a long-standing controversy about the existence of an electron halo. If cosmic rays are to be contained in the Galaxy, a rather strong electron halo is expected. The refinement of measuring techniques over the last 20 years has led radio astronomers to conclude that any such large scale component surrounding the galaxy must be weak. Also the experimental evidence indicates that the spectral index of the radio continuum emission at high distances above the galactic plane is steeper than the spectral index near the plane.

Observations of edge-on or nearly edge-on galaxies offer the best opportunity to study the halo phenomenon. An analysis of 408 MHz observations led R. Wielebinski to conclude that any halo around M31 is weaker than that surrounding the Galaxy. Further studies of the halo of M31 using the 100 m telescope were made recently at the "low" frequency of 842 MHz by R. Gräve et al. Other edge-on galaxies mapped were NGC 891 and NGC 4631. The only high frequency halo so far found was at 8.6 GHz in NGC 253 (R. Beck et al.). This observation implies a young population of relativistic electrons and this may be due to the high nuclear activity seen in NGC 253. The relation between nuclear source and radio emission in the disk is unclear at present. Studies of the nuclei of galaxies, particularly with the highest angular resolution of the VLBI technique, should tell us something about these relations and hence about the energy production in galaxies.

What Comes Next?

Future instrumental developments necessary in this field of research are now becoming apparent. Single-dish maps at the highest frequencies will be able to provide information on the thermal emission distribution in nearby galaxies. At present, to map a larger galaxy at 10.6 GHz down to the confusion level of the telescope would take ~ 1,000 hours. Developments which would speed up the observing, such as use of multi-beam receiver systems, are highly desirable. Aperture synthesis telescope maps at lower frequencies require the filling of the missing spacings. If this is not done, the extended structure is lost and the resulting map unusable for detailed studies. Combination of synthesis arrays and single-dish maps would give data which could be used in detailed spectral studies. The improvement in VLBI sensitivity by the use of a broader bandwidth should enable detailed studies of a larger number of nuclei of galaxies.

Studies of the radio continuum distribution in galaxies require parallel information from all other astronomical observation modes. For the investigation of the thermal content Hα-data are required. To study the relation of radio continuum to the density wave theory, high resolution H I studies of the same galaxies are needed. The halo of our galaxy can be investigated either in radio continuum or in γ-ray observations. Molecular line studies of normal galaxies have so far been limited either to nuclei or to extremely large H II regions. The advent of new techniques in all fields of astronomy and their application to studies of nearby galaxies will certainly bring us nearer to understanding the workings of these beautiful beings.

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δ Crucis is Variable!

E. W. Elst

During a recent visit to La Silla, Dr. Eric W. Elst of the Royal Observatory at Uccle, Belgium, discovered that one of the stars in the Southern Cross is variable. So are many other stars, but the present case is particularly interesting because the maximum amplitude in the lightcurve is only 0ᵐ006! The discovery is a powerful demonstration of the quality of the La Silla site and a tribute to the Bochum 61 cm telescope and its photometer.

Although the bright, southern star δ Crucis (V = 2ᵐ8) has been observed many times during the past, its variability has remained undiscovered until now. Due to the high precision of the Bochum 61 cm photometric system and extremely good weather conditions, it was possible, during my last stay at ESO in February 1979, to detect a short-periodic light variation of δ Crucis, with an amplitude of only 0ᵐ006!

Fig. 1: *The Southern Cross above La Silla. δ Crucis is indicated. Photographed by ESO photographer B. Dumoulin in 1977. The two bright stars below are α and β Centauri.*

Earlier Observations

In 1956 the radial velocities of seven bright southern B-type stars (from the D.H. McNamara list) were systematically examined at the Radcliffe Observatory, in an effort to detect the presence of short periods (Pagel, 1956, *MNRAS,* **116,** 10). Positive results were obtained for β Cru, τ^1 Lup and α Lup, whereas no conclusion could be drawn for δ Cru because the lines in the spectrum were too diffuse to be measured accurately.

It is interesting to note, that photoelectric observations of α Lup at that time by A.B. Muller (Leiden Observatory Southern Station) did not reveal any variation in excess of 0^m01. α Lup was therefore considered as apparently constant, which was confirmed by earlier observations of this star, carried out at the Cape Observatory in 1948 and 1950.

In connection with an investigation of the multiperiodicity of β Cru (Van Hoof, 1959, *Z. f. Astrophys.,* **47,** 198), Haffner observed this star during several nights at the Boyden Observatory. He used δ Cru as the comparison star during the first two nights, but its brightness was not checked for constancy.

From the third night on, δ Cru was replaced by the closer star 39 Cru. This change, Van Hoof states, was not a favourable one, since night-to-night variations were found in the average Δm (β-39).

In 1972, Shobbrook (*MNRAS,* **156,** 5P) again observed δ Cru, together with β Lup, η Lup, δ Lup and ε Cen. After a few nights it became apparent that δ Lup varied by up to 0^m005 and ε Cen by up to 0^m015. The other three stars appeared constant to 0^m003, and were not observed further.

In 1973, δ Cru appears once more in a list, this time compiled by Percy *(A&A,* **30,** 465) with the aim of doing some statistics of undiscovered β Cephei stars. However, since Percy relied on the Shobbrook investigation, δ Cru was considered as "not variable".

Finally Jerzykiewicz and Sterken (1977, *Acta Astronomica,* **27,** 365) put δ Cru on their list, during a search for β Cephei stars. But for some reason, they indexed this star with "NO". This symbol indicates stars which the authors do not plan to observe in their present programme, either because they are already well-known variables, or because no suitabel comparison stars could be found for them.

Photometric Observations with the Bochum 61 cm Telescope

In order to establish more firmly the TPA (timeshift-period-amplitude) relation (Elst, 1978, *Astrophys. J.,* **223,** 959), I planned to observe in February 1979 several δ Cephei stars and some well-known β Cephei stars. The observations were done with the automated photometer which is attached to the Bochum 61 cm telescope. Due to the extremely favourable weather conditions, I soon ran out of stars! Therefore, without previous planning, I selected six early B-stars from the sky in an arbitrary way, and observed them for several nights. During the day time, a preliminary photometric reduction of the observations was made by means of a pocket calculator.

It immediately became clear that all of the six stars had to be considered as variable (Elst, 1979, *Inf. Bull. Var. Stars,* 1562), but since at that time I did not know of the previous history of δ Cru, I did not observe this star very extensively. However, from the observations of four minima and one maximum, it is still possible to estimate the period and the amplitude of the light variation of δ Cru. Table 1 gives some information about the observed minima. The deduced period is $P = 3^h62491$ and the amplitude is $\Delta V = 0^m006$.

Table 1: *Minima of δ Cru*

Date (UT)	UT
31–1–79	$7^h\,43^m$
12–2–79	$6^h\,16^m$
13–2–79	$7^h\,22^m$
15–2–79	$6^h\,34^m$

Figure 2 shows the lightcurve as deduced from observations on two nights. Overlapping points are not shown.

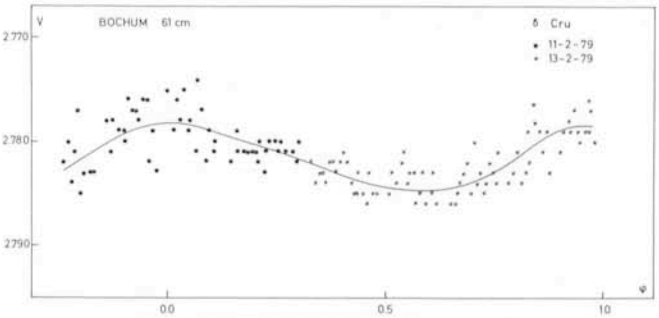

Fig. 2: *The lightcurve of δ Crucis, as measured in February 1979.*

So, by pure coincidence, δ Cru was now observed once more, and due to the fine photometer at the Bochum 61 cm telescope, and the excellent weather conditions, it could no longer hide its variability!

* * *

This article is dedicated to Mrs. Hilde Fritsch, formerly in charge of the ESO Guesthouse in Santiago and now retired. I also thank Mr. De Kersgieter for drawing the figure.

List of Preprints Published at ESO Scientific Group

March–May 1979

51. G. TENORIO-TAGLE, H. W. YORKE and P. BODENHEIMER: The Gas Dynamics of H II Regions. III. Submitted to *Astronomy and Astrophysics.*
52. D. PELAT and D. ALLOIN: High-Resolution Profile of the [O III] Lines in NGC 1068. Submitted to *Astronomy and Astrophysics.*
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