OBSERVATIONS OF THE NUCLEUS OF M100

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ABSTRACT

The IUE observations of the nucleus of M100 are presented and briefly discussed.

INTRODUCTION

M100 = NGC 4321 is a spiral galaxy in which a bright Type II Supernova (SN 1979c, m_B (max) $\simeq 12^m$) was discovered on April 19, 1979. Its spectral evolution has been followed with IUE for more than two months (refs. 1,2). At all epochs, the spectrum was dominated by continuous radiation on which emission and absorption features were superimposed. The equivalent width of most of the absorption features appeared not to vary with time suggesting that they originated in the interstellar media of M100 and our own galaxy. However, the possibility remained that the absorption lines be formed in the SN photosphere. Thus, the problem required some independent check for obtaining a definite solution.

This prompted us to observe the nucleus of the galaxy with IUE in order to discern bona fide interstellar features, which should be present in the spectra of both SN 1979c and the nucleus, from those originated in the SN photosphere which must be absent from the nucleus spectrum. Moreover, the nucleus of M100 in itself is worth being studied because in blue plates it presents interesting structure, namely, a central condensation (a core of $\sim$ 3") enveloped by a more diffuse region (a halo of $\sim$ 20") which contains additional 4 condensations around the central core (ref. 3). Also, radio observations with VLA have detected emission from a similarly extended area (ref. 4) and X-ray observations with the Einstein Observatory have revealed the presence of at least 2 condensations in the nuclear region (ref. 3).

OBSERVATIONS AND DISCUSSION

The observations were made on April 18, 1980 (LWR 7542, exposure time 197^m) and April 20, 1980 (SWP 8790, exposure time 420^m) at the ESA Satellite Tracking Station in Villafranca del Castillo, Madrid, Spain. Since the large slot (10" x 20") was employed for both observations, two of the condensations were observed at the same time. The spectra are displayed in Figure 1 and 2. The main results of a preliminary analysis can be summarized as follows:

1) The spectra of both components are dominated by continuous emission with approximate shapes $F_\nu \propto \nu^{-2}$ (upper component) and $F_\nu \propto \nu^{-1.5}$ (lower component). These imply relatively high color temperatures in the UV, of the order of 15 to 20 x 10^3K.

2) The line spectrum consists mostly of absorption features which are characteristic of the interstellar medium in both halos (e.g. Si IV 1400, C IV 1550, Al III 1850) and disks (e.g. Mg II 2800, C I 1260-1330, C II 1335, O I 1305, Si II 1260-1304, S II 1250-59) of M100 and our galaxy. This result confirms the interstellar origin of most absorption lines found in the SN 1979c spectra.

3) Emission lines, if present, are very weak. In fact, one may possibly identify the lines He II 1640 and O III] 1663 in both spectra. However, it is not clear whether they are real emissions or rather their appearance is mimicked by the shoulders of nearby absorption lines. Also, the possible presence of an emission component of the Mg II 2800 line in both spectra is indicated by the lower absorption observed in the red portion of the Mg II 2800 line just in correspondence to the radial velocity of M100.

REFERENCES

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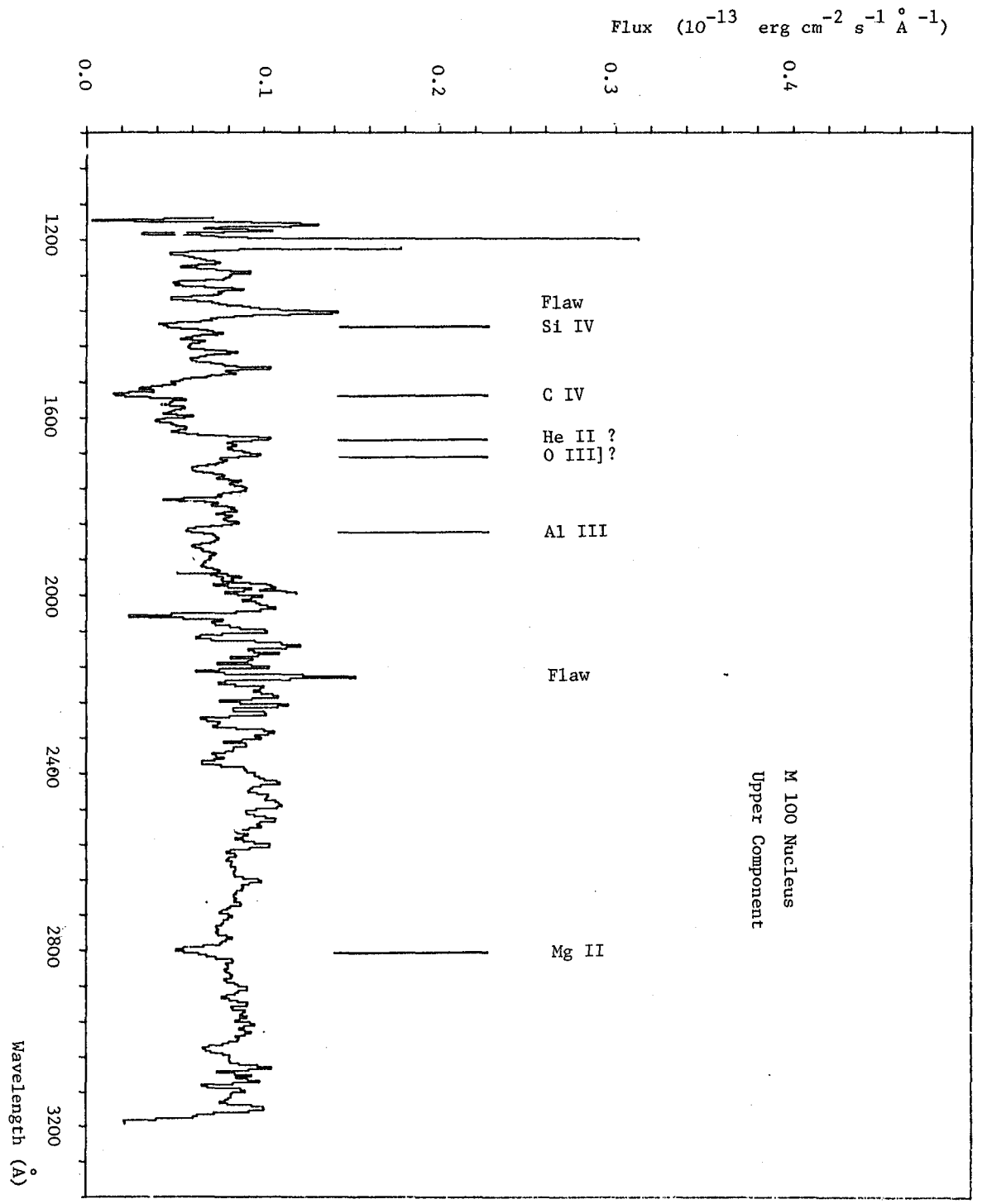
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0.0
0.1
0.2
0.3
0.4
1200
1600
2000
2400
2800
3200
Wavelength (Å)
Flaw
Si IV
C IV
He II ?
O III]?
Al III
Flaw
Mg II
M 100 Nucleus
Upper Component

Figure 1

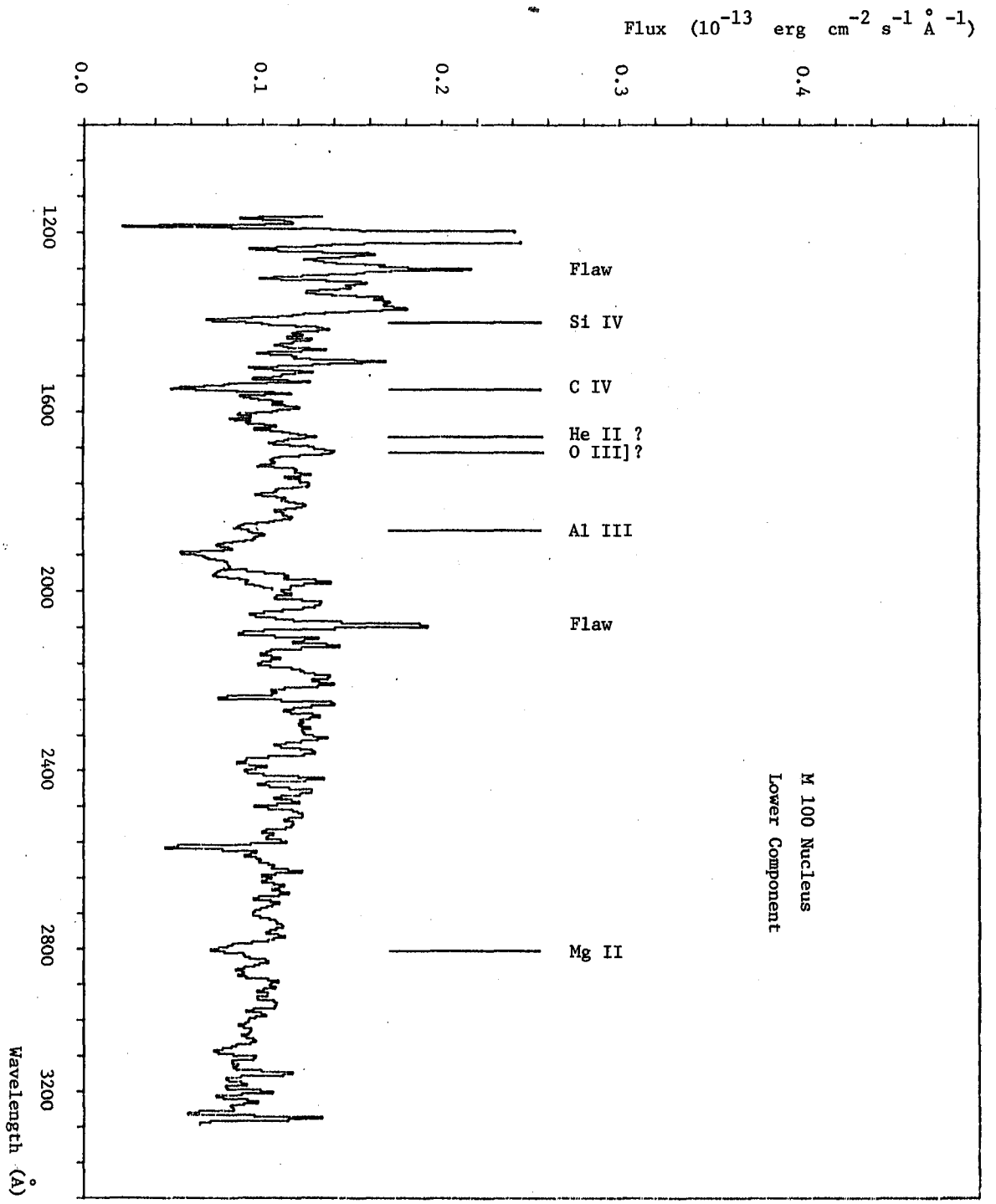
Flux (10^-13 erg cm^-2 s^-1 Å^-1)
0.0
0.1
0.2
0.3
0.4
1200
1600
2000
2400
2800
3200
Wavelength (Å)
Flaw
Si IV
C IV
He II ?
O III]?
Al III
Flaw
Mg II
M 100 Nucleus
Lower Component

Figure 2