objects for further investigation. At the ESO 1.52m-telescope spectra (114 Å/mm,IDS+CCD) have been obtained for all white dwarfs and an analysis by model atmosphere technique has started to determine the distance of the objects. For three stars (GD (GD 1401,GD 1555,GD 1072) we did polarimetric measurements with the PISCO at the ESO 2.2m telescope,where GD 1072 yielded a positive result of 2% slightly variable linear polarization,the others did not show any polarization.

https://doi.org/10.1017/S0252921100099504 Published online by Cambridge University Press

Here we would like to present our results for those stars of spectral type DA indicated by heavy colour in Fig.1 and with photometric data summarized in Table 1.

Table 1: WHITE DWARFS OF TYPE DA FROM COLOURS

NAME	V	B-V	U-B	U-V	R-I	y	b-y	m_1	u-b	d (pc)
L 550-52	14.20	.14	-.51	-.37	.04	14.33	.01	.47	.74	25
LP 611-52	15.24	.12	-.62	-.50	.08	15.53	.05	.31	.41	47
LP 906-28	15.05	.19	-.62	-.43	.11	15.03	.07	.33	.50	36
LP 734-74	15.53	.24	-.69	-.45	-.06	15.49	.11	.26	.59	39
LP 615-46	14.97	.23	-.60	-.37	.26	14.98	.14	.19	.56	30
LP 736-4	14.75	.27	-.96	-.69	.17	14.71	.22	.10	.41	49
LTT 4893	14.66	.12	-.59	-.47	-.13	14.54	.16	.20	.62	28
L 905-20	14.10	.04	-.89	-.85	.24	14.16	.03	.08	.01	34
LHS 2712	14.81	-.03	-.67	-.70	-.10	14.80	-.07	.30	.47	58
LTT 5410	14.61	.21	-.57	-.36	.06	-	-	-	-	25
LTT 5453	14.93	.32	-.61	-.29	.04	15.00	.16	.20	.54	25
LP 739-61	15.77	.15	-.66	-.51	-	15.77	-.06	.41	.53	54
LTT 6451	15.20	.20	-.59	-.39	-.07	15.16	.03	.30	.63	34
GD 1295	14.17	-.13	-.68	-.81	-.01	14.16	-.03	.15	.36	47
GD 1192	13.37	.10	-.61	-.51	-.04	13.37	.03	.41	.61	22
GD 1212	13.26	.18	-.57	-.39	.04	13.25	.08	.27	.67	16

ANALYSIS

Hydrogen line-blanketed LTE model atmospheres have been used to compute colours as well as fluxes in the range $16000^{\circ} \geq T_{eff} \geq 11000^{\circ}$K, log g=7 and 8. For a detailed comparison of the Balmer line region, we developed a new code of Stark profile calculation for H_α to H_ε. Fig.2 shows the region of H_β to H_δ for one of the cooler objects of our DA sample in direct comparison with flux and line profiles of a model atmosphere. The profile of each Stark component is computed in steps of .15Å and

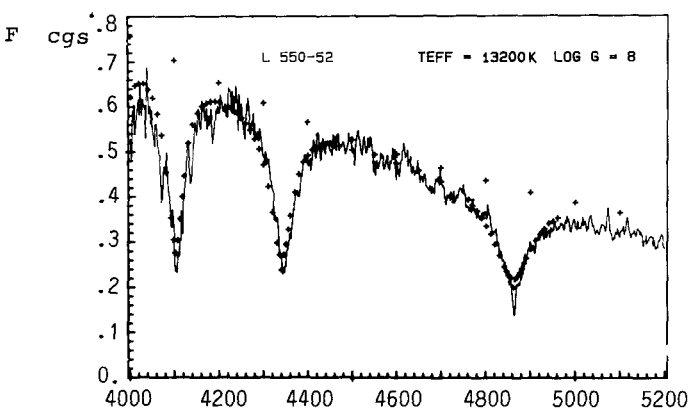

Fig.2:Direct comparison between the flux of a model atmosphere and an observed best fitting spectrum

https://doi.org/10.1017/S0252921100099504 Published online by Cambridge University Press

then folded with other broadening mechanisms. The agreement with observed profiles is improved as compared to tabulated and interpolated values.

With T_{eff}, log g and the bolometric correction taken from a fit of a model atmosphere with white dwarfs of known distance we calculated photometric parallaxes of the stars in Table 1. The last column of the Table contains the results.The accuracy of the distance determination should be better than 15pc.

If compared to the total number of this most common type of white dwarfs in the intermediate range of temperature,our survey increases the number within 50 pc by 5 %. Our investigations of cooler objects,however,do not show a further increase of objects by number,as we had expected when we started the programme.

For 4 cool very blue subdwarfs (GD 806,GD 1439,G82-44,G152-67) with an abundance analysis by model atmospheres with $7000^{o} \gtrsim T_{eff} \gtrsim 5500^{o}K$, $5.5 \lesssim \log g \lesssim 6.5$ and photometric parallaxes a distance of $\sim$100 pc for the G-stars and 500 pc for the GD stars has been determined.GD 806 is the most interesting object of this group with a reduction of heavy metals by a factor of at least 10^{3} and C reduced by a factor of 10 only. Fig.3 shows an important part of the blue spectrum,where the Balmer lines are the strongest features by far and the weakness of CaII at $6500^{o}K$ is evident.

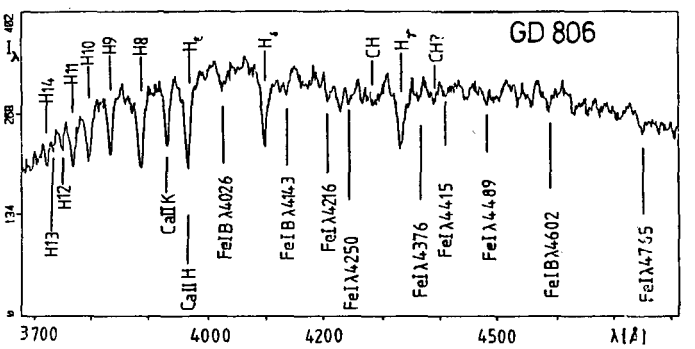

Fig.3: Blue spectrum of GD 806 (114 Å/mm)

The survey will be continued for another year to obtain a detailed analysis for white dwarfs and various kinds of subdwarfs.

REFERENCES

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https://doi.org/10.1017/S0252921100099504 Published online by Cambridge University Press