Note that the amplitude of the optical pulsations also implies an X-ray luminosity, responsible for the reprocessed flux, greater than the X-ray measurements. This leads to assume that a large fraction of the hard X-rays is rethermalized at lower energy. Detection of very soft X-rays or extreme UV radiation could solve the mystery of the missing X-ray radiation.

Though the detection of an accretion disk is not quite well established, we have seen that it seems reasonable to affirm its existence. On the other hand, the proposed interpretation for the pulsations requires a white dwarf sufficiently magnetized to favour an anisotropic accretion along the magnetic field. But other possible signatures of a magnetic field (i.e. linear and circular polarization, Zeeman components, cyclotron lines) have been seeked unsuccessfully in these systems. Such properties have been detected in other cataclysmic systems called "polars" in which the magnetic field of the white dwarf was evaluated to be equal to $3\,10^7$ Gauss. In these sources, the extended magnetosphere prevents the formation of an accretion disk. Moreover, a magnetic coupling between both companions occurs, leading to a synchronization of the rotation of the white dwarf with the orbital period. In the intermediate polars, the magnetic field would be too weak to achieve this synchronization and to observe its direct effects. Besides, we expect to observe a polarized radiation in infrared. Unfortunately, no such measurements have been done up to now. I think that now the reader begins to understand the origin of the name "intermediate polars". He also has to know the existence of a small group of cataclysmic variables which exhibit pulsations at very short periods, and consist of two novae DQ Her and V533 Her and a dwarf nova AE Aqr (respectively with periods 71s, 63s and 33s). Only one, AE Aqr, was detected in X-rays and shows X-ray 33s pulsations. The magnetic oblique rotator model was also suggested for these systems. But recently the disappearance of the 63s pulsations in V533 Her cast serious doubt on such an interpretation. These fast rotating objects are thought to have a weakly magnetized white dwarf ($B < 5\,10^5$ Gauss), although no direct evidence for such a field is found. With respect to their rotational period as well as the strength of their magnetic field, the "intermediate polars" are therefore located between the DQ Her type objects and the AM Her type systems (polars).

A Puzzling Source: H2215–086

While a satisfactory model has been proposed for 4U1849–31 and H2252–035, the X-ray source H2215–086 classified as an intermediate polar on the basis of strong optical pulsations with a 21-minute period does not seem to enter quite well in a similar frame. It differs slightly from the two previous sources by showing very strong He II lines, a rather flat UV continuum and pulsations with a huge amplitude (40% in V). Previous observations suggest the presence of a 23-minute period (Patterson, J., and Steiner, J. E., 1983, *Astrophysical Journal,* **264,** L61). In order to precise the nature of this system, we have carried out spectroscopic observations at the 3.6 m telescope using the IDS detector. Unfortunately, the wind was blowing too strongly at the 1 m telescope to get simultaneous photometric data. Then, after four hours of observing time we were requested by a careful astronomer on duty to shut the dome of the 3.6 m. Despite the bad wheather, these observations provided a lot of information. Thanks to very short-exposure spectra (30 seconds) with a 12 Å resolution, it was possible to detect the 21-minute pulsations in the continuum and the strongest emission lines. Search for periodicity in these individual spectra reveals clearly the 21-minute period and an additional period at 23 minutes corresponding to the beat period with the orbital one (4 hours). A possibly false pulsation at 19 min could also be present, maybe due to the total duration of the observations.

To increase the signal to noise ratio we have folded the spectra with the 21-min and 23-min periods and then determined the variations of the continuum at several wavelengths and of the Balmer and He II λ 4686 lines (intensities, equivalent widths and radial velocities) (Fig. 5). Surprisingly, the results, though well established, are rather difficult to interpret when gathered together. Let us discuss some of them. Both pulsations exhibit an energy distribution F_λ in λ^{-2} on the wavelength range 4200–6800 Å and at the maximum of the orbital period, the 23-min pulsation is at minimum when the 21-min pulsation is at maximum. In the context of the geometrical model described above and assuming that at the orbital maximum the red dwarf companion is behind the white dwarf, this would imply a pulsation arising from the accretion column while the other one is due to a heating effect. But how to explain the energy spectrum? Now, taking into account the strong variations of the radial velocities of the lines with the 21-min period (receding motion when the flux is minimum), this suggests a region of line formation in the column (the free-fall velocity being the dominant motion) and a heating origin for the 21-min pulsation, a conclusion incompatible with the previous ones based on the phasing of the 23-min and 21-min pulsations! It is obvious that no clear description similar to the one proposed above is satisfactory. The study of the spectroscopic variability of 4U1849–31 and H2252–035 has not yet been completed. It is urgent to do so in order to confirm the previous interpretation and to clear up to the confused and puzzling results of H2215–086.

Conclusion

Though the class of the intermediate polars is very little crowded, the similar properties of the four objects incite to consider them as a special group. Nevertheless, it might be possible that further observations emphasize different behaviours or on the contrary strengthen a unique model for these systems. The discovery of new pulsating sources, either from X-ray or optical observations would allow to clarify the nature of these peculiar objects. Let us hope that bad weather conditions will not prevent us from achieving these crucial observations.

Acknowledgements

I would like to express my thanks to the ESO staff members for their helpful assistance during several observing runs on La Silla.

List of Preprints Published at ESO Scientific Group

September-November 1983

276. G. Chincarini: HI Content in Cluster and Supercluster Galaxies. COSPAR/IAU Symposium in Rojen, Bulgaria. September 1983.
277. M. Rosa and J. Solf: On the Internal Kinematics of the Giant Extragalactic HII Complex NGC 604. *Astronomy and Astrophysics.* September 1983.
278. G. Contopoulos: Theoretical Periodic Orbits in 3-Dimensional Hamiltonians. *Physica D.* September 1983.
279. A. C. Danks, W. Wamsteker, P. A. Shaver and D. S. Retallack: A Near-Infrared Study of the Region l = 305°. *Astronomy and Astrophysics.* September 1983.

280. D. Baade: Discovery and Preliminary Identification of Two Retrograde Nonradial Pulsation Modes in the Be Star μCentauri. *Astronomy and Astrophysics.* September 1983.
281. C. Cao and R. N. Wilson: An Improved Prime Focus Corrector for f/3 True or Quasi Ritchey-Chrétien Primaries. *Astronomy and Astrophysics.* October 1983.
282. V. Caloi, V. Castellani, R. Nesci and L. Rossi: The Contribution by HB Stars to UV Radiation from Population II Systems. *Memorie della Società Astronomica Italiana.* October 1983.
283. A. C. Danks, S. R. Federman and D. L. Lambert: The CH Radical in Diffuse Interstellar Clouds. *Astronomy and Astrophysics.* October 1983.
284. M. Salvati: A New Geometry for Superluminal Motions. IAU Symposium No. 110: "VLBI and Compact Radio Sources", Bologna. October 1983.
285. M.-H. Ulrich: The Infrared, Optical and Ultraviolet Properties of Active Nuclei. IAU Symposium No. 110: "VLBI and Compact Radio Sources". October 1983.
286. I. J. Danziger, R. A. E. Fosbury, W. M. Goss, J. Bland and A. Boksenberg: Very Extended Ionized Gas in Radio Galaxies – II. An Optical and Radio Study of PKS 0349-27. *Monthly Notices of the Royal Astronomical Society.* October 1983.
287. C.-I. Björnsson: Pulsar Polarization as a Direct Consequence of the Emission Process. *Monthly Notices of the Royal Astronomical Society.* November 1983.
288. E. M. Sadler: Radio and Optical Observations of a Complete Sample of E and SO Galaxies. I. Radial Velocities. *Astronomical Journal.* November 1983.
289. E. M. Sadler: Radio and Optical Observations of a Complete Sample of E and SO Galaxies. II. UBV Aperture Photometry. *Astronomical Journal.* November 1983.
290. E. M. Sadler: Radio and Optical Observations of a Complete Sample of E and SO Galaxies. III. A Radio Continuum Survey at 2.7 GHz and 5.0 GHz. *Astronomical Journal.* November 1983.
291. A. F. M. Moorwood and I. S. Glass: Infrared Activity in Circinus and NGC 4945 – Two Galaxies Containing Luminous H_2O Masers. *Astronomy and Astrophysics.* November 1983.
292. L. W. Fredrick and R. M. West: A Study of Suspected Planetary Nebulae. *Astronomy and Astrophysics Supplement Series.* November 1983.
293. G. Contopoulos: The Dynamics of Galaxies. *Mitteilungen der Astronomischen Gesellschaft.* November 1983.
294. R. Svensson: Steady Mildly Relativistic Thermal Plasmas: Processes and Properties. *Monthly Notices of the Royal Astronomical Society.* November 1983.
295. G. Chincarini: Superclustering and Substructures. IAU Colloquium No. 78, Asiago, Italy. November 1983.
296. S. Cristiani and M. Tarenghi: A New X-Ray Emitting Seyfert 1 Galaxy. *Astronomy and Astrophysics.* November 1983.
297. G. Chincarini, M. Tarenghi, H. Sol, P. Crane, I. Manousoyannaki and J. Materne: The Horologium Region. I. The Data. *Astronomy and Astrophysics.* November 1983.
298. G. Contopoulos and A. Pinotsis: Infinite Bifurcations in the Restricted Three-Body Problem. *Astronomy and Astrophysics.* November 1983.

10th Meeting of the European Working Group on Chemically Peculiar Stars

H. Hensberge, Astrofysisch Instituut, Vrije Universiteit Brussel
H. M. Maitzen and W. W. Weiss, Institut für Astronomie, Universität Wien

On October 5 and 6, 1983 the European Working Group on Chemically Peculiar Stars (CP Stars, formerly called Ap Stars) convened its 10th meeting at the ESO headquarters in Garching. After the opening, Dr. Herman Hensberge from the Vrije Universiteit Brussel gave a seminar to the ESO audience on "Progress of Ap research at ESO". In what follows we shall provide the reader with the essence of his talk.

The foundation of the European Working Group on CP Stars dates back to autumn 1978 (more precisely and more astronomically: to J. D. 2443793.917) when on the occasion of a workshop on Ap stars in the Infrared, held at the Vienna Observatory, half a dozen Belgian and Austrian astronomers got together and decided that the unsatisfactory situation concerning data collecting in Ap research should be removed by coordinated planning of the observations, especially at ESO, and by more intense exchange of information concerning available, but unpublished data.

The first requirement has been met since by organizing semiannual meetings before the deadlines of ESO applications. These meetings are usually hosted by one of the collaborators of the Working Group (WG), i.e. his institute, but also by ESO. This way Vienna, Paris, Brussels, Liège, Catania, ESO-Garching, Trieste, Göttingen, Mons and now again ESO have been our meeting places since spring 1979.

The second point has been tackled by issuing so far 10 times *A Peculiar Newsletter* (eds. H. Hensberge, Gh. Deridder, W. van Rensbergen, Brussels) containing information on existing data, planned observations and submitted papers. Due to its important role it has become a worldwide means of communication and serves also the IAU Working Group on Ap Stars.

At the moment astronomers from six European countries participate actively in the WG: Austria (Maitzen, Rakosch, Weiss), Belgium (Deridder, Hensberge, Manfroid, Mathys, Renson, van Santvoort), France (Floquet, Gerbaldi, Megessier, Morguleff), Germany (Hössler, Kroll, Schneider, Vogt, Voigt), Italy (Catalano, Faraggiana), Yugoslavia (Pavlovski). There is some cooperation also with Switzerland and with eastern and non-European countries.

Our scientific goal is to collect data on the peculiar properties of the CP stars which encompass slower rotation compared to the normal stars, strong metal line spectra, strong organized magnetic fields, often with reversing polarity, strong spectrum variability and recently pulsational instability.

The model of the "Oblique Rotator" which foresees a non-zero angle between the magnetic and rotation axes in these stars explains successfully the observed phase relationship between these phenomena.

Unexplained, however, is the question of the origin and the evolutionary time scales of these phenomena, i.e. magnetic fields, abundance anomalies, slow rotation. A number of theories and hypotheses have been put forward to explain the formation of peculiarities. Havnes and Conti (1971) have qualitatively shown that the interaction of the rotating magnetosphere of a magnetic Ap star with the interstellar medium produces both the deceleration of stellar rotation and the building up of abundance anomalies around the magnetic poles. Michaud (1970) takes diffusion of elements due to the selective effect of the radiation field on different elements as the mechanism for abundance anomalies. Strittmatter and Norris (1971) advocate mass loss along the polar field lines as cause for breaking of the rotation, while Fleck (1981) recently proposes hydromagnetic deceleration by the stellar magnetic field without mass loss.

The important question, where the strong magnetic fields come from, is answered either by the fossil field hypothesis or by a dynamo theory.