msec the time that is needed for the phase plate to move through an angle of $11\overset{\circ}{.}25$ and $T_{90} = 8 \times d = 41.68$ msec the time for the phase plate to run through 90° we have:

$$\delta(t) = 11\overset{\circ}{.}25 \times n \times P/d \qquad (2)$$

where $\delta(t)$ repeats modulo 90° and $n = 1, 2, \ldots$ is the number of rotations of the pulsar.

Therefore, if $P \approx 2 \times d/k$, $k = 1, 2, \ldots$ (extremely fast rotation of the pulsar), or if $P \gg 8 \times d$ (extremely slow rotation of the pulsar or observation of a polar like star) one single polarization measurement would need $6 \times 5.21 = 31.26$ msec. Presumably it can be expected that P is of the order of the time necessary for one rotation of the phase-plate. One polarization measurement would then last for a time of $4 \times P$. Naturally the compromises described above are fully valid in that case and therefore a fast computer with a sufficient great memory is required.

Reference

Metz, K.: 1984, *Astron. Astrophys.* **136,** 175.
Metz, K.: 1986, *Astron. Astrophys.* **159,** 333.
Stahl, O., Buzzoni, B., Kraus, G., Schwarz, H., Metz, K., Roth, M.: 1986, *The Messenger* **46,** 23.

ESO Press Releases

The following Press Releases have been published since July 15, 1987, the date when *Messenger* 48 went to press.

PR 11/87: Astronomers and Physicists Meet at ESO at the First Full-Scale International Conference on Supernova 1987A (8 July).

PR 12/87: Discovery of a Binary Quasar (13 July), with one B/W photo.

SN 1987A (Continued)

The ESO Workshop on SN 1987A took place on July 6–8, 1987 in Garching with almost 200 participating scientists. It was the first, full scale international meeting on this exciting object and it was followed with great interest, not only by the participants, but also by the media which reported extensively about the results. The summary talk by S. van den Bergh is reprinted in this issue of the *Messenger* on page 32.

Since the ESO meeting, SN 1987A has continued to behave differently from most other supernovae. From magnitude 4.5 in early July, it has decreased to about magnitude 5.0 in early September; this is unusually slow. In fact, it almost looks as if the brightness has become nearly constant since mid-August.

Attempts to detect X-ray and gamma radiation have so far been unsuccessful. It was announced on July 14 that no significant gamma-ray emission from SN 1987A had been observed with the gamma spectrometer on-board the Solar Maximum Mission satellite (SMM) and neither the Japanese Ginga satellite nor the Quant instrument on the Soviet Mir station has detected any X-ray emission. Dramatic confirmation of the extreme weakness of short-wave radiation of SN 1987A came from a rocket experiment by the Max-Planck-Institut für Extraterrestrische Physik on 24 August. On this date, an X-ray detector on a rocket launched from Woomera in Australia was unable to register any signal in the 0.1–2 keV region, thereby setting an upper limit at 1/6000 of the X-ray strength of the Crab Nebula. However, theoreticians expect that a signal should be detectable during the coming months, as the shell of ejected material becomes less dense and when the material collides with the surrounding interstellar medium.

Radio astronomers in Australia have failed to confirm the observations of radio emission at 22 GHz, reported from Brazil in late June. However, the uncertainty of the Brasilian measurements may be larger than first thought.

Observations of SN 1987A are therefore still limited to the UV, visible and infrared spectral regions. At ESO, pictures in the light of doubly ionized oxygen were obtained (see page 34 in this *Messenger* issue) and the other types of observations continue. The "mystery spot" reported earlier apparently was of transitory nature and is no longer seen. It may have been a light echo in a nearby cloud.

The editor (September 8, 1987)

Sun Rings over La Silla

Sun rings were seen from La Silla during several days in late February 1987. This photo, which was obtained by Claus Madsen with a 35 mm camera (f = 28 mm), shows two sun rings with radii around 23 and 45 degrees. This atmospheric phenomenon is caused by refraction of sunlight in ice crystals, probably of hexagonal form. It is described in the famous book by M. Minnaert on "The nature of light and colour in the open air" (Dover, 1954).