ΑΣΤΡΟΝΟΜΙΑ.—**Monochromatic atmospheric extinction coefficients for the Kryonerion Observatory site,** *by E. and M. Kontizas*.*

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A B S T R A C T

The values of the monochromatic extinction coefficients $\alpha(\lambda)$ for the wavelenght range 3800 Å to 5600 Å have been obtained at the Kryonerion Observatory, Greece.

INTRODUCTION

The starlight reaching the earth passes through its atmosphere and causes a weakening which is due to absorption or scattering. This light loss is called atmospheric extinction and its amount depends on the path length of the light beam in the atmosphere, the chemical composition, the physical state of the air and on the wavelength. The expression for the monochromatic extinction in magnitude scale is,

$$m(\lambda) = m_0(\lambda) + \alpha(\lambda) \sec z, \tag{1}$$

where $m(\lambda)$, $m_0(\lambda)$ are observed magnitudes on the ground and the top of the atmosphere respectively and $\alpha(\lambda)$ the monochromatic extinction coefficient.

INSTRUMENTS AND OBSERVATIONS

The data included in this paper correspond to observations made with the spectrum scanner (Smyth - Kontizas, 1978) attached to the 1.2 m telescope at Kryonerion Observatory (Contopoulos and Banos, 1976) on Apr. 3 - 4, on Jun. 10 - 11 and on Aug. 2 - 3, 1976. The spectrum scanner used is a two channel photoelectric spectrum scanner. A feature of this scanner is the use of a small fraction of the undispersed starlight,

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abstracted behind the entrance aperture, to provide a reference beam for compensating changes in atmospheric trasparency, and seeing and guiding errors.

The main part of the scanner is a «SPEX» minimate monochromator with a degital read-out wavelength in nm. A glass splitter is used

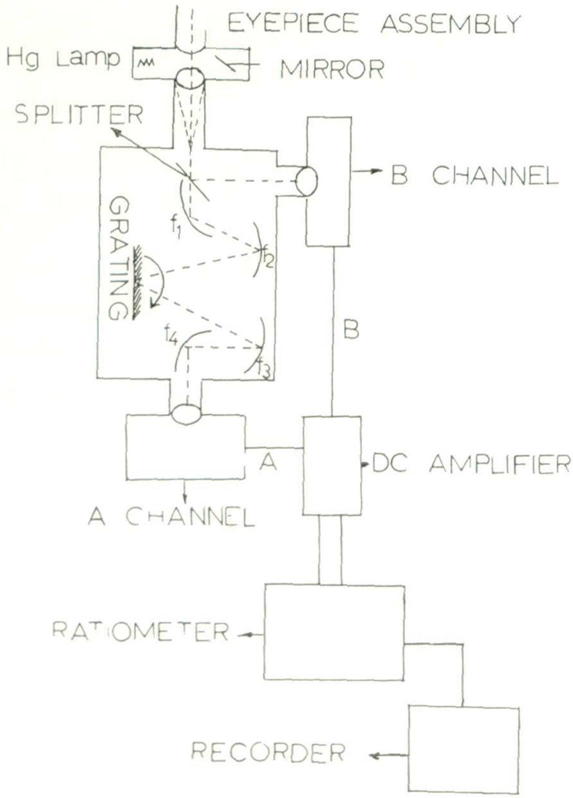

Fig 1 Schematic diagram of the photoelectric spectrum scanner.

to provide a reference beam of undispersed light. The dispersing element (grating) is rotating with a synchronous motor drive in order to provide successive monochromatic light beam for channel A (Fig. 1). The two available gratings (1200,600 grooves/mm) are blazed at 5000 Å and 10000 Å respectively

The two signals, namely the main beam (A) and the reference beam (B) are led through two identical dc amplifiers to the ratiometer that produces their ratio $R = A/B$. The ratiometer can be used as a DC amplifier as well ($A \times 10$ or $A \times 100$) and in that case the spectrum scanner is working as a single scanner photometer.

The observed stars were a Lyr and α Cr B. The principal data of these two stars, taken from the bright star catalogue, are

Star	HD	V	Sp	α (1950)	δ (1950)
α Lyr	172167	0.03	A0V	$18^h 38^m 33^{sec}$	$+38°41'$
α Cr B	139006	2 23	A0V	$15^h 30^m 27^{sec}$	$+27°03'$

The stars were observed several times each night starting from small zenith distances and followed towards the horizon, measuring the deflection on the chart recorder.

REDUCTION OF OBSERVATIONS

If the observed deflection at a zenith distance z is $D_\lambda(z)$, and $D_\lambda(0)$ is the deflection at the zenith, Eq (1) is transformed into:

$$2.5 \log D_\lambda(0) - 2.5 \log D_\lambda(z) = \alpha_\lambda \sec z - \alpha_\lambda \, . \tag{2}$$

For zenith distance down to 60° the air mass can be taken approximately proportional to secz but for larger zenith distances it deviates from secz. Therefore, in the present computations data of z between 0° and 63° are used.

The values of $2.5 \log D_\lambda(z)$ have been plotted vs secz for different z, the slope of the best curve gives the monochromatic extinction coefficient $\alpha(\lambda)$ with a standard error ± 0.01

Table 1 gives the monochromatic extinction coefficients for different wavelengths at different periods. These values have been plotted vs λ(Å) in (Fig. 2).

TABLE 1

λ (Å)	Monochromatic extinction coefficients α_λ		
	Apr. 3 - 4	Jun. 10 - 11	Aug. 2 - 3
3 830	0.429	0.455	0.460
3 970	0.391	0.406	0.415
4 100	0.369	0.391	0.398
4 600	0.308	0.320	0.329
5 110	0.250	0.262	0.265
5 360	0.224	0.240	0.250
5 620	0.192	0.202	0.208

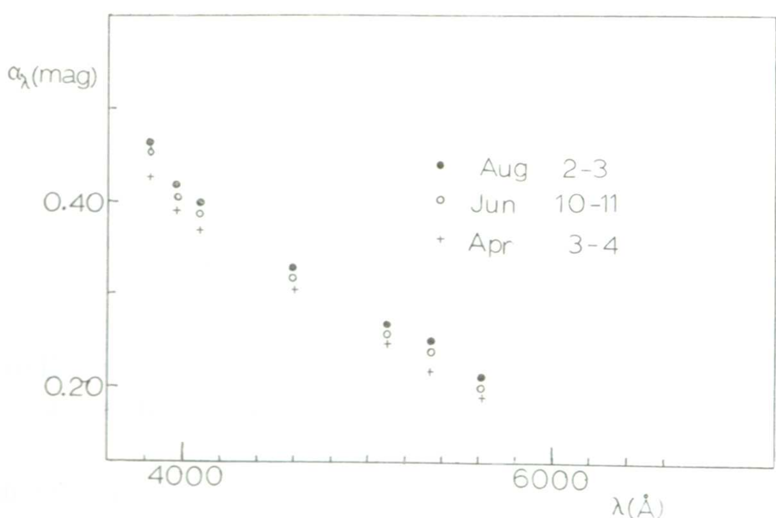

Fig. 2. Monochromatic extinction coefffcient.

DISCUSSION

It is obvious that the extinction is a function of wavelength with larger values towards the blue. These values have been determined for very good conditions. It is very well known that this coefficient varies from night to night and therefore it is necessary to be calculated every time needed for the reduction of accurate observations. So table 1 is only indicative of the atmospheric extinction values of Kryonerion Observatory site.

From a similar study for the Mount Wilson and McDonald Observatories (Abott 1929, Hiltner 1956) it was found that the extinction coefficients for the Kryonerion site are larger but competitive.

ΠΕΡΙΛΗΨΙΣ

Εἰς τὴν ἐργασίαν ταύτην δίδονται αἱ τιμαὶ τῶν μονοχρωματικῶν συντελεστῶν ἀπορροφήσεως διὰ τὴν φασματικὴν περιοχὴν (3800 Å - 5600 Å) μὲ σκοπὸν τὴν μελέτην τῆς ποιότητος τῆς ἀτμοσφαίρας τῆς περιοχῆς τοῦ Ἀστρονομικοῦ Σταθμοῦ Κρυονερίου τοῦ Ἐθνικοῦ Ἀστεροσκοπείου Ἀθηνῶν.

Οἱ ἐν λόγῳ συντελεσταὶ εὑρέθησαν φασματοφωτομετρικῶς εἰς διαφόρους ἐποχὰς (Ἀπρίλιος, Ἰούνιος, Αὔγουστος 1976) ὑπὸ καλὰς συνθήκας παρατηρήσεως. Αἱ τιμαὶ τῶν συντελεστῶν δεικνύουν ὅτι ἡ ποιότης τοῦ οὐρανοῦ τῆς περιοχῆς Κρυονερίου πλησιάζει αὐτὴν ἄλλων μεγάλων ἀστεροσκοπείων Mount Wilson, McDonald).

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