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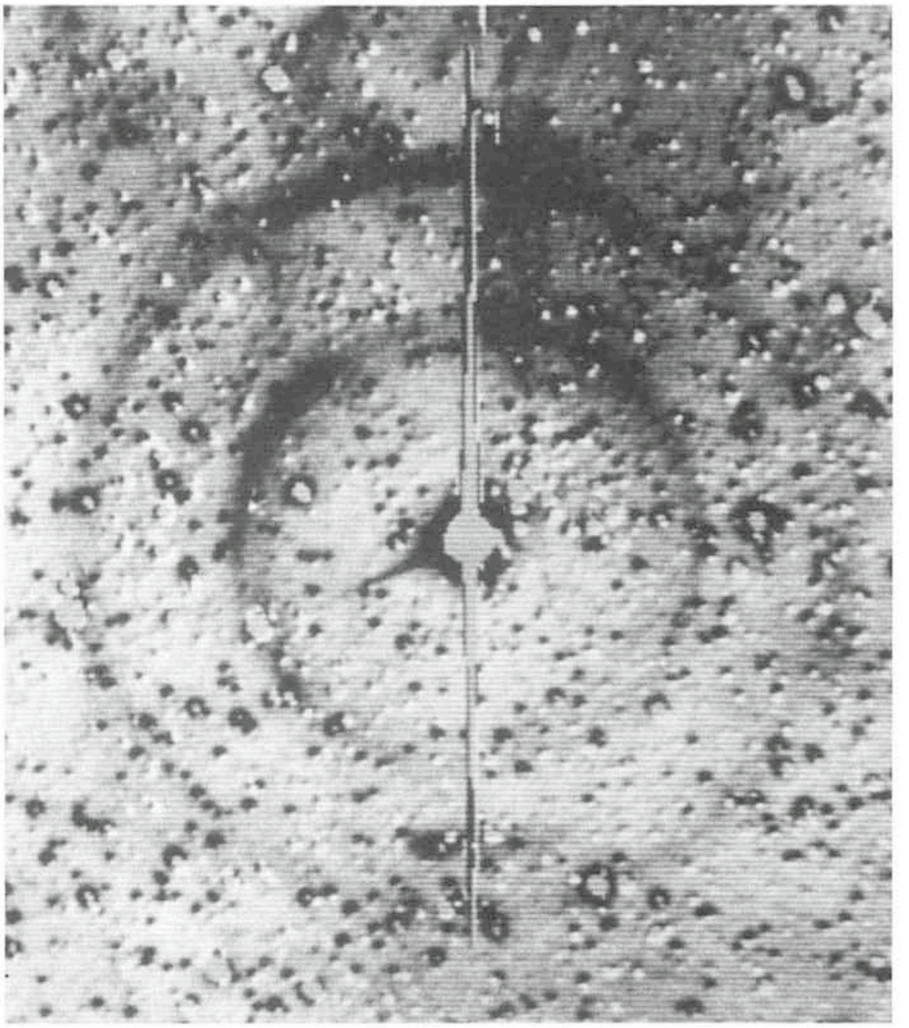
An Update on the Light Echoes of SN 1987A



The ring shaped light echoes found earlier this year around the supernova SN 1987A in the LMC (*The Messenger* **52,** 13) have been under close monitoring ever since. The picture shows an artificially enhanced image of the rings as observed by H. Pedersen and J. Melnick on the nights 29th through 31st of October 1988, using a CCD camera in the Gascoigne adapter at the prime focus of the 3.6-m telescope. The resolution is 0.58 arcsec per pixel and the seeing was about 1.2 arcsec. In order to enhance the contrast, the photo shows the ratio of averages of five 3-minute exposures in B and V each.

The outer ring has reached a radial distance of about 77 arcsec and the inner ring of about 45 arcsec, very close to the predictions for plane parallel sheets of reflecting material perpendicular to the line of sight. In February the radii measured 52 and 32 arcsec respectively. The most interesting aspect is that the echoes retain their near circular shape. This implies that, at least over the area swept by the echoes since February, the interstellar dust must be highly concentrated into two thin layers located roughly 120 und 320 pc in front of the supernova. The very small deviation from circularity of the rings imposes tight constraints on any inclination and curvature of these sheets of matter, which are likely to belong to the halo of the LMC. *M. ROSA*

The ESO Schmidt Telescope

The ESO(R) half of the joint ESO/SERC Survey of the Southern Sky will soon be finished. For more than 90 % of the 606 fields, Atlas-quality plates have now been obtained. Reasonably good, but not quite optimal plates are available of another 5 % of the fields and only for ~20 fields (3 %) has no acceptable plate yet been obtained. The Atlas production in Garching in also nearing the end; 22 shipments out of a total of 24 have been sent to about 200 customers. It is hoped that the last two shipments will become available in the course of 1989.

Most of the missing Atlas plates are in the right ascension interval between 20 hours and 4 hours and high priority will be given to the atlas work during the corresponding season (August to December). For the rest of the year, virtually all time is now available for other purposes.

One of the current programmes is the extension of the Quick Blue Survey from declination −20° to the equator. This involves taking about 300 Atlas-quality IIa-O + GG 385 plates, each with 60-minute exposure time. This project proceeds rapidly and more than one quarter of the fields have been covered with excellent plates.

Other Projects now under consideration include retaking the entire QBS, about 15 years after the first survey of this type. This would provide a very good basis for determination of proper motions in the southern sky, even of rather faint stars. The supernova search programme in brighter galaxies might also be re-activated. Other possibilities include deep infrared plates along the galactic plane or very long exposures (up to 5 hours) of selected objects through the available Hα and S II interference filters which have a useful field of about 2°.

The approximate limiting magnitudes for direct plates are quoted in the table. They depend on the seeing; the numbers given are for medium seeing and deeper plates are obtained under excellent conditions. These values may possibly be further improved after the installation of the new Grid Processing machine in November 1988. At the same time, tests are being made of the new Kodak T-max emulsion, although the sensitization appears to be more difficult than first expected. We shall report in one of the next *Messenger* issues about the initial results.

The ESO Schmidt telescope is equipped with one of the world's largest objective prisms, giving a dispersion of about 450 Å/mm at Hγ. Under good seeing conditions, it is possible to obtain widened spectra which allow MK classification, down to magnitude 14.5–15.0. Unwidened spectra give limiting magnitudes, approximately 2–3 magnitudes fainter. The performance is critically dependent on the seeing, as is the case for all objective prism work. The UBK 7 glass is ultraviolet transparent.

Performance of the ESO 1-m Schmidt Telescope

Emulsion	Sensit.	Filter	Bandpass	Exposure	Lim. mag
IIa-O	no	UG 1	UV	60 min	~19
				120 min	~20
	no	GG 385	B	60 min	~21
IIIa-J	yes	UG 1	UV	60 min	~20
				120 min	~21
	yes	GG 385	B	120 min	~22.5
103a-D	no	GG 495	V	45 min	~19
IIIa-F	yes	RG 630	R	120 min	~21.5
IV-N	yes	RG 715	I	90 min	~19

In the future, the 30 × 30 cm plates will be scanned on the refurbished two-coordinate measuring machine at the ESO Headquarters (formerly the S-3000 machine). With a new CCD head and much improved software and large computer storage space, it will become possible to perform "blinking" of large areas. This will greatly speed up the extraction of data from the photographic plates and may give a new impetus to the use of the ESO Schmidt as a powerful survey instrument.

H.-E. SCHUSTER and R.M. WEST

Monitoring SN 1987A

Since the explosion in late February 1987, more than 130 ESO Schmidt plates have now been obtained of the LMC area in which SN 1987A is seen. They document its slow decrease in brightness as well as the now famous double light echo. It is particularly well visible on red and infrared plates. The supernova magnitude was about 10.5 by mid-November 1988.

Learning About Young Globular Clusters

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1. Introduction

Even after many decades of intensive investigation globular clusters still fascinate astronomers. Galactic globular clusters are "fossils" of the epoch of galaxy formation and samples of a very early, but still reachable stellar generation. The situation is different in the Magellanic Clouds where globular-cluster-like objects with a wide variety of ages can be found. We see globular clusters which, judged by their stellar content, cannot be much older than 10^7 yr. Their integrated light is dominated by a slightly evolved upper main sequence. Therefore, they have often been referred to as "blue globular clusters". the question why such clusters are found in the Magellanic Clouds (and perhaps in some other galaxies like M33 and NGC 2403) and not in the Milky Way is certainly of significance for the general understanding of galaxy evolution (see IAU Symp. 126 for more information).

Young globular clusters are ideal laboratories for determining Initial Mass Functions (IMF's), which describe the number of stars found per mass interval in a star forming region. The IMF is of fundamental importance for the evolution of a galaxy, since it controls the energetic feed-back by massive stars to the interstellar medium and largely determines its chemical evolution. However, the determination of the IMF in stellar systems in the Milky Way faces several difficulties. For instance, stars in the solar neighbourhood do not form a coeval sample; open clusters show poor statistics; in galactic globular clusters, only the small mass interval 0.4–0.8 solar masses is observable and they are so old that the observed mass function may be modified by secular dynamical effects. It is evident from these considerations that young globular clusters provide a unique opportunity to study stellar mass functions with good statistics over a large range of masses. Additionally, there is also hope of uncovering a possible dependence of the IMF on metallicity. A spectroscopic high-resolution study by some of us (Spite et al. 1986) confirmed earlier suggestions that NGC 330, the brightest of the young globular clusters in the SMC, has an abnormally low metallicity of −1.3 dex (Fig. 1). In contrast to this, the overall metallicity of the young SMC population is believed to be around −0.7 dex.

Another cluster for which a high-resolution spectrum hints of a lower metal abundance than is found in the field population, is NGC 1818 in the LMC (Richtler et al. 1988, Fig. 2).

It is of great interest to look into the mass function of these objects to find possible differences to a "normal" IMF.