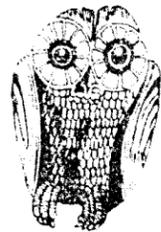


XVIIIth GENERAL ASSEMBLY



ASTROCOSMOS



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Number 6



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Participants enjoy themselves at the Wine Festival, one of the continuing and highly successful events of the I.A.U.



Professor Hanbury Brown (left) and Professor McCrea (right) cool off between sessions

NEW INTERFEROMETRIC TEST SYSTEM FOR TELESCOPE MIRRORS

by Michael Smyth, University of Edinburgh Department of Astronomy, Royal Observatory, Edinburgh, U.K.

Solid-state image devices are increasingly replacing the photographic plate as astronomical detectors; and desk-top microcomputers are taking over many of the tasks until recently assigned to large computers. A combination of these technologies is proving useful in the figuring of the new generation of large telescope mirrors. Developed in collaboration between the Department of Astronomy of the University of Edinburgh, Scotland, and NEI Grubb Parsons of Newcastle, England, the system comprises a silicon diode array detector attached to a wavefront shearing interferometer and linked to a microcomputer.

The wavefront shearing interferometer is widely used in the manufacture of large optical components, and since this involves many cycles of testing and polishing it is important to minimize the duration of testing and data processing. The accuracy achievable during manufacture is limited by the accuracy of the test procedure, and the new combination of precise photometry and integral data processing yields significant advantages.

In the past, the interference fringes across the image of the mirror under test were photographed, maxima and minima in the interference pattern were located, and the coordinates transferred to a computer where the interferogram phase errors and other desired data (such as wavefront profile or the pitch distribution on a lap designed to correct the observed errors) could be calculated. Photography, measurement of the photograph, and transfer of data to the computer were separate processes, giving limited accuracy and spatial resolution and a long cycle time.

The newly developed system images the fringe pattern into a silicon diode detector array which senses the intensities at 512 points across a diameter of the mirror. The 512 intensities are stored in the microcomputer, and the measurements are repeated for a total of five stepped phase values. Within 10-15 minutes of measurement and computing time, the microcomputer displays a plot of relative phase across the mirror diameter. Interactive graphics allows 360° phase discontinuities to be removed, and the display can be «folded» to allow comparison and superposition of points equidistant from a selected centre of symmetry. Under the conditions of routine measurement, with unsilvered glass surfaces, the relative phase precision is of order of 0.01 wavelength. The phase data are stored on a floppy disk for subsequent processing.

A summation procedure is used to convert the relative phases into wavefront errors. The final precision of wavefront measurement depends on the shear used, but is typically 0.03 wavelength. Expressing the errors in more familiar astronomical terms, with a shear value of 100mm the phase precision of 0.01 wavelength is equivalent to 0.01 arc second.

The system is being used for testing several large astronomical optical systems in production at Grubb Parsons, including the 4.2 metre mirror of the Herschel Telescope, the largest optical telescope ever to be produced in Britain.

QSOs AND OTHER PECULIAR EXTRAGALACTIC OBJECTS

by G. Burbidge and A. Hewitt

In the coming year, we are planning to produce two catalogues of extragalactic objects which are not stars or normal galaxies.

1. The first catalogue will provide a complete compilation of all extended extragalactic objects which either contain abnormal components, or which are not normal galaxies of stars. Thus we confine ourselves among the types called N galaxies, emission-line galaxies, Markarian galaxies, Arakelian galaxies, Seyfert Galaxies, and compact galaxies to those objects with nonthermal continua and strong emission lines. All observations of radio, infrared, optical, ultraviolet and x-ray fluxes will be included together with variability and line structure.

2. We plan to publish a supplement to the QSO catalogue of Hewitt and Burbidge 1980, Ap. J. Suppl. 43, 57.

If you have reprints, preprints or unpublished observations of objects which should be included in either catalogue, please send material to A. Hewitt, Kitt Peak National Observatory, P.O. Box 26732, Tucson, Arizona 85726-6732, USA. Deadlines for receipt of material are

For the Catalogue of peculiar non-stellar extragalactic objects — December 31, 1982.
For the Supplement to QSO catalogue — June 30, 1983.

We hope to publish these catalogues in late 1983 and early 1984, and copies will be available on tape.

Please pass this request to your colleagues.

The Soviet Comet Probe

The audience at Commission 16 on Tuesday morning heard the latest news of Russia's Vega programme—given by Professor Mikhail Marov, who had himself just received it from Moscow. The launch date will be in December 1984. The flight to Venus will last from 174 to 176 days; two days before encounter the Venus lander will be released. At this time Halley's Comet will be in the region between the orbits of Saturn and Jupiter. The flight-time between the Venus and Halley encounters will be about 270 days: the fly-by, at a minimum distance of 10000 km is scheduled for 1986 March 8, roughly a month after Halley has passed perihelion.

At the moment all the Soviet plans seem to be proceeding well. In view of the cancellation of the NASA probe, we depend entirely upon Vega, Giotto and Japan's Planet A. Otherwise we must wait until AD 2061!

NASA-CNRS MONOGRAPH SERIES

The NASA of the United States and the CNRS of France are publishing a series of monographs «Nonthermal Phenomena in Stellar Atmospheres». Each volume contains a comparison of normal stars in a given spectral class and at least one kind of peculiar star of this class. It focuses on

(i) a current, ordered summary of these stars across the spectral range from x-ray to radio, placing in focus these characteristics which are apparently non-thermal;

(ii) a confrontation between these observations and classical, theoretical models;

(iii) the gross outlines of preliminary attempts at empirical modeling of these observations, which may eventually serve as basis for a more complete theory of stellar atmospheric structures and of the origin of these fluxes of matter and energy producing it.

With its focus on observations, its volume emphasizes the series goal of providing a basis for observational planning during the 1980's terrestrial and spatial projects.

Volumes appear at the rate of two per year. The first, **The Sun as a star**, edited by S.D. Jordan, appeared in July 1981. The second, edited by A.B. Underhill and Vera Doazan, appeared in May 1982.

TABLE OF CONTENTS

Part I-B Stars by A.B. Underhill.

Understanding and introducing the B stars. Observations of normal main sequence and B giant stars. Observations of B-type supergiants. Special types of B stars (by J. Rountree Lesh). Model atmospheres. The

TODAY'S EVENTS:

LES EVENEMENTS DU JOUR:

Sea, Sun, Sleep, Nourishment, Refreshment and Recuperation (whenever you like!).

In the Ancient Odeon of Patras:

20.30-22.00 Performance of the Ancient Greek Tragedy «ANDROMACHE» of Euripides.

At EOT Swimming Resort, Aya, Patras:

WINE FESTIVAL: 20.00-24.00.

Publisher: For the Local Organizing Committee, V.V. Markellos
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evolution of massive stars. Unsolved problems.

Summary.

Part II - Be Stars by V. Doazan

Introduction to Be stars. Ground based observations and ad hoc models. Data obtained from spacecraft. Global picture of a Be star (in collaboration with R.N. Thomas).

Orders may be sent to either.

CNRS

15 Quai Anatole France
75700 Paris

or

NASA

c/o S.D. Jordan

Goddard Space Flight Laboratory; Building
21 Greenbelt Maryland - USA
USA

The Largest
Lunar Basin?

Despite all the Surveyors, Orbiters, Lunas and Apollos we are still far from a full understanding of the Moon. In Commission 16 E.A. Whitaker, from the Lunar and Planetary Laboratory in Arizona, presented evidence for a basin which seems to be the largest known. Some craters (such as Compton) have both central elevations and inner rings of peaks; larger structures such as Mare Orientale, show very obvious concentric rings. The Mare Imbrium is associated with a ring system, but it has not been previously recognised that there are clear indications of a very large outer associated ring which includes the Oceanus Procellarum: Mr. Whitaker referred to it as the Procellarum Basin. It is undoubtedly very ancient, and if produced by a plunging meteorite the global devastation must have been far greater than for the Imbrium event itself.

At the same meeting Patrick Moore (U.K.) gave an account of recent research into Lunar Transient Phenomena - slight localized events generally believed to be due to gaseous emission. Previous result that the phenomena occur mainly in regions around the peripheries of the circular maria, or areas rich in clefts - has been confirmed. Regular monitoring is producing useful data, but the main target is to obtain a good spectrogram. So far only one exists (Kozyrev's of the 1958 Alphonsus event). At the moment the data are very incomplete but the reality of the events is now generally accepted.

ASTROCOSMOS

Back issues of this potential collector's item (!) may be obtained at the press office, second floor, Building T as long as stocks last.

SIMOS
PHOTOGRAPHY

Photos of the functions and activities of the I.A.U. are on display for sale in the concourse bldg. Next to the news stand.

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Editorial

LATE NIGHT FINAL

An earthquake occurred around 2 a.m. on Tuesday, August 17. According to the Institute of Geodynamics in Athens, it had an intensity of 6.1 on the Richter scale and its epicenter was located 450 km S-S-W of Athens.

Your editor and the printing staff of ASTROCOSMOS noticed it. They were busy putting the finishing touches to the following day's number of the paper and with customary devotion to duty continued their task after remarking that the overhead lights had begun to perform a mild Galilean pendulum dance.

The IAU is of course holding its General Assembly in an earthquake area. Perhaps the most famous example of the art of Poseidon, the God of the sea and of earthquakes, was the explosion at the Greek island of Thera about 1450 BC. Anyone visiting that island - sometimes called Santorini - cannot fail to be awed by the huge flooded caldera and the huge 400 metre high cliff running round the inside of the crescent-shaped island.

It is supposed by many that the cataclysm at Thera was responsible for the collapse of

the Minoan civilisation, justly called the first great civilisation of Europe and enshrined in those Greek legends of Theseus and the Minotaur and Daedalus, King Minos's great engineer.

You will remember that when Daedalus fashioned the famous wings of feathers and wax with which he and his son Icarus escaped from Minos's prison, he warned Icarus not to fly too near the Sun or his wings would melt. Icarus paid no attention - an early case of generation gap - and paid the penalty.

The explosion at Thera has been estimated to have been an order of magnitude more severe in its effects than the historic eruption at Krakatoa in 1883 which was heard over one-thirteenth of the Earth's surface, sent tsunamis right round the world, put so much dust into the atmosphere that the Sun went out for fifty hours over one million square kilometers and caused the deaths of 36,000 people. Unfortunately, although we can say that something like the Thera cataclysm happens in this area about once every ten thousand years we cannot give any reliable prediction as to when the next one is due. It however it does happen during the General Assembly you may be sure that your devoted staff of ASTROCOSMOS will draw your attention to it.

Letter to the Editor

Dear Editor,

I would like to protest against the «votes» at the General Assembly on Tuesday the 18th August. Significant decisions had already been made by national representatives and the Assembly was asked to «vote» by applauding them. While it was normal to applaud certain decisions like that solving the problem of the representation of China, the participants did not possess much information about other questions. In any case, a «vote» by applause is completely undemocratic. I hope the IAU will not continue this type of sham.

Yours sincerely,
Michael Friedjung
France

Sky and Telescope

«Sky and Telescope» has for over 40 years been the leading popular astronomy magazine in the world. In the years to come we hope to report even more fully international astronomical news. If you think your research is of general interest to the astronomical community, please send us a preprint. We are always open to suggestions for articles of any nature.

L.J. Robinson (0235)
Editor «Sky and Telescope»

Wine Festival

The Local Organising Committee of the 18th General Assembly of the University of Patras has organised a wine festival to entertain our honoured guests.

It will be open every evening from the 10th until the 26th of August 1982 between 20.00 and 24.00.

The entrance charge for registered participants is \$2 and for the non-registered \$4. Special wine glasses and wine carafes will be on sale inside the festival area.

Greek specialities (souvlaki) and soft drinks will also be available at a cantina at reasonable prices. Participants will also be able free of charge to drink wine from different parts of Greece.

An Orchestra «The Planets» will provide music for the occasion. There will also be contributions from local choirs.

Buses and coaches will be available to take participants from their hotels to the Wine Festival and back to their hotels. The last bus will leave the Festival at 00.10.

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WOMEN IN ASTRONOMY

INTRODUCTION

by John R. Percy

Very recently a number of essays on this subject was compiled by Dr John R Percy, Department of Astronomy, University of Toronto, Toronto, Canada M5S 1A7, who comments

What is the status of women in astronomy in different parts of the world? What percentage of astronomers are women? What special problems do women encounter when they train to become astronomers? How can these problems be solved? These are questions which should be of interest and concern Commission 46, Teaching of Astronomy, because able, interested women are an important source of «manpower» for astronomy, now and in the future, and no unnecessary barriers should be placed in their way.

I have solicited short articles on «women in astronomy» from various parts of the world. Our articles were submitted, they are printed below, and represent the current status of women in astronomy in four of the more astronomically-active parts of the world.

It is apparent, from these and other articles, that there are many factors which may affect the status of women in astronomy. These range from possible (but controversial) differences in natural scientific and mathematical ability, through social factors militating against women becoming interested in science, to problems associated with combining marriage, child-raising and a scientific career. Nevertheless, women enter careers in astronomy in reasonable proportions especially in Europe. However, in all the countries surveyed, women are often prevented by various factors from reaching the highest levels of the astronomical community. There are exceptions, of course: Drs. Edith Müller (Switzerland), Margharita Hack (Italy), Pamela Bues and Waltraut Seitter (Federal Republic of Germany, and Margaret Burbidge (USA) are prominent examples.

More detailed discussions of the status and problems of women in astronomy (at least in North America) are contained in the references below.

Bole, J R 1981 American Scientist 69, 385
 Gasiakowski, V 1980 Physics Today 33 2, 32
 Miller, M H 1980 Bulletin of the American Astronomical Society 12, 624
 Percy, J R 1981 Journal of the Royal Astronomical Society of Canada 75, 210

WOMEN IN ASTRONOMY IN FRANCE

Dr. Lucienne Gouguenheim

Laboratoire d'Astronomie, Université de Paris-Sud
 Centre d'Orsay, 914 05 Orsay, France

French astronomers belong to three different groups: National Centre for Scientific Research (CNRS), observatories (civil servants full time in astronomical research) and universities (civil servants). The highest wages are obtained at CNRS, the lowest in observatories.

Each of the three groups is divided into four ranks, they are indicated in Table 1 by increasing level. The two lower ranks constitute the lower category (B) and the two higher constitute the higher category (A). The population of each rank is given in Table 2.

Table 1

Category	Rank	CNRS	Universities	Observatories
B	1	Attaché de Recherche	Assistant	Assistant
	2	Chargé de Recherche	Maître Assistant	Aide Astronome
A	3	Maître de Recherche	Professeur (2nd class)	Astronome adjoint
	4	Directeur de Recherche	Professeur (1st class)	Astronome

Table 2

Rank	CNRS*			Universities			Observatories		
	Tot	W	% (W)	Tot	W	% (W)	Tot	W	% (W)
1	48	9	19	20	4	20	a) 9	4	44
							b) 51	10	20
2	129	43	33	37	17	46	57	18	32
3	43	10	23	9	3	33	65	14	22
4	15	2	13	16	1	6	32	4	12

* including External Geophysics
 a) lower category, b) higher category

General Comments

In the last five years the number of positions in any of the three groups has considerably decreased. As a consequence very few women have been engaged: none in the universities, 4 among 23 in the observatories and 4 among 42 at the CNRS. Up to now, access to category A was the more difficult. The larger percentage of women in rank 2 is a direct consequence of this difficult access to rank 3.

A more detailed investigation has been performed in the observatories. Among the 34 astronomers who entered rank 2 less than 10 years after entering rank 1, there are only 7 women. But among the 18 astronomers who entered rank 2 after 10 years or more, there are 7 women.

A similar result is obtained concerning the access to the higher rank. Only one woman among 18 astronomers entered rank 4 after less than ten years and four of them, among 13, entered after 10 years or more.

The distribution of ages is also informative.

Rank	Astronomers born after 1935		Astronomers born before 1935	
	W	M	W	M
3	2	27	12	11
4	1	5	3	23

This illustrates the greater difficulty for women to attain higher ranks.

Level of responsibilities

French astronomers receive their funding from the Ministry of Universities and from the CNRS. There are eight observatories depending on the Ministry of Universities and 29 laboratories depending on the CNRS. Only two laboratories and no observatories are directed by women.

WOMEN IN ASTRONOMY IN THE U.S.S.R.

Dr. E. Kononovich

Sternberg Astronomical Institute
 Moscow University, 117234 Moscow, U.S.S.R.

It is well known that in the U.S.S.R. women enjoy equal rights with men in all fields of social, political and cultural life. There is only one exception: it concerns women's nature and their family position and child care. In this respect women have special privileges. Possessing natural abilities equal to those of men, women have free access to science in the U.S.S.R. Their number is about 40% of the total scientific staff and in astronomy as well. It is rather difficult to specify the absolute number of women in astronomy, but one may suggest this number to be about, say, seven to eight hundred. About 30 to 40% of these women have a doctor's degree, nearly the same percentage as men. In this respect, women's scientific position is equal to that of men. Needless to say, women and men are paid equally.

There is a second doctor's degree which, being of a higher rank, is usually awarded to the most prominent scientists whose contribution includes the development of some new scientific trend. The number of specialists of such rank is about one tenth of all those holding a doctor's degree. Usually women cannot afford to devote all their life to obtaining this degree. Nevertheless one can find dozens of such highly qualified women among Soviet astronomers.

It seems that the reasonable and natural proportions of men and

women in science and astronomy in particular are due to the situation existing in the college and university educational system. In school, girls and boys study together. Their proportion corresponds to the natural demographic proportion, due to the obligatory nature of the educational system.

Astronomy is a separate course in the Soviet school programme, and boys and girls in their teens regard astronomy romantically. After graduating from secondary school, they can choose their future speciality. Boys and girls who prefer astronomy have equal chances to enter a university.

In the main universities (Moscow, Leningrad etc), girls represent more than 25 to 35% of students in astronomy. This accounts for the existing percentage of women among astronomers.

There have been many outstanding women in Soviet astronomy. Their names are well known in many countries: V F Gase (1988-1954), N N Sytinskaya (1906-1974) and A G Masevitch in astrophysics, L P Tseraskaya (1855-1931), R A Bartaja and K A Barkhatova in stellar astronomy, A Ja Bougoslavskaya (1899-1960) in astrometry, N F Rein (1905-1942) and E I Kazimirschak-Polonskaya in celestial mechanics. We find women in all branches of astronomy.

Is there any branch which attracts more women than others? It is difficult to say. But there is evidence that many women solve problems in celestial mechanics, discover minor planets, novae and supernovae, and make many other contributions to observational study.

WOMEN IN ASTRONOMY IN THE U.S.

Dr. Caty Pilachowski

Kitt Peak National Observatory
 Box 26732, Tucson, AZ 85726, U.S.A.

Women astronomers in the United States comprise almost 9% of the membership of the American Astronomical Society. This percentage is down from a maximum of about 17% in the early 1940's, but the figure has been slowly increasing since the early 1970's. The total is now approximately 300 women. The representation of women on college and university astronomy faculties is more dismal. Fewer than 5% of the tenured or tenure-track professors of astronomy in the U.S. are women, a total of fewer than 30 women. Women are especially underrepresented in high ranking professorial representation positions, although the age distributions for men and women in astronomy are similar. By 1979, the average salary differential between men and women had increased to \$3,500 from \$3,300 in 1973.

The AAS has twice appointed an *ad hoc* Committee on the Status of Women. The reports of these Committees are published in the *Bulletin* of the AAS (12, 624, 1980; and 6, 412, 1974) and those reports are the source of the data presented here. The AAS has since appointed a standing Committee on the Status of Women to help promote the full participation of women in the AAS and in the U.S. astronomical community.

One of the problems most frequently faced by women in astronomy is the difficulty of being part of an «astronomical couple». Fully half of our women astronomers are married to other astronomers or to spouses working in a closely related field. A woman astronomer must often take whatever employment she can find near her husband's place of work. Frequently these positions are lower ranking lecturer or research appointments. Affirmative action procedures in the U.S. occasionally compound this problem because such procedures increase the difficulty in hiring astronomical couples.

The National Science Foundation proposed two new programs to increase the participation of women in astronomy research. The first provided research initiation funds for women who recently received their doctorates or who are re-entering the research community after career interruption. The second supports visiting professorships for women for up to two years at academic institutions. Unfortunately funding for both programs has been withdrawn.

During the 1970's, the recognition of the contributions of women to astronomy increased. More women are now serving as officers of the AAS, on astronomy advisory committees and as referees for journals. More women are asked to give invited papers at AAS meetings, and at least one woman has been honored with a prestigious Society award. However, this improvement has not yet been matched with a significant increase in the percentage of astronomers who are women or in their representation on astronomy faculties.

Continued on page 6

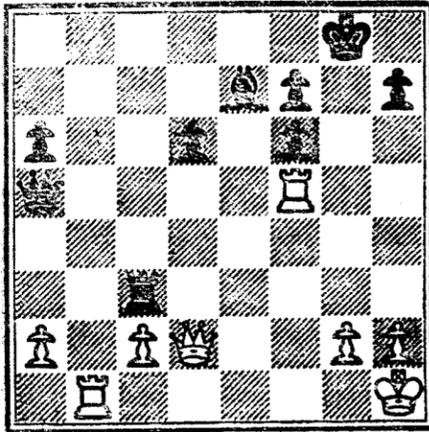
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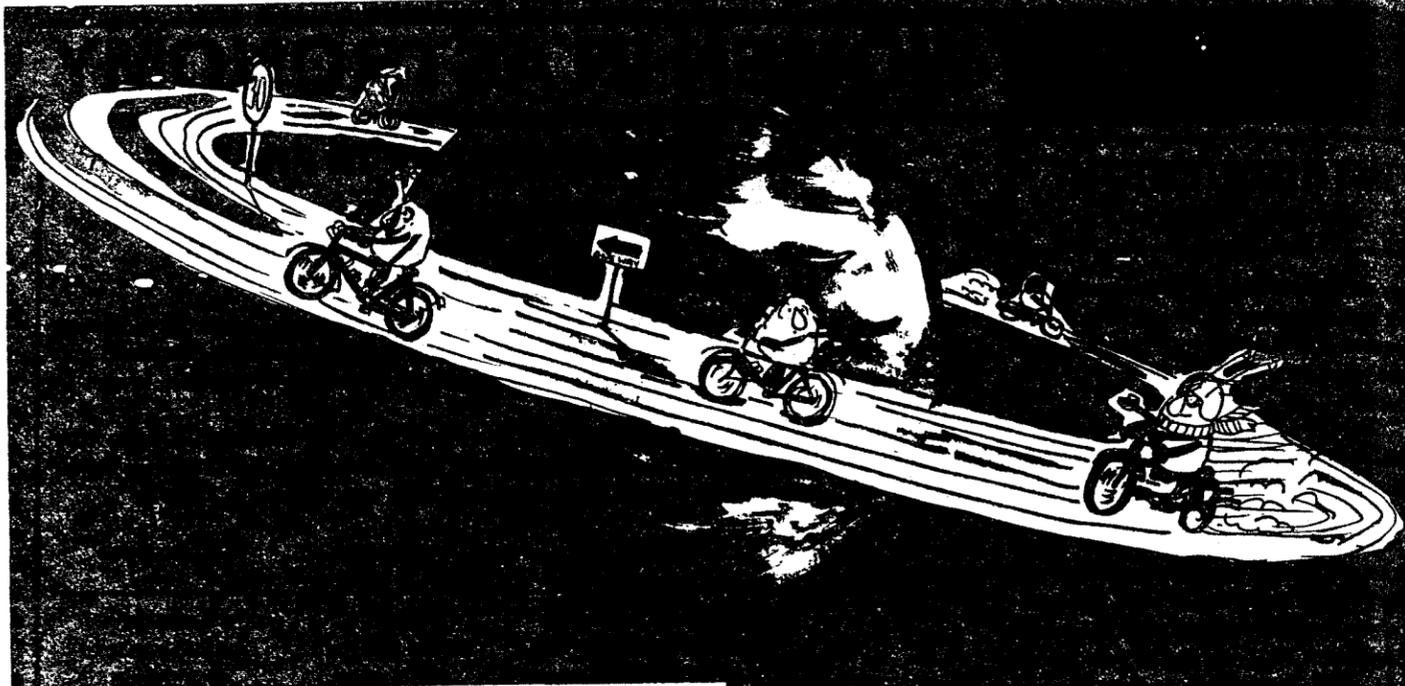


Black to play and win

Solution to Chess Position 4:

1. B-R7I, B-R8 2. K-K1I, B-B6 3. K-B2, B-R8
4. B-Q4I, B X B 5. K-Q3, B-R8 6. K-K4 and the white pawn cannot be stopped.

V.V.M.



VOYAGER SATURN PICTURES NASA did not dare publish. Number 3

IR

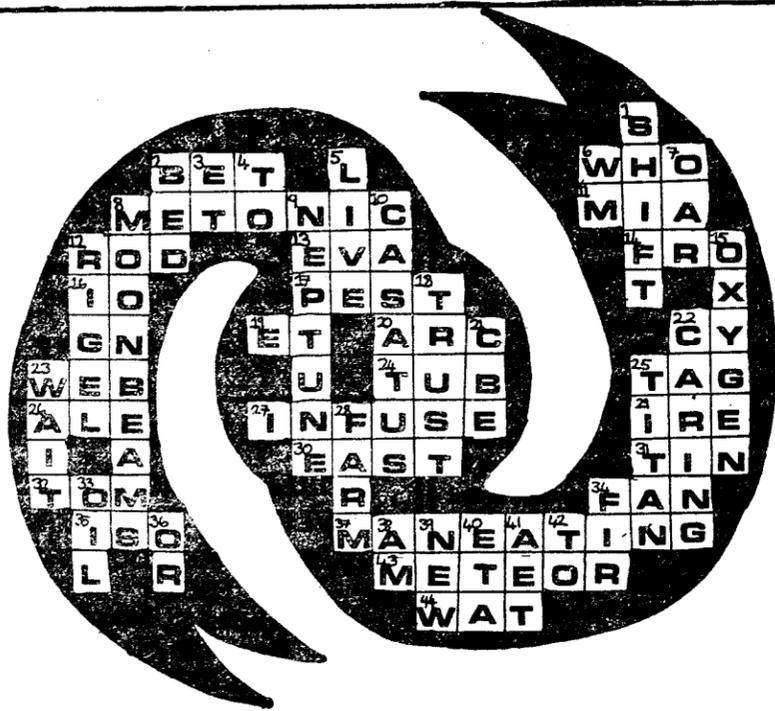
USEFUL ASTRONOMICAL PHRASES AND THEIR MEANINGS

Many people complain that it is difficult to understand astronomical lectures or papers because of the obscure jargon used. To alleviate such difficulties we give a

list of some of the more frequently occurring phrases with their scientific meanings.

PHRASE	MEANING
1. After a little reduction.	After a week's hard slogging.
2. The computer trials verified the analytical formula.	I had used the numerical integration procedure before Bill showed me the standard integral.
3. Obviously true	I can't find a proof but I have this feeling about it.
4. Manifestly true.	As for 3 but wave hands even faster.
5. Certain.	Dubious.
6. Probable.	Possible.
7. In full agreement with...	Yes or no, depending on what you want.
8. 10 to the 40 within a factor of two.	From 10^{20} to 10^{40} .
9. Revealing a slight deficit in solar neutrinos.	Where in hell are they?
10. Giving the reliable age of the Universe as 20,000,000,000 years.	We're pretty sure of the number of zeroes but the 2 could be anything between 1 and 3 we think.
11. Exhaustive survey.	A quick glance through the literature.
12. Unanswerable objection.	Trivial criticism.
13. Trivial criticism.	Unanswerable objection.
14. Considered opinion.	My guess is...

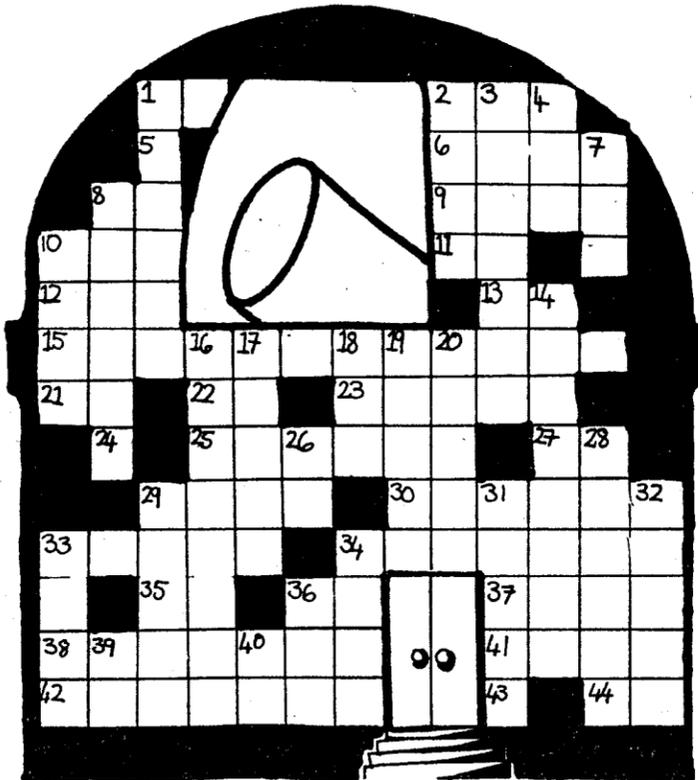
Rodopoulos Michalis
Cavo d'oro
Cafeteria - Spageteria
Iron Polytechniou, Glyfada



ASTROCROSSWORD

ACROSS

- Exclamation
- Hard water
- Commonly used symbol for energy
- Fit of unconsciousness
- You can make it canine
- Musical work
- Greek «are»
- I can turn it into a pinch
- Strong emotion
- Reversed American greeting
- Relating to the universe
- «Now» in the mnemonic for spectral class
- A search for ET's
- White, B8, $m = 0.34$, binary; $d = 700$ ly
- The hottest
- Of the North or North wind
- They are neighbours to the Sun's position.
- You have to draw it somewhere
- Of the intellect
- Its song on Voyager's record may outlast it.
- Helps keep you balanced
- See I have a rhyme assisting, my feeble brain its chore resisting.
- GMT
- Scramble «omit» to get it
- Famous Czech composer
- To undress fruit or vegetables
- Geometrical shape - or dead parrot!
- With 44 it draws its own conclusion



DOWN

- Found in Greek churches
- Small wood
- Large Australian bird
- Burnt tree?
- Timely to add a meter
- Eastern staple food
- Football teams switch round then
- Characteristic of all transport
- Protective layer endangered by human inventiveness.
- Sometimes it's valuable
- Above the main sequence
- Eskimoes' traditional house
- With reference to
- Immature cat
- Folded back part of coat
- In the west it is considered a romantic thing to do
- And often results in this
- Small bundle of straw
- Is NATO going the right way?
- The hopes of many
- Add a «B» and you've got a riot
- It's painful if you add it to the 6th, 7th and 4th of 42

GASTRONOMY CORNER



Moussaka

- 3-4 medium sized aubergines
- 3-4 courgettes (optional)
- 2 potatoes
- 1 medium onion grated
- 1/4 cup butter
- 1 1/2 lb minced meat
- 1/2 cup white wine
- 3 peeled and chopped tomatoes (or a 1lb can)
- Chopped parsley
- 3 cups bechamel sauce
- Salt and pepper
- 2 egg whites, lightly beaten
- Olive oil (or corn oil) for frying
- 2 egg yolks
- 1 egg
- 3 cups grated cheese

1. Cut the aubergines, courgettes, potatoes into slices 1/2 inch thick. Put the aubergines into salty water and leave on one side for an hour.

2. Sauté the onion in a little butter until soft and opaque. Add the mince, stirring with a fork to keep the meat broken up. Add the wine, tomatoes, parsley salt and pepper and simmer, covered for 30 minutes. Remove from heat to add the egg whites and stir well.

3. Rinse and dry the aubergines and the other vegetables and fry lightly in olive oil on both sides.

4. Grease an ovenproof dish, and line the bottom with half the vegetables. Spread on the meat mixture and cover with remaining vegetables. Beat the egg yolks with whole egg and stir into the bechamel sauce. Add 2 1/2 cups of grated strong cheese (such as kefalotyri) and pour over the vegetables covering the whole dish.

Sprinkle the remaining cheese on top and bake in a moderate oven for about 45 minutes or until the top is golden brown. (Serves 6).

Stuffing Summer vegetables

Summer vegetables such as vine leaves, aubergines, tomatoes, peppers, courgettes, are very common and plentiful this time of year in Greece.

Their unforgettable taste when they are cooked or simply served with olive oil and



A little-known episode in the observing life of William and Caroline Herschel (apologies to Honoré Daumier (1808-1879) «Not there, you fool! There!»

seasoning is fully appreciated by Greeks and by tourists travelling in Greece.

Many vegetables can be filled with savoury stuffings to make delicious summer dishes, either hors-d'œuvres, or main courses. Left over pasta, rice or cooked lamb or beef mixed with other vegetables are also a good basis of filling. Another advantage of stuffed vegetables is that they are very easily prepared in advance when guests are expected.

Here are two recipes from the many ways of stuffing vegetables, very common in Greek cooking.

Stuffed Vine Leaves or Dolmades

Cooking time: 1 hour, oven temperature 325F, Gas Mark 3.

1/2 lb vine leaves. (You can use canned vine leaves because fresh young vine leaves are not easy to come by, or spring cabbage leaves. Greek manufacturers «Kyknos», «BEM»).

- 1 cup olive oil
- 1/2 lb chopped or grated onions
- 1 cup uncooked rice
- 1 cup hot water
- 1/2 lb minced meat
- 4 tomatoes chopped small or 1 can peeled tomatoes.

- Vine leaves or cabbage leaves
- 1 lemon
- Salt /pepper

Heat half a cup of olive oil and fry the onions until they are opaque; Add the rice and cook on medium heat for 3 minutes. Add all the remaining ingredients except for the rest of the oil, the lemon and vine or cabbage leaves. Simmer for 5 minutes. Put on one side to cool. Rinse the leaves in cold water. They must be fresh and young about the size of the palm of the hand. Drop them into boiling water and cook for 3 minutes; drain and rinse in cold water. Place the leaves rib sides up, on a flat surface, and in the centre place a heaped teaspoonful of the filling. Fold both ends of the leaves inwards and then roll into a small parcel. Don't fold too tightly as the rice must have room to swell. Pack in a flame proof dish or casserole close together in layers. Pour in the remaining oil, lemon juice, 1 1/2 cups of hot water and a spoonful of good quality butter. Then cover with a heatproof plate or lid or foil to prevent rolls unwrapping.

Simmer gently on top of the cooker or place in the oven for about 1 hour.

Serve hot as an hors-d'œuvres, or as main course

- 1 clove of garlic, finely chopped or dashed (optional)
- 1/2 kg (1lb) of minced raw beef
- 3 tablespoons of olive oil
- 1 can (400 gr or 14 oz) of whole tomatoes drained but with liquid reserved.
- 3 tablespoons of butter (or margarine)
- 1 oz of flour or 3 tablespoons of flour
- 1/2 pint of milk
- 2 eggs
- 4 tablespoons of thick cream (or evaporated milk)
- Salt and freshly ground pepper
- 4 tablespoons of grated cheese (kefalotyri or parmesana).

Halve the aubergines and scoop out the insides without breaking the skin. Brush the skins with oil inside and out.

Dice the aubergine flesh and sauté with onion and garlic in the heated oil. Add the minced meat and cook until the meat is browned. Allow to simmer for a few minutes.

Make a white sauce by melting the butter and adding flour to make a roux, then add milk gradually. Add to meat mixture, then stir in cream. Adjust seasoning. Stuff the aubergines' skin with the filling and sprinkle with grated cheese.

Transfer the aubergines to a heatproof dish. Coat with juice reserved from canned tomatoes and some olive oil. Bake uncovered for 35-40 minutes. Serve hot.

Hellen Markellos

Baked stuffed aubergines (or peppers)

Cooking time: 40 minutes Oven temperature: 220C (425F) Gas Mark 7

- 4 medium sized aubergines
- 1 large onion, finely chopped

CLUES

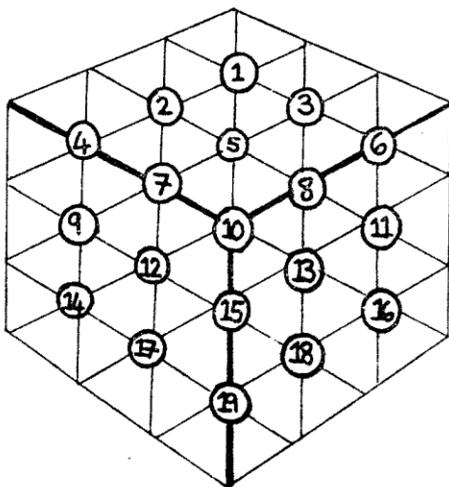
1. Transform into greater depth.
2. Most people find it too fast a game.
3. Justifiably paid.
4. Yours truly of this paper.
5. Lose it and you calm down?
6. Not taken into account by astrologers before 1781.
7. Hail to thee blithe spirit, Bird thou never wert.
8. A neighbour of 6, appropriately.
9. A farmer at sea?
10. An implication or a feature of anything.
11. Many people like a puzzle that forces them to do this with it.
12. An acidic yogi?
13. To do this is a requirement when working with a Rubik cube or with this puzzle.
14. Meek and obedient.
15. Am not able to.
16. Transmits.
17. Seen during a total solar eclipse.
18. Mathematical device to put your head in a whirl?
19. Thresh.

RUBIK CUBE CROSSWORD

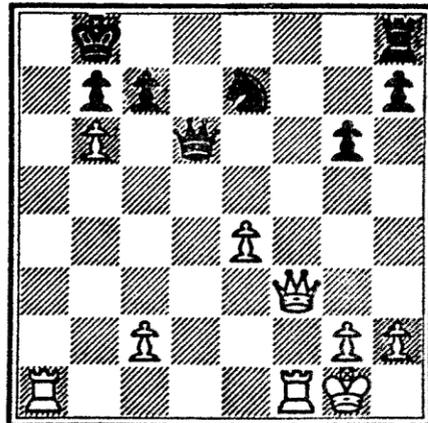
It was perhaps inevitable that the universally popular cube of Mr Rubik should influence the crossword maker. It certainly influenced the ASTROCOSMOS crossword maker for he has dreamed up the one you see before you.

Each clue answer is a six letter word which is placed in the six spaces surrounding the clue number in the Rubik Cube. But although the word's letters retain their correct order the word may be spelled out clockwise or anticlockwise and it may begin in any one of the appropriate six spaces: thus, the answer to clue 13 is ROTATE and it happens that to fit in with the answers to 8, 11, 16, 18, 15 and 10, it is spelled out in a clockwise manner, the letter R being placed in the bottom right hand space.

Simple, isn't it?



Chess Position 6



White, to move, wins

Continued from page 3

WOMEN IN ASTRONOMY

THE EDUCATION AND ASTRONOMICAL CAREERS OF WOMEN IN POLAND

Dr. Cecylia Iwaniszewska
Institute of Astronomy, Nicolaus Copernicus University
Chopina 12/18, PL 87-100 Torun, Poland

The education of children begins of course at home and later is continued at kindergarten and preparatory schools. There is no separate educational system in Poland for boys and girls. It is now the most common family model for both parents to work and the care of children to be left to state institutions. Although new regulations give mothers the benefit of a yearly unpaid leave (after the three-month paid maternity leave) so that very small children can be brought up by their mothers only a few of them really have enough financial resources to be able to live on only one (the father's) salary. Some families are happy enough to find a reliable woman to come daily and care for their child, but her pay may take up to 50 to 70% of the mother's salary. Finally, some parents may get help from grandmothers but these are usually still working themselves, as the age or retirement for women is 60.

When children leave primary schools at 15, they enter various kinds of secondary schools, either general (lycées) or technical (electrical, chemical, economic, etc). Both boys and girls may study in these schools, but it is customary to have more boys in the technical schools, while girls prevail in lycées. Pupils may begin university studies independently of their secondary school education, they have to undergo entrance examinations. Astronomical courses lasting five years are now available at five Polish universities. The proportion of girls studying astronomy is about one-third, this is exactly true for our Torun University as we have had exactly 33% women in the course for more than 30 years and I suppose it is also statistically true for other Polish universities.

What do the women do when they finish their university education? First of all, some 80% get married, usually during their fifth academic year and then they have to follow

their husbands when these get settled and look for such work as they can find in the vicinity of their new homes. Women usually prefer to teach at secondary schools (they are prepared to teach astronomy and physics) as working hours are shorter than elsewhere while holidays are longer. Some women work at scientific libraries, meteorological institutes and computing centres. Only about 20% of women graduating in astronomy begin a scientific career in astronomy. They are in no way handicapped; they can get salaries equal to those of men, yet in practice, if they have their own families, then they can't spend as much time as they should working on astronomical problems. It is still worse if they have to spend some nights at the observatory and must leave the care of children to the husband, a paid baby-sitter, or perhaps grandmother. And while children are small, it is nearly impossible for a woman to attend scientific conferences, either here or abroad, or to go abroad for a scientific stay. Such a stay usually enables a young astronomer to get more observational material for the preparation of his doctoral thesis. Hence the time for obtaining a doctor's degree is normally much longer for a married woman than for a man. Therefore I think that an astronomical career is much more difficult for a married woman than, for instance, the career of a physicist or a mathematician also working at a university.

If in her astronomical career a woman is given a chair in astronomy in one of the universities, then she may work till 70, which is the age of retirement for professors, both women and men. Generally speaking, there is no legal difference in rights between men and women. Women may be elected to parliament, they may be given the posts of ministers, of directors in various branches of industry, of university presidents, and every-



The pause that refreshes - participants recover from a difficult session

BULLETIN

RADIO OBSERVATIONS OF COMET HALLEY

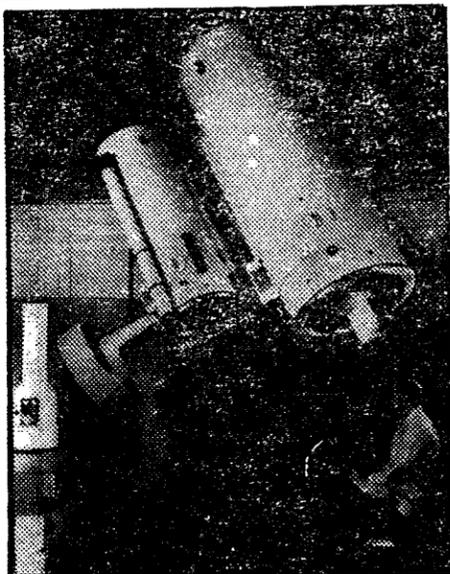
Informal discussion of plans to take place, Monday, August 23, 1030, building A, Pres. of Commissions Room (upstairs). Any interested persons welcome.

Commission 12 and 10 — Discussion Meeting on Solar and Stellar Spots and Activity Cycles

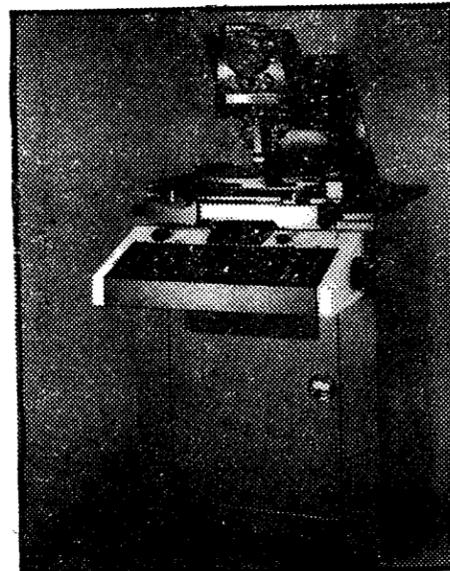
A 3-hour meeting on the above subject will take place starting at 9.00 on Tuesday, August 24 in the concourse Auditorium, room CA. Note that this is a **change of location** from the meeting room printed in the Final Program. The discussion will include invited presentations by M. Rodono («The Starspot Phenomenon»), A. Vaughan («Solar and Stellar Activity Cycles»), and M. Stix («Theories of Spots and Activity Cycles»). In addition there will be contributed oral presentations and poster papers. For details please see the Commission 12 bulletin board.

where they get salaries equal to those of men.

Finally, I ought to mention Emeritus Professor of Astrophysics, Miss Wilhelmina Iwanowska, former Director of our Institute of Astronomy in Torun, Royal Astronomical Society and many other scientific societies, past Vice-president of the International Astronomical Union, who is now retired, but still is taking an active interest in Polish astronomical life.



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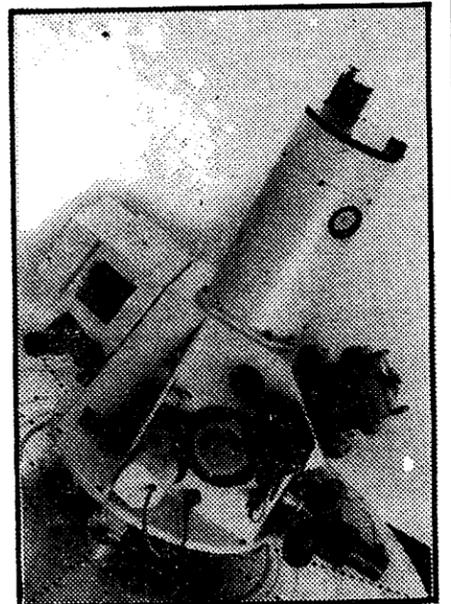
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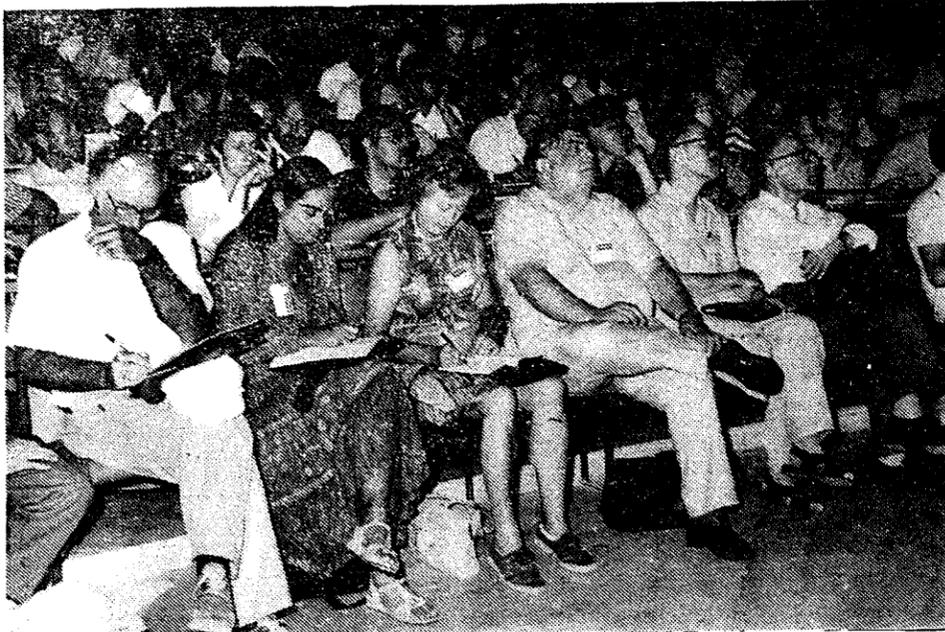
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Prof. Virginia Trimble, Prof. Margaret Burbidge, and Prof. Geoffrey Burbidge, among others in thoughtful mood.



Participants attending Joint Discussion One. A study in concentration!

AO538-66 The most luminous Galactic X-ray source known

P.A. Charles Department of Astrophysics, University of Oxford, Oxford, U.K.

The X-ray object AO538-66 is now known as the Periodic Recurrent Transient. Discovered in 1977 by Ariel V and positioned with the HEAO-1 satellite, the unusual nature of this source became apparent when its location in the LMC indicated an X-ray luminosity at peak of $\sim 10^{39}$ erg s^{-1} . This is ~ 100 times brighter than any other galactic X-ray source and comparable to the integrated X-ray output of a normal galaxy such as the Milky Way and M31. The X-ray outbursts recur every 16.65 days at which time the optical counterpart brightens from $B \sim 15$ to 13. Studies of archival plate material by Skinner have indicated that this has occurred for at least the past 50 years, although there are times of inactivity when no outbursts occur.

AO538-66 was in an inactive state for most of 1980 but came out of it in November 1980 so that our CTIO 4 m and AAT spectroscopy in Dec/Jan 1980/81 indicated growing activity (Balmer, He I emission) superposed on the spectrum of a B2 III star. At maximum the spectrum lines showed multistructure P Cygni

profiles and the addition of powerful He II λ 4686 emission (which we interpret as indicating the turn-on of the X-ray source). The quiescent or uncontaminated line velocities are in excellent agreement with the LMC systemic velocity thus confirming its location. No 16.65 day radial velocity modulation is evident, almost certainly as a result of the large and chaotic mass-motions evident in the system. At this time an IUE spectrum was also obtained near minimum light that showed the continuum of a B2 III star ($T_{eff} = 18500$ K) together with a C IV λ 1550 P Cyg profile that indicated a wind velocity of $v_{\infty} = 1600$ km s^{-1} . Subsequently (in April 1981) IUE spectra were obtained near phase 0 that indicated dramatic changes in the UV spectrum. C IV, He II, N V and Si IV were now very powerful and broad (~ 3000 km s^{-1} , in stark contrast to the UV spectra of other galactic X-ray sources) superposed on a redder continuum of a \sim B 9 I star ($T_{eff} = 12000$ K).

The periodic (and presumed binary) nature of the outbursts and their tremendous

range and peak power clearly require an eccentric orbit. Taking the B star to be of 12 M_{\odot} with an orbiting neutron star of 1 M_{\odot} indicates a maximum $e \sim 0.8$ if the compact object skims the primary's surface. The source of the mass transfer is unlikely to be a stellar wind because of the very large maximum X-ray luminosity range and also the absence of X-rays at periastron during inactive periods. We thus interpret the mass transfer as being due to tidal lobe overflow. Since the primary is rotating at ~ 400 km s^{-1} (the quiescent spectral lines are resolved) this infers that "co-rotation at periastron" is achieved and the (modified) Roche lobe formulae can be applied to give $e=0.7$ assuming that the primary fills its Roche lobe at periastron. Material is available for transfer when this lobe lies within the B star envelope and a rough estimate of this amount is $\sim 10^{-7}$ M_{\odot} . Hence the observed X-ray luminosity can be obtained with an efficiency of only $\sim 10^{-3}$ (since radiation pressure effects will be substantial). A large amount of this material

will be blown out and will escape the system (as observed) thus forming the large optically emitting region at outburst. The recent discovery of 69 ms X-ray pulsations from AO538-66 by Skinner et al has given considerable support for this model because the observed \dot{P}/P is consistent with that expected due to eccentric binary motion with $e = 0.7$.

Our 1981/82 observations indicate a possible long-term trend in the size of the outbursts (peaking during summer 1981 and now declining) and thus suggesting that an inactive period may be approaching. Further observations are needed to verify this, as well as joint X-ray/IUE/optical/radio programs to define the model in detail. This extraordinary object is the ideal transient to study because of its predictability as well as being an example of an object that periodically approaches the condition of a common-envelope binary.

