First Photographs of Andromeda and Galactic Clusters at 1950 Å

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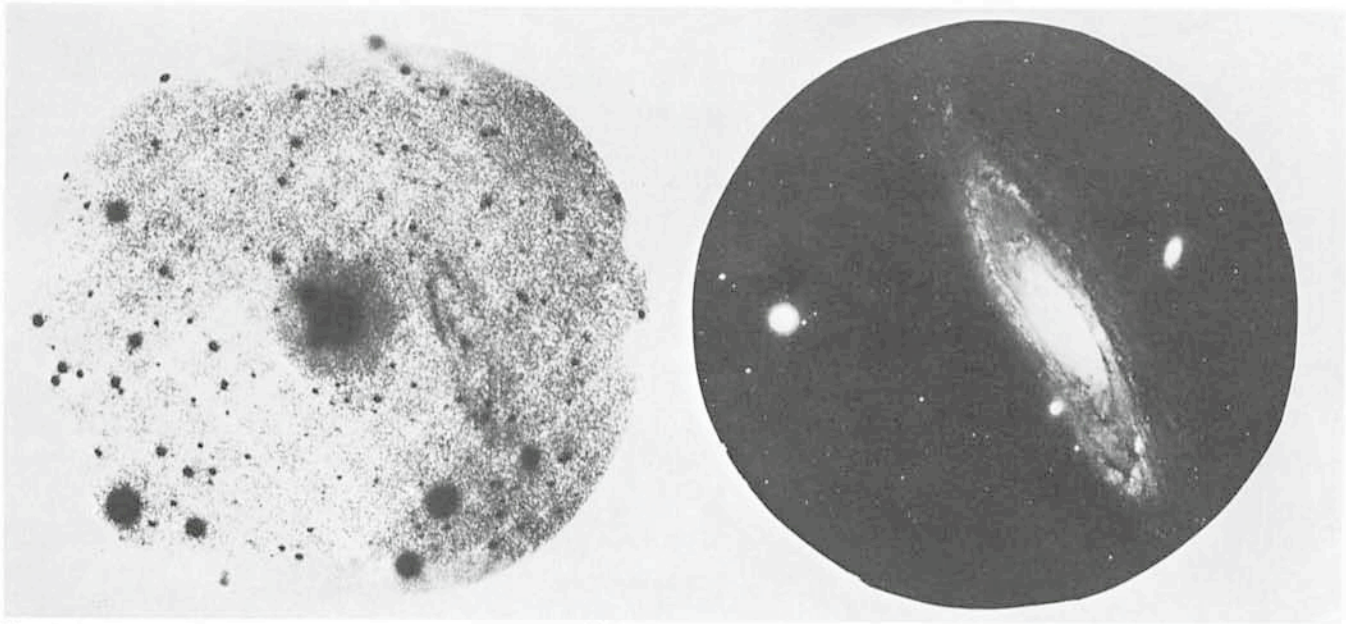

Fig. 1: *10-minute exposure of Andromeda (M 31) at 1950 Å (left). To the right a visual photo (5500 Å) for comparison.*

The photographs shown in this note were taken on October 30, 1978, with a camera built by the Space Astronomy Laboratory of Marseille (LAS) and launched in the stratospheric gondola of Geneva Observatory.

This was the second flight of a long series of launchings the main purpose of which is photography at 1950 Å of the entire galactic plane and certain regions near the northern and southern galactic poles. More than 30 photographs are presently being analysed. B stars down to 13th magnitude are observable, and some galaxies have already been detected in the ultraviolet, as well as a number of blue, galactic halo stars.

The three pictures presented here are of particular interest because they are the first photographs in the ultraviolet of a spiral galaxy, of a pair of young galactic clusters and of a supernova remnant which exploded 50,000 years ago. A part of this nebulosity is also an X-ray source. For the first time a fine structure of a spiral galaxy can be analysed in the ultraviolet. The nucleus of Andromeda (M 31) in the ultraviolet is much smaller than on the plate taken in the visible. The intensity of the nucleus can be estimated to be about 5×10^{-13} erg cm^{-2} sec^{-1} Å^{-1} at 1950 Å.

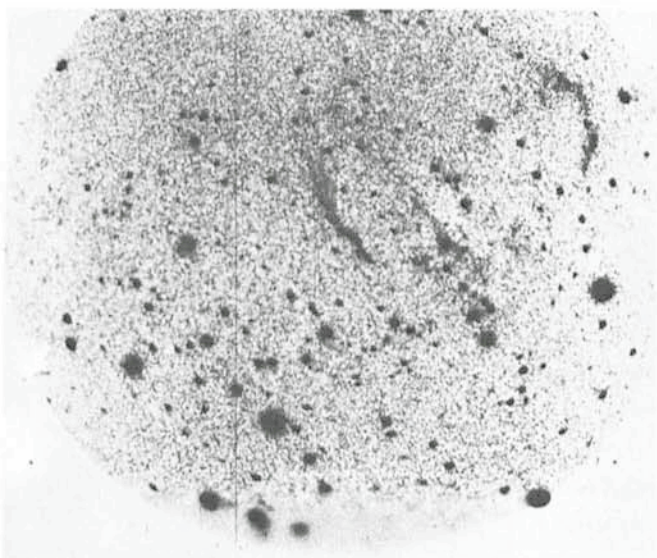

Fig. 2: *The Cygnus Loop. Exposure time 1 minute.*

The camera is composed of a Schmidt-Cassegrain objective, an ultraviolet image intensifier and a 35 mm film holder. Here are several other characteristics of the camera and the gondola:

Camera:

Diameter of the aperture:	130 mm
Focal length:	230 mm
Equivalent photometric aperture:	F : 2.10
Field:	6° diameter
Passband:	1900 Å–2075 Å obtained by selective coating of 2 mirrors. Blocking in the visible by the Cs-Te cathod of the image converter

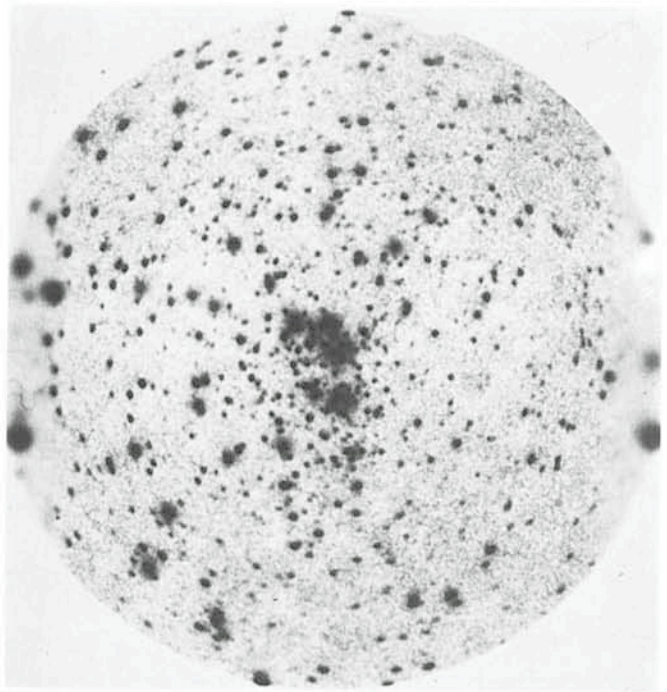

Fig. 3: *The young double cluster, h and χ Per at 1950 Å. Exposure time 5 minutes.*

Film:	Kodak
Weight:	17 kg

Gondola:

The Observatory of Geneva system constructed in cooperation with the Space Astronomy Laboratory of Marseille.

Guiding:	single axis by servo-guided siderostat of 300 × 300 mm
	RMS precision of 20 arc seconds magnitude range $m_B = -2$ to $+6.4$
Total weight:	337 kg
Flight altitude:	40 km, balloon of 350,000 m³

Construction of the ESO Headquarters Building

The Max-Planck Society informed ESO that the construction company in charge of the ESO project has unexpectedly run into financial difficulties and that a new construction firm has now taken over the project.

There will be some delay but the termination of the building is still expected for summer next year. The exact date is 31 July 1980.

Cassegrain Echelle Spectrograph (CASPEC)

M. le Luyer, J. Melnick, W. Richter

The CASPEC figures prominently among the future, highly advanced auxiliary instruments for the ESO 3.6 m telescope. It will allow high-dispersion, spectroscopic observations of comparatively faint objects to be made in a reasonable amount of observing time. When it enters into operation in late 1980, it will become possible to analyse distant stars and nebulae in great detail. The CASPEC project is directed by Maurice le Luyer, Jorge Melnick and Wolfgang Richter from ESO Geneva.

CASPEC is the first major instrument for observation at the Cassegrain focus of the 3.6 m telescope which has been designed by ESO and which is now going into manufacture. This seems to be the appropriate moment to describe the main features of the instrument and to hope for eventual comments from the future users, comments which are useful for the finalization of the instrument.

1. Astronomical Purpose

Placed at the Cassegrain focus of the 3.6 m telescope, the CASPEC will provide astronomers with spectrograms of resolutions previously obtained only with large coudé instruments, where a significant fraction of the light is lost in additional reflections required to bring the beam to the remote coudé focus. The considerably higher dispersion of echelle gratings as compared to conventional grating spectrographs makes high-resolution work possible at the Cassegrain focus. The CASPEC will allow observers to obtain high-resolution spectra of objects much fainter than what would normally be possible with a coudé spectrograph.

The possibility of obtaining high-resolution spectroscopic observations of stars as faint as 15 magnitude will open a vast field of research to European astronomers, in particular since very high resolution studies of the properties of galactic and nearby extragalactic stellar and interstellar systems only observable from the southern hemisphere will become possible for the first time.

2. Optical Concept

The concept is based on a 15 cm echelle grating and a plane cross-dispersion grating which provide two-dimensional spectra.

The instrument has been designed to be used in three different modes (resolving powers 17500, 30300 and 60600) as shown in table 1. Shown also is the required combination of echelle grating, cross-disperser grating and camera for each of these modes.

The principal detector will be a SEC vidicon tube, which is described on page 34. This tube has a target area of 25 × 25 mm and a pixel size of 25 μm. The last lines of table 1 give slit width and length (and the corresponding angular resolution on the sky) per pixel. The optical scheme uses the minimum number of elements to get a very efficient white instrument. It comprises 3 mirrors, 2 lenses and

Table 1. Optical Parameters

Resolving power	17 500	30 300	60 600
Dispersion at = 5000 Å	9.5 Å/mm	5.5 Å/mm	2.8 Å/mm
Echelle grating	Jobin Yvon	Bausch and Lomb	
blaze angle	46°30′	63°26′	
line pairs	95 mm^{-1}	79 mm^{-1}	31.6 mm^{-1}
Cross disperser			
blaze angle		4°18′	
line pairs		300 mm^{-1}	
White camera			
focus	F = 279 mm		560 mm
aperture	f/1.66		f/3.3
Resolution/pixel			
slit width	144 μ	173 μ	86 μ
sky angle	1″	1″2	0″6–
slit length	192 μ	277 μ	138 μ
sky angle	1″3	1″9	1″