3. The Map

In Figure 1 we present a map of the relative extinction in the Southern Hemisphere. The photometry of external galaxies cannot provide absolute extinction, or in other words, it cannot provide the zero point. Formally, the technique provides the relative extinction compared to an overall mean of $A_B=0$. We have not finalized the constant yet (our work on this is still in progress) but we can easily deduce a lower limit for it. We cannot allow negative extinctions to occur (the white and blue regions in Fig. 1) and more formally, we can deconvolve the observed frequency distribution of A_B with the formal σA_B error function. This way, we derive a lower limit to the zero point of 0.4^m, which has been included in the scale of Figure 1.

Our understanding of Figure 1 is that most of the structures that can be seen are real. We checked that they do not correlate with the spatial distribution of the target galaxies, while around the Southern Galactic pole we could observe a good spatial correspondence with the IRAS cirrus maps of Boulanger et al. We can also compare the extinction in a small, but still significantly large, part of the Northern Galactic Hemisphere (92 ESO survey plates) with that in the Southern Galactic Hemisphere. In the regions of absolute galactic latitute in the range $10°-30°$, we find on average about 0.1^m more extinction (A_B) in the South. If our evaluation of the lower limit on the zero-point is correct, then the average extinction at low galactic latitudes ($<70°$) should be $A_B > 0.25^m$.

4. Availability of the Data

Our results for the relative extinction in the B band (A_B) in our Galaxy will be available in the following forms:

1. In our paper we anticipate a printed list of overall extinction values for each of the 404 ESO sky survey plates that were assessed in the ESO-LV project.
2. A computer programme AEJ (in MIDAS environment) which fills two columns of the digitized version of the ESO-LV catalogue (the MIDAS table PCAT): column # 102 which contains A_B 'per galaxy' and column # 105 which contains the average A_B per plate. It is distributed, on request, by the data archivist of ESO.
3. An ASCII file which contains three columns: R. A., Decl. and A_B for each of 10,930 galaxies. It is distributed, on request, by J. Chołoniewski (Astronomical Observatory of the Warsaw University, Aleje Ujazdowskie 4, 00-478 Warszawa, Poland) on 5.25 or 3.5 floppy disk.

The Recent Outburst of (X-Ray) Nova Muscae 1991

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Discovery

The transient X-ray source, GRS 1121-68 (Nova Muscae 1991), was almost simultaneously detected by the WATCH all-sky X-ray camera installed on the Soviet GRANAT satellite on January 9 and the All Sky X-ray Monitor aboard Ginga on January 8, 1991. Lund and Brandt (IAU Circ. 5161) reported that this new X-ray source was at that time about twice as bright as the well-known X-ray emitting Crab Nebula. The search for a possible optical counterpart began on La Silla on January 11, using the GPO astrograph without success.

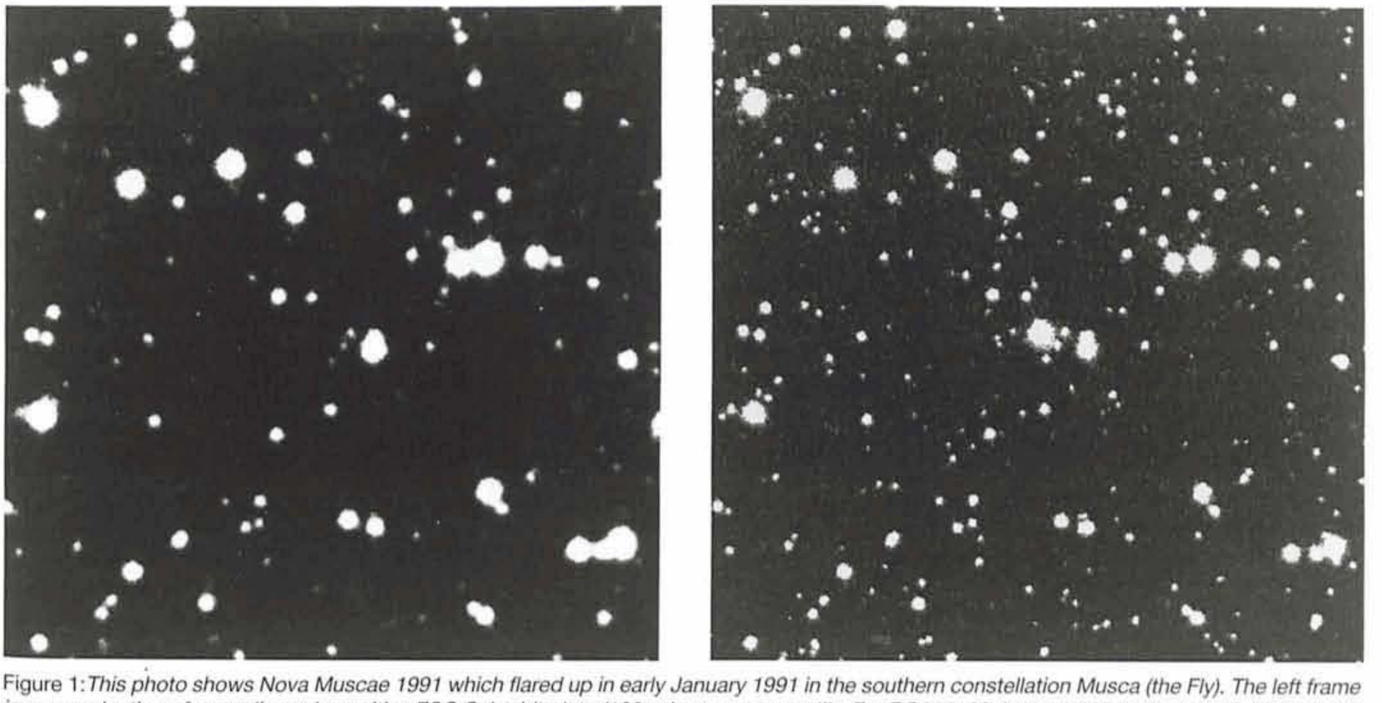


Figure 1: *This photo shows Nova Muscae 1991 which flared up in early January 1991 in the southern constellation Musca (the Fly). The left frame is a reproduction of an earlier red-sensitive ESO Schmidt plate (120-min exposure on IIIa-F + RG630; 29 January 1976; observer G. Pizarro). To the right is the same sky field, observed with the ESO New Technology Telescope (EMMI + CCD, 5-sec exposure in R; 15 January 1991, 7:22 UT; seeing 0.9 arcsec; observers M. Della Valle and B. Jarvis); here the nova can be seen as the bright object at the centre. The pre-nova is faintly visible at the same position in the left frame.*

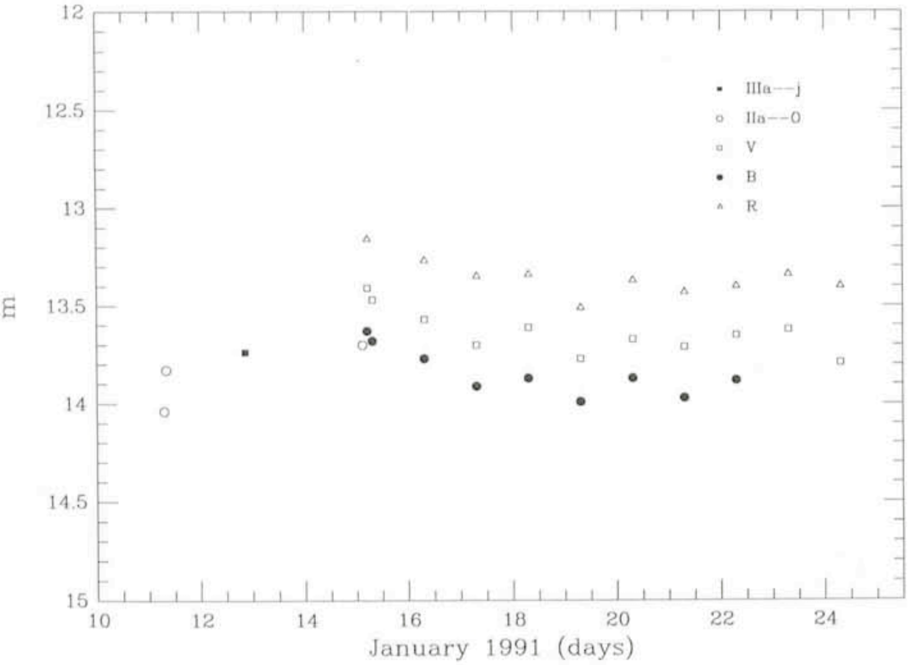


Figure 2: *Preliminary light curve of Nova Muscae 1991 during the early stages after outburst.*

Makino and the Ginga Team (IAU Circ. 5161) subsequently reported a new and more accurate position from which a 45-min ESO Schmidt IIIa-J plate was obtained on January 13. Nova Muscae 1991 was identified on this plate (IAU Circ. 5165) as a star of $m_v \sim 13.5$, near the edge of the error box reported by them.

The Progenitor

A faint, star-like object could be seen on the deepest, pre-1991 plates at the approximate position of the nova (Fig. 1). A total of twelve photographic plates which cover the area around Nova Muscae 1991 were available at ESO and have been measured.

In order to verify the identity with the progenitor, accurate astrometric positions of the presumed pre-nova star were measured on the deepest blue plate (SRC 2172) and a combined R (290-min) frame, and then compared with the position of the nova as measured in a 5-sec R-frame, obtained at the NTT on January 15.3, 1991. It was possible to measure the pre-nova position to an accuracy of $\sim \pm 0.2$ arcsec. The interpolated positions of the pre-nova and the nova are given in Table 1 and demonstrate that it is the same object.

Table 1: *Astrometric positions*

Object	R.A.(1950)	Dec.(1950)
pre-nova (B)	11 24 18.51	−68 24 01.9
pre-nova (R)	11 24 18.52	−68 24 02.2
Nova (R)	11 24 18.49	−68 24 01.7

All plates were scanned with the PDS microdensitometer at the ESO Headquarters in Garching and the magnitudes were interpolated from secondary photometric standards, established in two CCD frames, obtained with the ESO NTT and 2.2-m telescopes. Due to the faintness of the pre-nova on the red plates, four of these were co-added to produce a combined frame on which a more accurate magnitude could be determined. The resulting, mean magnitudes of the pre-nova are B = 20.9±0.2 and R = 19.8±0.2.

Photometric and Spectroscopic Follow-up

Photometric and spectroscopic observations, mostly carried out with the ESO NTT and 2.2-m telescopes at La Silla Observatory, have been carried out since January 15. The star had increased in brightness by about 8–9 magnitudes from minimum (Fig. 2). Although these characteristics are typical of galactic novae, the spectrum, obtained on January 15.3 UT with the NTT (Fig. 3), shows a number of features (generally) not seen in the spectra of classical novae at early stages. The *pre-maximum* and *principal* spectrum of galactic novae are normally distinguished by FeII, NaI, OI and Balmer emission lines coupled with *P Cyg* absorptions (Payne-Gaposchkin 1957). These features are normally superimposed on a continuum similar to that of A-F supergiant stars. In contrast the spectrum of Nova Muscae exhibits a very blue continuum with H_α, H_β, H_γ, He-I (587.6 nm), He-II (468.6 nm), and NIII (464.0 nm) emission lines without *P-Cyg* profiles, making it similar to the spectra of dwarf novae in outburst.

Subsequent spectroscopic observations carried out on the following three days (IAU Circ. 5167) confirm this. Moreover, the strong X-ray emission preceding or accompanying the optical

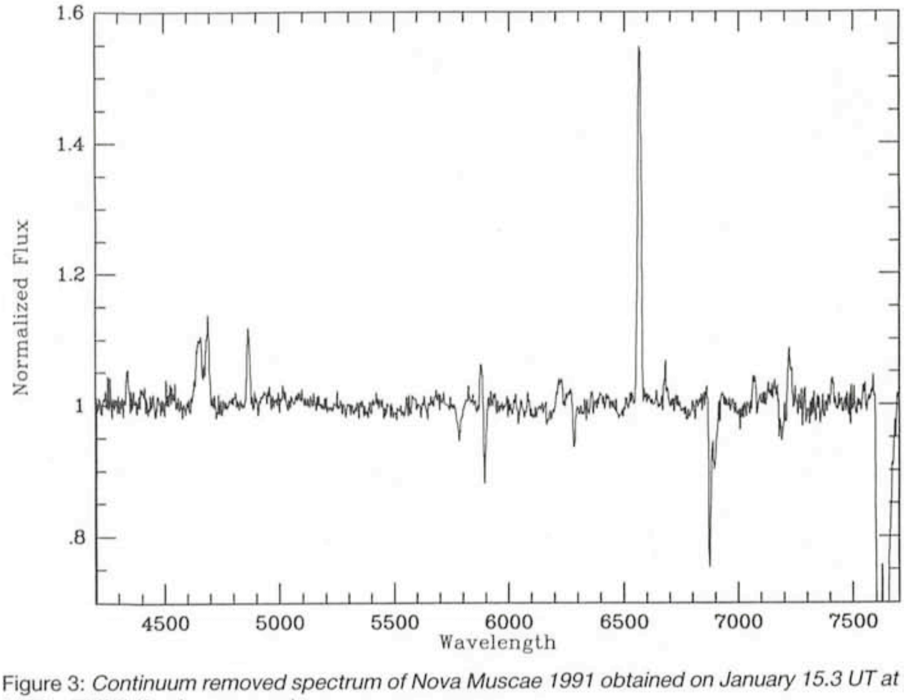


Figure 3: *Continuum removed spectrum of Nova Muscae 1991 obtained on January 15.3 UT at NTT + EMMI (3-min exposure).*

increase in brightness, suggests that this object almost certainly belongs to the low-mass X-ray binary (LMXB's) class of objects and in particular to the small sub-class of *X-ray Novae*. This sub-class includes such objects as: V 616 Mon 1975 (Mon X-1), V 2107 Oph 1977 (H1705-25), V822 Cen 1980 (Cen X-4) and V 404 Cyg 1989 (GS2023+338). Furthermore, the equivalent width of the He II (468.6 nm) (EW=2.5 Å) and H_β (EW=1.8 Å) emission lines are consistent with the values found for other LMXB's (e.g. van Paradijs and Verbunt, 1984, see their Fig. 1).

Some Current Views of X-Ray Novae

The energy source during the paroxysm of LMXB's, and cataclysmic variables (CV's), is generally believed to be provided by two mechanisms: (a) the thermonuclear energy released by nuclear runaway of the accreted matter onto the surface of the degenerate companion, and (b), the gravitational potential energy released by the accreting material from the disk onto the compact star. At minimum, the luminosity of both CV's and LMXB's is mainly provided by the mass transfer rate. The first mechanism is commonly believed to explain the Nova explosion and the X-ray bursts in some LMXB's while the second mechanism is believed to be responsible for the eruptions both of the dwarf novae and the X-ray novae. According to current understanding, mechanism *(b)* can be triggered by an accretion rate from the disk onto the white dwarf smaller than the mass transfer rate from the secondary to the disk (the so-called *disk-instability* model) and/or through sudden bursts of mass transfer rate from the secondary to the white dwarf (the so-called *mass transfer instability* model).

The main difference between the LMXB's and other CV's is the large amount of X-ray emission during the outburst. For the X-ray novae (including Nova Muscae 1991) the L_X/L_{opt} is generally $\geq$ 100 (at least) that of CV's. This difference is due to the dramatic difference between the physical nature of the compact companion. Whereas for the CV's the material is normally transferred from a main-sequence star to the white dwarf ($D \simeq 10^{-2}\ R_\odot$), for the X-ray novae, the material is transferred from the main-sequence star onto a neutron star ($D \simeq 10^{-5}\ R_\odot$) or possibly a black hole (McClintock and Remillard, 1986). The outburst in the UV and optical is caused by the reprocessing of the X-ray radiation (produced by the accretion onto the neutron star) which warms up the outer layers of the accretion disk.

Tentative Time-table of Council Sessions and Committee Meetings in 1991

April 3:	Finance Committee
May 6–7:	Users Committee
May 13–14:	Scientific Technical Committee
May 16–17:	Finance Committee
May 28–29:	Observing Programmes Committee
June 3–4:	Council
November 11–12:	Scientific Technical Committee
November 14–15:	Finance Committee
November 28–29:	Observing Programmes Committee
December: 2–3:	Council

References

Della Valle, M., Jarvis, B., West, R. 1991, IAU Circ. 5165.

Della Valle, M., Pakull, M. 1991, IAU Circ. 5167.

Lundt, N., Brandt, S. 1991, IAU Circ. 5161.

Makino, F., and the Ginga Team 1991, IAU Circ. 5161.

McClintock, J., Remillard, R. 1986, *Ap.J.* **308,** 110.

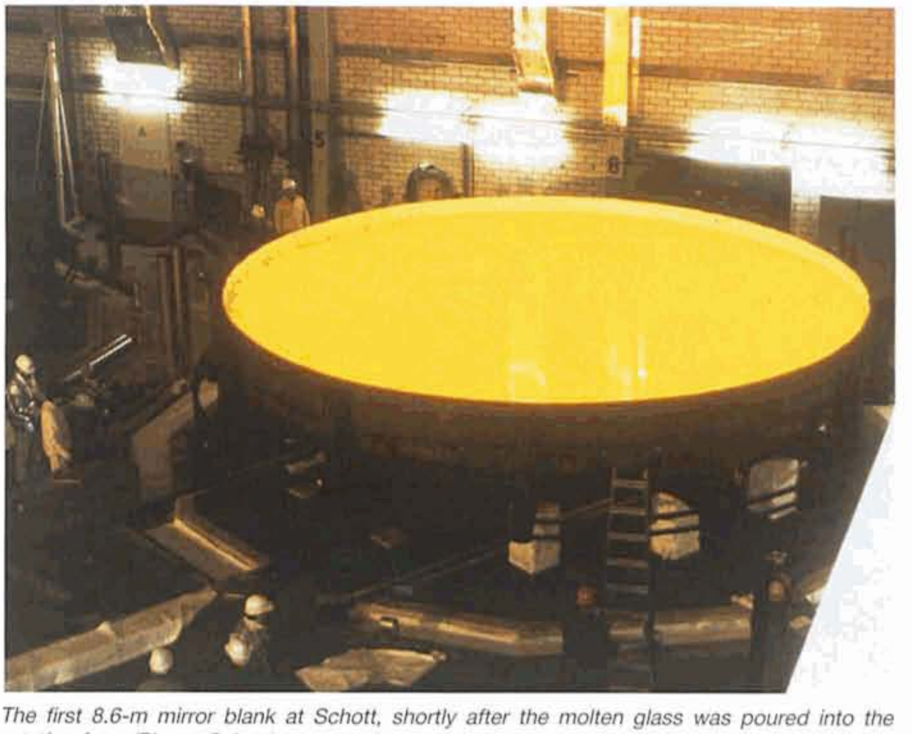
Payne-Gaposchkin, C. 1957, *The Galactic Novae*, chapter 10.

van Paradijs J., Verbunt, F. 1984, in *High Energy Transients in Astrophysics*, ed. S.E. Woosley, p. 49.

Schott Successfully Casts an 8-m Mirror Blank

A test run for the manufacture of mirror blanks in the 8-m class, for use in the world's largest optical telescope, the ESO 16-m equivalent Very Large Telescope (VLT), has been successfully performed at Schott in Mainz, Germany. The test blank had a diameter of 8.6 metres and a surface area of more than 55 m². This is the first time that it has been possible to cast such a large glass-ceramic blank in one piece. To accomplish this impressive feat, Schott has developed a number of new technological procedures.

During the next years, Schott will produce the four mirror blanks needed for the VLT. Each of them will have a final diameter of 8.2 metres and be unusually thin, only 177 mm, in order to be so flexible that their surface form can be easily controlled and maintained in optimal shape by means of an active optics system. This technique has already been successfully installed in the ESO 3.5-m New Technology Telescope for which the mirror blank was also produced by Schott. *The editor*



The first 8.6-m mirror blank at Schott, shortly after the molten glass was poured into the rotating form (Photo: Schott).