CATACLYSMIC VARIABLES IN A WHITE DWARF SURVEY AT THE SOUTH GALACTIC POLE

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ABSTRACT. During a photometric and spectrophotometric survey of 200 white dwarf candidates with $m_{pg} < 15^m.0$ in a field around the South Galactic Pole two new cataclysmic variables have been identified and new observations of one already known object have been accumulated. Observations in the visible and UV-region show variability and differences in spectral type.If compared to the numbers of cataclysmic variables/white dwarfs as computed by Ritter and Burkert (1985)there is a shortage of a factor of 5.

INTRODUCTION

For a sample of 354 blue stars of the Giclas and Luyten proper motion lists photometric observations in the UBVRI and Strömgren system have been obtained in order to identify white dwarfs.From their positions in the combined two colour diagrams more than 100 objects belong to the white dwarf region.Some objects,however,showed a strong deviation for (R-I) when the blue colours definitely proposed a white dwarf.A spectroscopic investigation revealed several binaries,three of which belong to the group of cataclysmic variables.Here we present part of the observations for GD1662 =VY Scl,GD 1401 and GD 1555.

OBSERVATION

Our survey started in 1980 with the Bochum 61cm-telescope and continued with the ESO 1m-telescope for the photometric observations until now.Spectroscopic results have been obtained with the ESO 1.52m telescope (dispersion 114Å/mm and 59Å/mm) since 1983.The UV-observations are low disper-

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sion spectra taken with the IUE-satellite. Furthermore, the Bamberg plate collection (70 plates taken in South Africa during the years 1963-1974) could be used to check for variability.

GD 1555($\alpha(1950)=23^h15^m54^s$, $\delta(1950)=-30^o14!6$) is the object with the smallest changes of intensity in the blue region of the spectrum. With $m_{pg}=14^m.9$ at maximum,it is at the limit of the Bamberg plates and visible on 7 of them (Kodak IIa-O).Our photometric observations yield $15^m.5$ at the minimum and a variation of B-V from -.21 to .06,R-I from .10 to .20.The IDS-spectra in the visible,taken during 2 nights in May 1986,show very broad Balmer lines with strong emission components of variable strengths and traces of CIII-NIII at 4650 Å as well as a faint HeI 4472Å line.

The equivalent widths of the Balmer lines correspond to white dwarfs of spectral type DA,the profiles to those of novalike cataclysmic variables like V3885 Sgr.The investigation will be carried on with more spectra to determine a period and the nature of the system.

GD 1662=VY Scl($\alpha(1950)=23^h26^m21^s$, $\delta(1950)=-30^o03.4$) is a cataclysmic variable system,already known for a long time. It is normally in a high state of $m_{pg}=13^m.4$ with reported (Pismis,1972,van Genderen,1973,Philip and Stock,1972) spectra of broad absorption lines of hydrogen and helium with emission components.Irregular very deep minima occur with a large change of colours and spectra.

In Fig.1 we have accumulated, improved and enlarged the sample of observations shown by Pismis (1972) and by Rupprecht and Bues (1983).The values between 1964 and 1974 are from the blue Bamberg plates,where the scale in magnitude is taken from a sequence on the Harvard-Groningen Selected area Nr.163.Since 1980,the value of our photoelectric blue magnitude is taken or the limits for it.

Our photometric survey started when the system was on decline and the colours showed a small red excess.Unfortunately spectra could not be obtained due to telescope restrictions and-during another observing run- due to the faintness ($m_{pg}=17.0^m$).During rise again,in 1983,Hutchings and Cowley (1984) took spectra in the same period when we obtained photometric data and noisy IUE data could be taken.The system was at $m_{pg}=16.3$,all colours were bluer than our data from 1981.The spectra in the visible showed HI and HeI lines in emission,the UV-region is dominated by strong CIV lines in emission.A period of .16 days was determined by the authors.Our new spectra(October 1985,June 1986)show emission lines of neutral hydrogen only,no P-Cygni profiles,and the photometric blue magnitude is with 12.6 and 12.3 stillin rise.The R-I=0.00 indicates that the hot component is the only source of radiation. The accretion disk seems to contain a very small amount of material.

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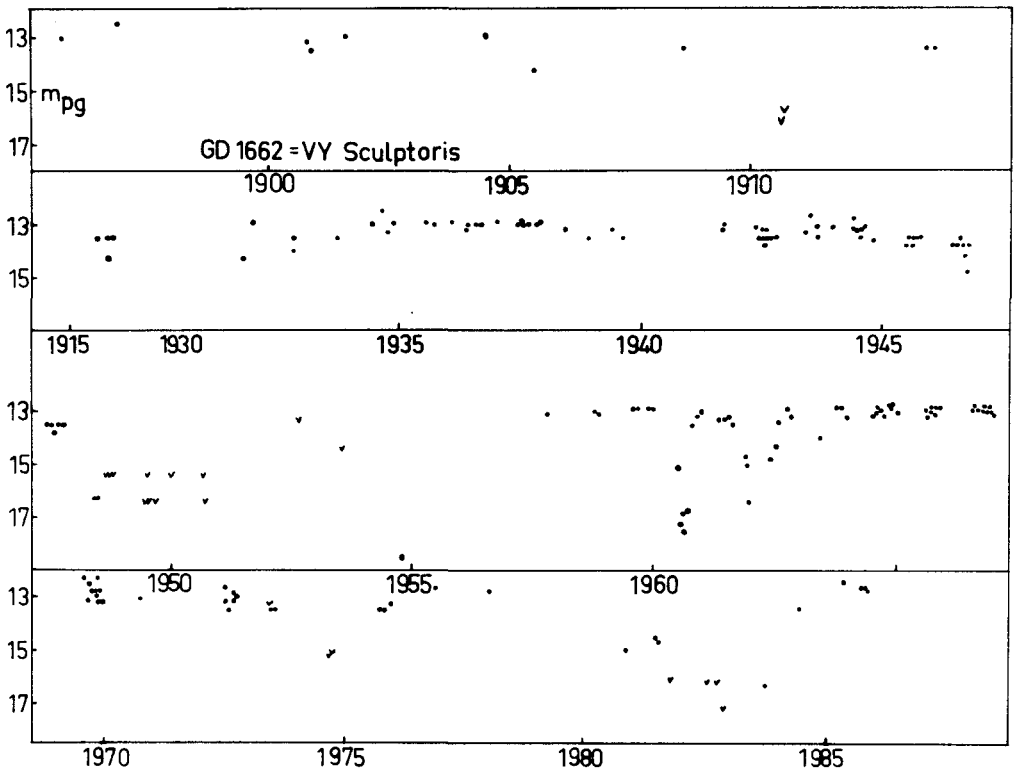

Fig. 1. Accumulated data for the variation of the blue magnitude of the system GD 1662 = VY Sculptoris from the literature and from own photometric data.

GD 1401($\alpha(1950)=1^h45^m49^s$, $\delta(1950)=-25^o47.6$) is the new cataclysmic system already mentioned and partly analyzed by Bues (1985). Fig.2 and Fig.3 show two phases with strong emission components.In the meantime we obtained 4 new IDS spectra in the visible and a low dispersion spectrum of the UV (Nov.26,1985,83min.exp.time).The spectra in the visible fit to our tentative solution of a period of 4hours,although at all phases strong absorption of the Balmer lines is observed,corresponding to a hydrogenrich white dwarf of spectral type DA.The UV spectrum,however,has a steep gradient in the continuum and no emission lines at all.A broad depression of Ly_α is the only feature visible.So the phase of the visibility of the white dwarf should be longer in this system than for a normal cataclysmic.A fine analysis will be finished within half a year.

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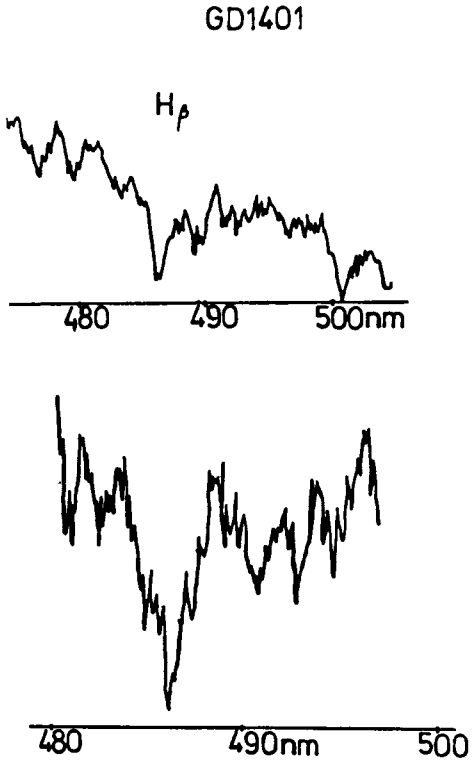

Fig. 2. The region around H_β of two image tube spectra of GD 1401 with strong emission components.

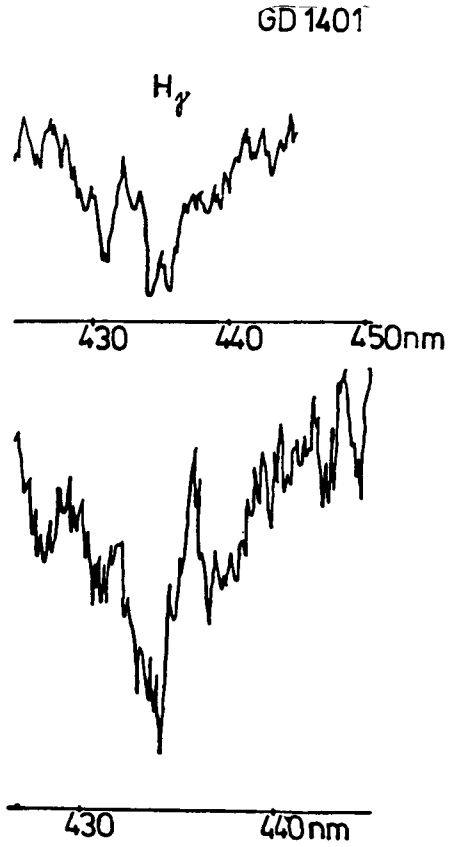

Fig. 3. The spectral region of H_γ for the same phase than for H_β.

DISCUSSION

The Green survey of blue stars (Green at al.1982) revealed already that the percentage of cataclysmic variables in the polar region is very small.Our three systems among 25 white dwarfs with m $\lesssim$15.0 at the South Pole are an improvement over Green's data achieved by our more subtile photometric method and we hope that the sample is now complete.
More theoretical data by Ritter and Burkert(1985 and this conference)would result in a fraction of visible cataclysmic variables of small mass of at least five times as many as we have got. A decision on the way of application of Ritter's numbers can be obtained only when a reliable mass determination for the systems is possible.

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