"Big Bang"

As mentioned in the beginning, the model of the Big Bang Primeval Fireball predicts values of the helium-to-hydrogen ratio from 0.07 to 0.10. The value found in h + χ Persei and the Cepheus III association is slightly out of this range. No mechanisms are known that can deplete the interstellar gas of helium, but in view of the uncertainty of the absolute values of the helium-to-hydrogen ratio, the discrepancy is not serious. The difference in helium abundance that is found between stars in the outer regions of the Galaxy and stars in the local and inner regions is more interesting, because it means that a considerable amount of helium has been formed since the Big Bang Primeval Fireball. Possible sites for this helium production are massive stars or the so-called "little Big Bangs" in the centre of our galaxy.

HD 80383: The Faintest Known β Cep Variable

Until recently no β Cephei stars fainter than 7^m were known, but now observations on La Silla by Dr. Ulrich Haug of the Hamburg Observatory seem to have pushed this limit to 9^m. He found light variations in HD 80383, a faint B star in the southern constellation Vela, which are typical of the β Cep class of hot, pulsating stars. Dr. Haug reports about his interesting discovery:

The high number of β Cephei (or β Canis Maioris) variables among the bright stars allows us to predict β Cephei characteristics for about 5 per cent of all stars of spectral types B0 to B3. Nevertheless there are no confirmed variables of this type among the stars fainter than 7th magnitude.

During my last observing run on La Silla in January 1977 I found that the photometric data for HD 80383 leave almost no doubt that this is a new β Cephei star of about 9th magnitude. HD 80383, which was on my observing list for "interstellar absorption in Vela", was discovered to be variable in 1976. When a period of only 4.45 hours became evident already at the beginning of my observations in 1977, many measurements were made during each available night. Very quickly the amplitudes of the light variations turned out to be variable. This excludes the possibility of an eclipsing or aspect variable double star. But both the period and the beat period (about 10 days) make the classification as a β Cephei star highly probable.

This is also supported by a discussion of the photometric parameters given in the table for the variable and another B-type star in my Vela programme which is being used as comparison, CPD −54° 2147.

M_{bol} and log T_{eff} can be calculated either from UBV and β according to relations applied to other β Cephei stars by Lesh and Aizenman (*Astron. & Astrophys.* **22,** 229 (1973)) or from uvby and β according to similar relations used by J. Scott Shaw (*Astron. & Astrophys.* **41,** 367 (1975)). The results, $M_{bol} \approx -5.4$ and log $T_{eff} \approx 4.35$, show that HD 80383 is situated well above the main-sequence in the Hertzsprung-Russell-Diagram, in a domain known as "the instability strip" of β Cephei stars.

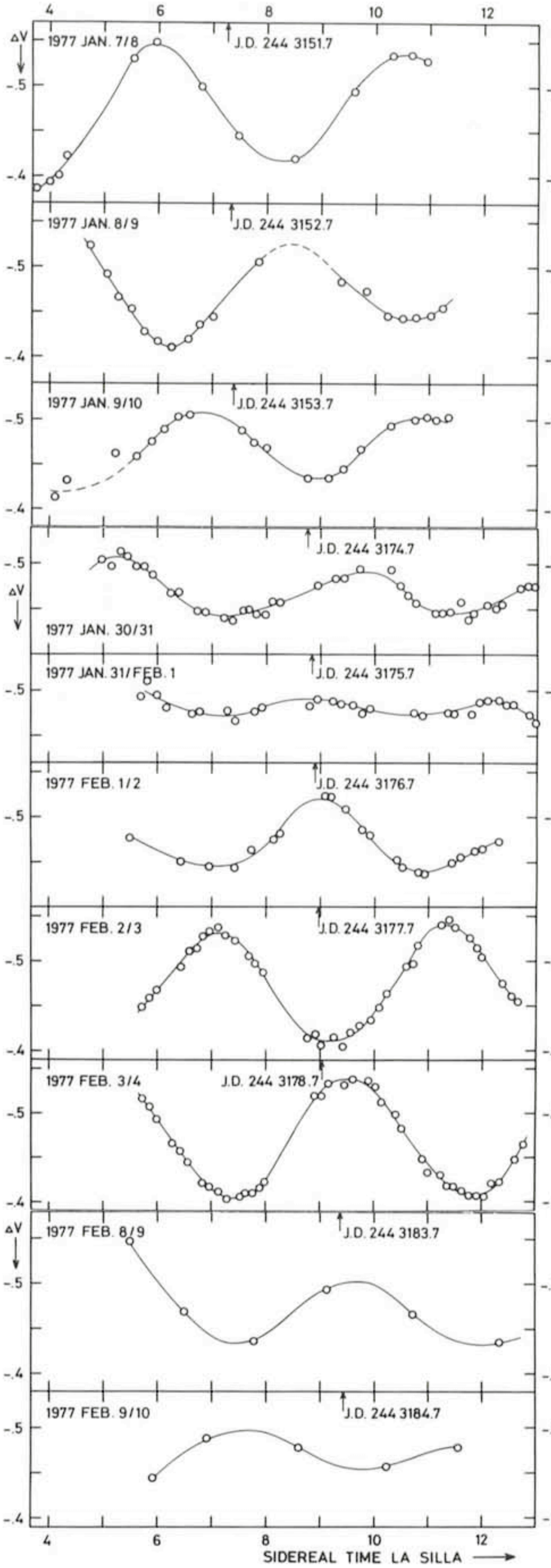

Fig. 1. — *Light variation of the new β Cep variable HD 80383 on ten nights. The difference $\Delta V = V$ (HD 80383)–V (CPD −54° 2147) is adopted from the on-line V measurements. Note how the amplitude is variable and how the beat phenomenon may be recognized, in particular on the nights of Jan. 31/Feb. 1 and Feb. 9/10.*

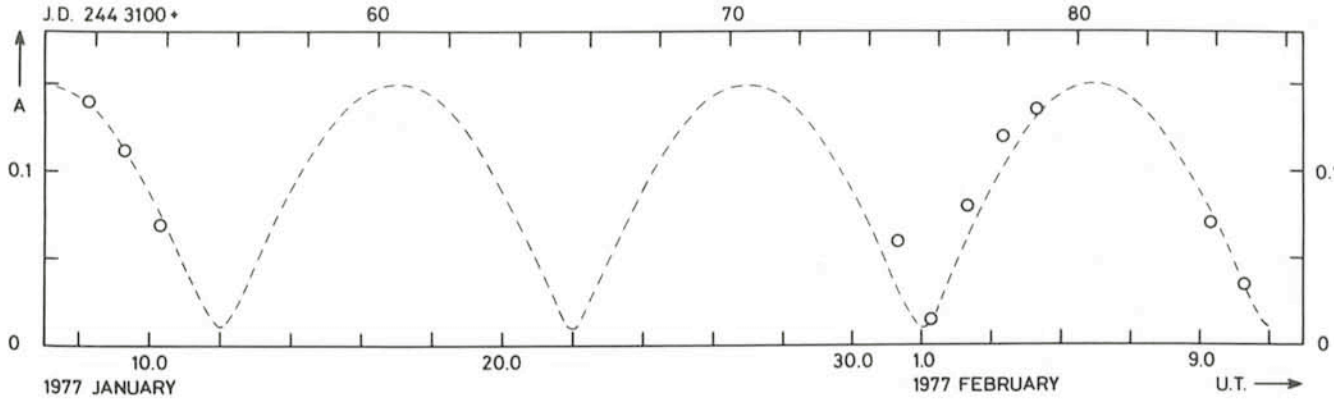

Fig. 2. — *The mean amplitudes A of the light variations for the observing nights early 1977. The beat period is around 10 days.*

The new variable looks like a quite normal member of its class. Remarkable are the maximum amplitudes (0.15 mag) of its light variations which are inferior only to those of BW Vul (0.2) and ν Eri (0.18). Large changes of radial velocity are to be expected. Their observation by means of slit spectra should be the next step in the investigation of HD 80383.

The detection and analysis of this star would have been impossible without the data-acquisition system of the ESO 50-cm photometric telescope which was used for all observations. I am obliged to the ESO staff for their help during the observations and to Dr. Kohoutek and Dr. Surdej for additional measurements on February 8 to 10, which are clearly important for the determination of the beat period.

Photometric results for the new β Cep-type star and its comparison star.

	HD 80383	CPD −54° 2147
V	(9.13)	9.603
B–V	0.041	0.095
U–B	−0.702	−0.596
y	(9.12)	9.595
b–y	0.101	0.130
m_1	0.019	0.028
c_1	0.111	0.189
β	2.626	2.650

The Recovery of Adonis

The ESO 1-metre Schmidt telescope has just played an important role in the successful recovery of a long-lost minor planet.

Forty-one years ago, Dr. E.J. Delporte of the Uccle Observatory in Belgium reported the discovery of a small planet (1936 CA) with an unusually fast motion. It was soon found that the new planet was very close to the Earth and when the preliminary orbit was computed it became apparent that it was of the Earth-crossing type, also known as "Apollos", cf. *Messenger* No. 8, p. 3. It was baptized *Adonis* and although it rapidly diminished in brightness due to increasing distance from the Earth, it was possible to follow it for two months through the world's largest telescope in 1936, the 100-inch reflector on Mount Wilson, just above Los Angeles.

Experience shows that in order to determine orbits of minor planets with an accuracy sufficient to assure that they will never be lost again, it is normally necessary to observe them for many months during several oppositions. This was of course not possible with Adonis—its close 1936 approach to the Earth was a one-time performance —and it was soon placed on the list of "probably lost planets".

Is Adonis Retrievable?

Dr. Brian Marsden of the Smithsonian Observatory has one of the best existing computer programmes for orbit determinations and he was not so sure that Adonis was irretrievably lost. In any case, he decided to invest some effort in the problem of finding Adonis again and he therefore started a careful integration of the Adonis orbit to bring it from 1936 to 1977. Starting with the relatively few observations from early 1936, he computed the gravitational influence of all nine planets (Pluto included!) on the tiny object, day by day, and was able to determine where it would have been at any date afterwards. This process involves unavoidable errors because of the short interval of the 1936 observations and the long time interval to 1977. In general, the errors tend to increase with the time and serious troubles develop when the small planet passes close by one of the larger planets, as for instance when Adonis came within 6 million kilometres of Venus in 1964. However, the final result was that Dr. Marsden, after having followed Adonis not less than sixteen times around the Sun (Adonis' orbital period is about 2 $^1/_2$ years) was able to predict that it would make another close approach to the Earth in early 1977.

A Search for Adonis

In November 1976, Dr. Marsden alerted the big Schmidt telescopes around the world and asked them to be on the lookout for Adonis in late January and early February 1977. Because of the full moon on February 4 and hoping to improve the chances of recovering Adonis, H.-E. Schuster used the ESO Schmidt telescope during two nights in January to search for Adonis, but this effort was not rewarded. When searching for minor planets for which the orbits are not accurately known (as was the case for Adonis), one normally predicts expected positions, corresponding to various values of the perihel time T, i.e. the last time the planet went through the point of the orbit closest to the Sun. The uncertainty of T was estimated to be about ± 16 days for Adonis. Dr. Schuster searched for