44. COMMISSION DES OBSERVATIONS ASTRONOMIQUES AU-DEHORS DE L'ATMOSPHERE TERRESTRE

Reports of Meetings

PRESIDENT: L. Goldberg.

Scientific Meeting, 23 August 1967

In opening the meeting, the President stated that in view of a number of recent highly successful space missions it had been decided to devote the entire meeting of the Commission to the reporting of new results. The solar results were to be given at this meeting, which was being held jointly with Commissions 10 and 12, while the results of other space investigations would be reported at an extra session scheduled for Saturday, 26 August.

W. M. Neupert reported preliminary results obtained from observation of the solar flare X-ray emission line spectrum of iron from 1·3 to 20 Å with two crystal spectrometers carried on board the third Orbiting Solar Observatory (OSO-III). Intensity variations with time were monitored for a series of new emission lines tentatively identified as transitions in Fe XXVI through Fe XX.

H. E. Hinteregger next described observations with a second scanning spectrometer carried on OSO-III and recording ultraviolet radiation from the whole sun in the spectral region 250–1300 Å.

R. G. Teske gave an account of his monitoring measurements of the soft solar X-ray flux from the entire solar disc using a standard ion chamber photometer with a pass band in the wavelength range 8–12 Å. This instrument is carried in the wheel section of OSO-III.

W. M. Glencross reported results obtained by the University College-Leicester group on the spectral distribution of soft X-ray emission as a function of position on the solar disc in the spectral region from 6 to 20 Å.

L. E. Peterson reported the analysis of the first two weeks of observations of solar and cosmic X-rays at energies greater than about 8 kilovolts in an experiment carried in the wheel section of OSO-III.

K. A. Pounds discussed possible models of the solar corona that would be in accord with the Leicester measurements of absolute intensities of solar X-ray spectra below 20 Å in the absence of solar flares.

R. Tousey then summarized the work of the Naval Research Laboratory in photographing the sun with rocket coronagraphs. In the most recent flight, very interesting observations were made of the outer solar corona, the zodiacal light and the earth-lit new moon as seen projected against the corona.

Preliminary results from a radio astronomy experiment on the OGO-III spacecraft were presented in a paper by F. T. Haddock. The objective of the experiment was to determine the kinds of dynamic spectra that the sun displays at frequencies in the range from 4 MHz to 2 MHz. Many interesting solar events have been recorded.

A. Vinogradov concluded the meeting with an account of two investigations in the USSR, the first on theoretical calculations on the spectrum of the solar corona in the spectral region 5–30 Å and the second on observations of the spectra of laboratory plasmas in the spectral region 120–200 Å, with special reference to the spectra of Ca X–XVI.

Scientific Meeting, 26 August 1967

The session consisted of a series of contributed papers concerned with observations of radiation from non-solar sources made with rockets, satellites and space probes.

D. C. Morton gave an account of Princeton University rocket observations of ultraviolet spectra obtained on five flights over a period of two years beginning in June, 1965. The spectral resolution

is 1–3 Å and the wavelength range 1130–3670 Å. The objects observed include eleven early type stars as well as the planets Venus and Jupiter.

T.P. Stecher next presented the results of similar observations on rocket stellar spectra obtained with a photoelectric recording scanning spectrophotometer.

H. Friedman reported results obtained by G. Carruthers at the Naval Research Laboratory in which a spectrograph was used in conjunction with an electronic image converter to obtain stellar spectra in the region 1000–1300 Å. The results were consistent with those reported earlier by Dr. Stecher and Dr. Morton.

V.G. Kurt described measurements of ultraviolet radiation from the Milky Way measured with photon counters on board the spaceships Venus II and Venus III. Measurements were made in two narrow spectral regions, one including Lyman alpha and the other just outside.

G. Courtés then gave a paper on the rocket photography of emission nebulosities in the ultraviolet. The zodiacal light was also recorded with good density at a distance of about 8° from the sun.

G.W. Clark presented preliminary results of an experiment aboard the OSO-III Satellite directed at the measurement of cosmic gamma rays above 70 MeV.

The next two papers dealt with measurements of low frequency cosmic noise. F.T. Haddock described results obtained by D. Walsh from a rocket launched on June 30, 1965 containing three receivers operating at 0·75 MHz, 1·5 MHz, and 2 MHz. The apogee of the rocket orbit was 1701 kilometers. J.K. Alexander described results obtained on board the Advanced Technology Satellite (ATS) launched on 6 April 1967 into an elliptical orbit with an apogee altitude of about 11 000 kilometers and a perigee altitude of about 180 kilometers. The experiment operates at 7 discrete frequencies from 450 kHz to 4 MHz.

The session was concluded with a brief report by I. Tindo on measurements of soft X-ray radiation from the moon-orbiting satellite Luna-12.

The complete list of papers and titles follows:

Wednesday, 23 August 1967

W.M. Neupert, W. Gates, M. Swartz, R. Young: 'Observation of the Solar Flare X-ray Emission Line Spectrum of Iron From 1·3 Å to 20 Å.'

H.E. Hinteregger: 'Solar EUV Spectra'.

R.G. Teske: 'Solar X-rays'.

P.J. Bowen, R.L.F. Boyd, W.M. Glencross, C.R. Negus, K.A. Pounds, A.P. Willmore: 'Spectral Distribution of Soft X-ray Emission as a Function of Position on the Solar Disc'.

H.S. Hudson, D.A. Schwartz, L.E. Peterson: 'Observations of Solar and Cosmic X-rays on the OSO-III'.

K.A. Pounds, P.C. Russell: 'Some Recent Solar X-ray Photographs'.

R. Tousey: 'Photography with a Rocket Coronagraph'.

F.T. Haddock: 'Solar Bursts 2000–4000 kHz'.

N. Basov, V. Boyko, J. Voinov, A. Kononov, S. Mandel'štam, J. Sklizkov, A. Vinogradov: 'Laboratory Investigations of Ca X–XVI Spectra'.

J. Bergman, L. Vainštein, A. Vinogradov: 'Spectrum of Solar Corona in Region 5–30 Å'.

K.A. Pounds, K. Evans: 'The X-ray Emission Spectrum of a Solar Active Region'.

Saturday, 26 August 1967

D.C. Morton: 'Rocket Stellar Spectra'.

T.P. Stecher: 'Rocket Stellar Spectra with a Scanning Spectrophotometer'.

H. Friedman: 'Stellar Spectra 1000–1300 Å'.

V.G. Kurt: 'The UV Observations of the Milky Way'.

G. Courtés: 'Ultraviolet Emission Nebulosities'.

G. Clark: 'Gamma Rays'.

D. Walsh: 'Low Frequency Cosmic Noise'.

J.K. Alexander: 'Advanced Technology Satellite-Radio Astronomy Results'.
S. Mandel'štam, I. Tindo, G. Čeremuhin, L. Sorokin, A. Dmitriev: 'Soft X-ray Radiation of the Moon and Cosmic Rays Background—as observed by Luna-12'.

SERVICE D'AÉRONOMIE DU CNRS

SOLAR OBSERVATIONS IN THE NEAR ULTRA VIOLET

A study of the solar emission between 2000 Å and 3000 Å has been actively pursued by a group of the Service d'Aéronomie du CNRS under J.E. Blamont.

Monochromatic pictures of the sun at 2200 Å, 2700 Å, and 2900 Å were obtained from a Veronique flight in November 1964 (**1**, **2**). During this flight it was demonstrated that even at 40 km of altitude, data could be obtained. The main effort of the group was then shifted towards balloon observations. The following results have been obtained.

(1) first observations of the granulation at 2000 Å (resolution of one to two seconds of arc) by J.E. Blamont and G. Carpentier, with the discovery of bright elements of small size (a few seconds) and long lifetime (more than 30 minutes) (**3**). These inhomogeneities should be taken into account when computing radiative transfer in this spectral range.

(2) limb darkening observations in the continuum and in the lines between 1800 Å and 2900 Å by R. M. Bonnet and J.E. Blamont (**4**, **5**); the continuous opacities of the photosphere layers were deduced from these observations and are not in agreement with usual models. From the source functions obtained for the shortest wavelengths, a value for the temperature minimum was proposed for inclusion in the Bilderberg model. (**5**, **6**). The depth of formation of faculae seems to be situated deep in the photosphere, since faculae can be observed close to the center of the disk from 2200 Å downwards, where the brightness temperature is 5500 °K.

(3) metallic photoionization discontinuities were observed at least for Mg I but the most conspicuous feature revealed was the discontinuity around 2080 Å, tentatively attributed to the photoionization of Aluminum. This discontinuity is much larger at the center than at the limb where it practically vanishes. It is responsible for the change in the aspect of the sun between 2100 Å and 2050 Å (disappearance of limb darkening, appearance of chromospheric features and faculae) (**7**) and it explains also the absence of the discontinuities of Si(I) (^3P, ^1D, ^1S states) in the Tousey spectra. Optical depth unity at 2000 Å seems to appear at the chromospheric level.

(4) stigmatic spectra of the Mg II doublet were obtained from a balloon borne spectrograph, providing the profile of the Mg II lines with a resolution of 0.04 Å and limb center variations of the profile of the lines with a space resolution of one minute of arc. (**8**).

Date	*Vehicle*	*Experiment*
November, 8, 1964	Veronique	limb darkening by pictures at 2200 Å, 2700 Å and 2900 Å
May 2, 1966	Balloon	granulation at 2000 Å
October 3, 1966	Balloon	limb darkening by pictures at 1976, 2235 Å.
January 13, 1967	Veronique	stigmatic spectrum from 1800 to 2800 Å.
March 22, 1967	Balloon	discontinuity at 2080 Å.
June 13, 1967	Balloon	stigmatic spectra of Mg II doublet

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5. Bonnet, R.M., Blamont, J.E. 1967, Limb Darkening Observations between 1800 Å and 2900 Å. *Solar Physics*, **2**, 3–33.
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7. Blamont, J.E., Bonnet, R.M. 1967, Mesure de l'assombrissement centre-bord du soleil entre 2000 et 3000 Å, *C.r. Acad. Sci. Paris*, **264**, 1158–1161.
8. Lemaire, Ph., Blamont, J.E., Stigmatic Balloon spectra of the Solar MgII Doublet (to be published, *Ap. J. Letters*)

Appendix

ADDENDA TO THE REPORT OF COMMISSION 44 PUBLISHED IN TRANSACTIONS IAU, VOLUME XIII A

Addenda to Section I.1., page 993

K.G. Henize signale que son groupe vient de terminer la construction d'un télescope *f*/3 de 15 cm d'ouverture muni d'un prisme objectif. Ce dernier sera utilisé par les astronautes du programme d'Applications Apollo pour obtenir des spectres d'étoiles dans la région 1400–3000 Å. La dispersion sera de 90 Å/mm à 1500 Å.

G.R. Carruthers rapporte que son groupe au US. Naval Research Laboratory projette deux vols supplémentaires de spectrographes munis de convertisseurs d'images. Le premier sera du type 'Schmidt' et couvrira la région de 1230 à 1800 Å. Le second système sera composé uniquement de surfaces réfléchissantes et couvrira le domaine de 950 à 1400 Å.

Miss Roman apporte les précisions suivantes relatives au satellite OAO-B auquel il est fait allusion p. 993, pénultième paragraphe.

'Le but de cette expérience, dont le responsable est A. Boggess, est de déterminer la composition et les propriétés des étoiles A et B, d'étoiles variables et des étoiles B particulières en utilisant des données spectrophotométriques absolues dans le domaine de 1000 à 4000 Å avec une résolution de 2 Å. Un télescope Cassegrain de 36 pouces suivi d'un spectromètre très ouvert en constitue le système optique. Six photomultiplicateurs utilisés en compteurs d'impulsions seront utilisés pour l'enregistrement des données'.

Addendum to bibliography II.1., page 1000.

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APPENDIX V. MEASUREMENTS OF RADIATION FROM THE EARTH

Dr A.I. Lebedinskij calls attention to the important series of observations of radiation from the Earth, which have been carried out from Soviet Earth satellites, and are described in the publications referenced below.

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