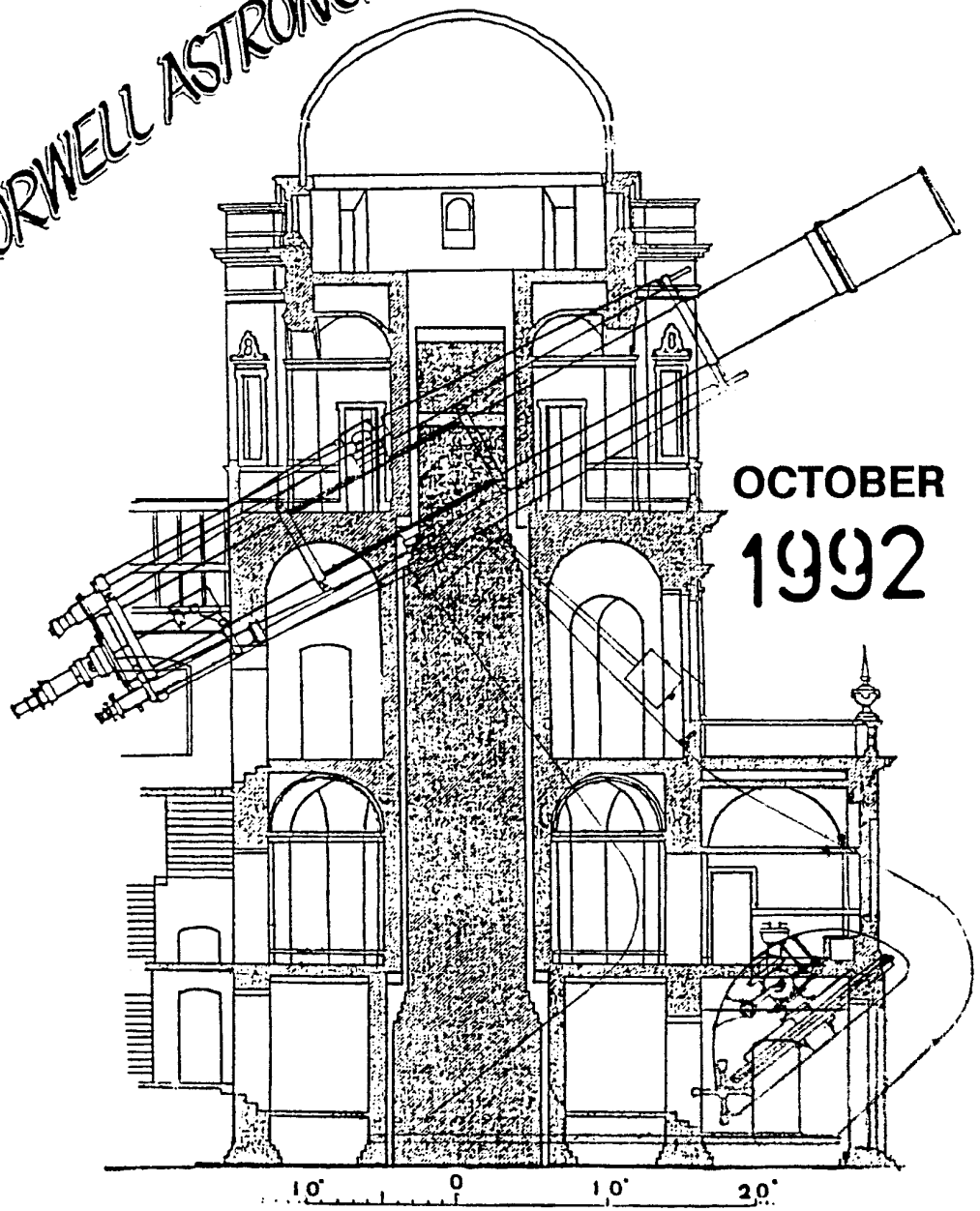
ORWELL ASTRONOMICAL SOCIETY IPSWICH



OCTOBER

1992

SOCIETY NEWS

1 CHRISTMAS MEAL

The Christmas meal this year will be held on Wednesday 16th December at the same venue as last year. The Landguard room at the Marlborough Hotel Felixstowe. The meal this year will cost £13.95 per person. The hotel requires written confirmation and a £5.00 deposit per person by 2nd November. All members who would like to come please contact Roy Gooding ASAP with the deposit. The deposit is not returnable once it has been sent off.

2 AN EVENING FOR AMATEUR ASTRONOMERS

This event is being organised by the Cambridge Astronomical Association, with the London Planetarium.

The event is to be held on Friday 5th March 1993 at 19.30

The programme will include a talk by Patrick Moore on the
"The Inner Solar System"

Followed by " The Zeiss Projector's Night Sky Special"
Presented by Teresa Graffton

Tickets will cost £4.00. As the London Planetarium has only a limited capacity I will be collecting money ASAP again.

3 COMMITTEE MEETING

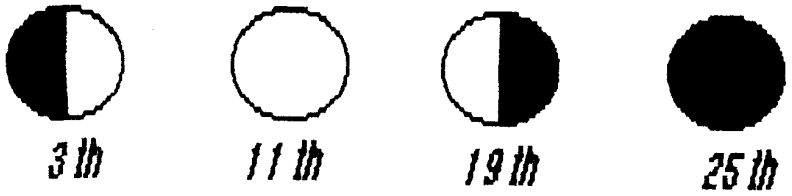
The next committee meeting originally arranged for 24th October has been postpone until November. The new date will included in the November's newsletter.

All times GMT

SUN

Rises approximately at from 06.00 to 06.54
Sets approximately at from 17.35 to 16.31

MOON



MERCURY Mercury is in the evening sky this month, but as it will be low down may not be easily seen. Greatest eastern elongation is on the 31st (24°). At the end of the month Mercury will be setting less than one hour after the the sun.

VENUS Venus will be drawing away from the sun this month, but still remains low in the western sky after sunset. Mag -3.8

MARS Mars will be rising at about 21.00 in mid month. Mag -0.2

JUPITER Jupiter is now visible in the morning sky. Rising at about 04.30 in mid month. Mag. -1.7.

SATURN Saturn will be setting by 22.40 at the end of the month. It is still low down the southern part of the sky. Mag. 0.4

URANUS Uranus will be setting at about 20.00 by the end of the month. It is low down in Sagittarius. Mag 5.6.

NEPTUNE Neptune is near to Uranus, in the sky. A little to north east. Mag. 7.9

R.Gooding

The Graze Of SAO 77178

by Alan Smith and James Appleton

On the night of 23rd August 1992, the star SAO 77178 was grazed by the Moon.

Although the star is faint (mag. 8.8), the track of the graze was predicted (using Jean Meeus's software) to pass just North of Mendlesham, so it was decided to mount an observing expedition. Because the graze occurred at 04:30 am, only two observers could be mustered!

Alan did a weather check at 02:30 am. Conditions were almost perfect apart from some wind, with a day of rain having left the atmosphere extremely transparent. We therefore left Ipswich at about 03:00 am, and found an observing site just off the A140 on a class 'C' road North of Wetheringsett.

As we began setting up the telescopes, the obligatory band of cloud appeared and blotted out the Moon! Fortunately, it soon dispersed, leaving the atmosphere perfectly transparent once more.

We soon identified what we thought was the graze star and began following it in towards the Moon. It was clearly visible in both the 4.5" reflector and 3" refractor: this pleasantly surprised us. However, as the predicted time of the graze drew near, it became apparent that we were following the wrong star!

This realisation prompted a frantic search for the correct star, which Alan eventually located about 15 minutes after the predicted time of the graze, nestling close to the trailing limb of the Moon. It could be glimpsed in the 3" refractor, but was not visible in the 4.5" reflector. It appeared that it had been grazed, while our attention was on the wrong star.

Two main conclusions were drawn from the evening's observing: (1) OASI can now make usably accurate predictions of grazes, and (2) field trips should be reserved for stars of mag 7.5 and above if only small portable telescopes are available!

GRAZES FOR THE REMAINDER OF 1992 - AND BEYOND

by James Appleton

Using computer software obtained recently from the Belgian amateur astronomer Jean Meeus, predictions have been made of grazing lunar occultations visible in East Anglia in the coming months.

GRAZES IN THE REMAINDER OF 1992

Seven grazes of stars of magnitude 8 or above take place in East Anglia in the remainder of 1992. Of these, only three have tracks which pass within reasonable distance of Ipswich and occur during the hours of deep darkness. Summary information for the three grazes is given below; more detailed information, including plots of graze tracks, will be provided if observing expeditions are planned.

17th October (Saturday) 23:45 UT

Star: ZC 1031. Mag: 7.0. Altitude: 24°. Lunar phase: 0.63 waxing.

Track: North of Milton Keynes, through Huntingdon, through East Dereham, North of Norwich, through North Walsham then out to sea.

12th December (Saturday) 23:56 UT

Star: SAO 97627. Mag: 8.2. Altitude: 42°. Lunar phase: 0.88 waning.

Track: almost exactly due East at latitude 52.1°, passing slightly North of Bedford, just South of Cambridge, through Needham Market, just South of Wickham Market, just South of Aldeburgh then out to sea.

13th December (Sunday) 03:59 UT

Star: ZC 1246. Mag: 6.6. Altitude: 51°. Lunar phase 0.87 waning.

Track: slightly North of St. Ives, North of Cambridge, through Colchester, through Clacton, then out to sea.

This track crosses the track of SAO 97627 near the village of Weston Colville, outside Cambridge.

FORECAST FOR 1993

Several good grazes are expected in 1993, including a graze of the magnitude 3.0 star Zeta Taurus on 28th December 1993. Unfortunately, observation of this graze will involve considerable travel; it will be seen as an occultation from Orwell Park.

LONG RANGE FORECAST

Looking even further ahead, long range calculations show that the next graze of a first magnitude star visible from the East Anglia area takes place on 23rd May 2007, when Regulus is grazed.

Younger members of OASI may wish to note in their diaries that 2053 is a particularly good year for grazes in East Anglia! In that year, there are two grazes of Aldebaran and a graze of the magnitude 3.6 star Θ_2 Taurus.

The 3K Cosmic Background Radiation

The 3K cosmic background radiation (CBR) is the blackbody radiation from the epoch when the Universe first became transparent. This is occasionally called the recombination epoch, but this is a misnomer since the gas had never before been neutral. So, at this time, roughly 300,000 years after the Big Bang, the Universe had adiabatically cooled enough for neutral hydrogen to exist. At the pressures expected, this happened at about 3000K. With the electrons no longer free, photons could now traverse large distances through the Universe (like from there to here!) The surface apparently emitting the radiation is sometimes called the 'surface of last scattering,' since at larger lookback times (i.e. earlier epochs), electron scattering dominated.

The blackbody nature of the CBR is explained very well in Weinberg's "The First Three Minutes", but essentially it consists of comoving (with respect to the expansion of the Universe) photons, which get stretched over time. Since a comoving unit volume also expands, this results in a constant photon density, but lower temperature.

The local CBR temperature that we deduce for a redshifted blackbody is 1+z times the temperature we would measure if we were at rest with respect to the emitter. That is, since we expect that the temperature of the Universe was about 3000 degrees, and we observe it at about 3K, the surface of last scattering has a redshift of about z=1000. Unless we can build a detector which can see the neutrinos which decoupled from matter at a somewhat earlier epoch, this is as far back as we can see.

Given that the CBR is a remnant of the Big Bang, one would expect to see the temperature increase as we look further back in time (or, if you prefer, higher values of z). The problem with doing this in practice is that high-z objects, to be seen today, are so luminous that radiation heating by their local photon fields completely dominates the blackbody background even at earlier epochs. We can see quasars & associated spectral lines back to z=5, so the background radiation would only be at T=18 K. You'd need to measure excitation temperatures in extremely low excitation molecular lines from high-z objects that do not have active nuclei (AGNs). If the lines can mase (e.g.OH) and are emitted from regions that are shielded from the quasar photon field (harder to do at high-z than z=0), they might have very high brightness temperature, but the temperature depends exponentially on the optical depth (in the most simple-minded radiative transfer, certainly too crude) which is poorly constrained, so it would be very difficult to extract a reliable temperature. See Spitzer, Physical Processes in the ISM, chap. 4. for the details. Note that considerable CO emission has been detected from the circumnuclear regions of some Seyfert I galaxies (low-z quasars) but it's quite a jump in distance from z = 0.1 to z = 5! Most models of quasar evolution show that the ISM in the host galaxy is quite effectively cleared away by the AGN, but of course this analysis is not exhaustive.

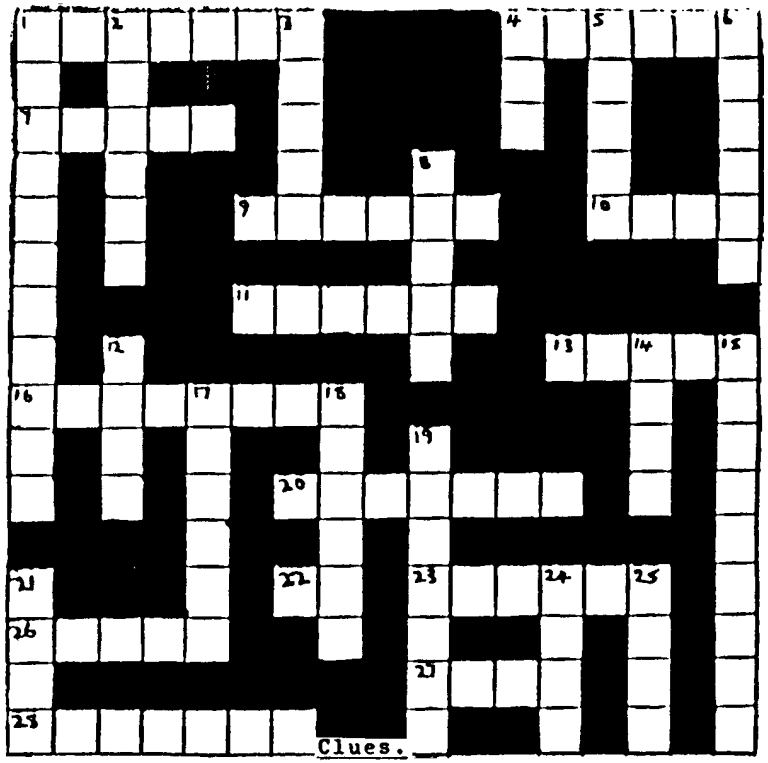
Various techniques have been (and are being) developed to explore the temperature of the CBR at distant locations. At present these are based on the excitation of the CN molecule, and other similar species. These techniques have so far only been applied within our galaxy, and perhaps on a few external galaxies. You have to find very dark clouds to do this in, since the molecules must have the CBR as their only heater ie. no starlight etc must get at them. It is thus difficult to do in distant objects as you have to find the dark clouds. This measurement can (and has) also been carried out by observations of fine-structure lines of neutral carbon and singly-ionized carbon. In fact, the lack of fine-structure CI absorption in the z=1.776 system toward the QSO MC 1331+170 sets upper limits on the CBR temperature at that epoch (see ''An Upper Limit on the Microwave Background Temperature at z = 1.776,'' D. M. Meyer, J. H. Black, F. H. Chaffee, Jr., C. B. Foltz, and D. G. York, Astrophys. J.Letters, 308, L37 1986). Limits derived from the ionized carbon absorption have also been presented: ''Molecules at Early Epochs III. The Lyman alpha Disk System Toward 1331+170,'' F.H.

Chaffee, Jr., J.H. Black, and C.B. Foltz, Astrophys. J., 335, 584, 1988.

The z=2.286 IRAS galaxy 10214+4724 has been detected in several CO lines. The ratios of these can, in principle, be used to determine the local CBR temperature (would be about 9 K) but are so dependent on other properties of the object (density, radiation field etc etc) that it can't be done until we understand this remarkable galaxy much better.

There is, as yet, no firm confirmation of CBR temperatures correlating with higher z values. If such a correlation were indeed established, it would provide yet more evidence that the Big Bang model is at least on the right track.

Alan Pengelly



Clues.

Across.

1/ Largest Planet in the Solar System.
4/ Planet with the rings.
7/ A Sun that goes white at the end of it's life.
9/ One of many on the Moons surface.
10/ First name of the first man on the Moon.
11/ Sideways Planet.
13/ Halleys one.
16/ One of many between Mars & Jupiter.
20/ The energy a body possesses as a result of motion.
22/ Moon of Jupiter.
23/ One of the Moons seas.
26/ Path around a body.
27/ One of Saturns Moons.
28/ Eighth Planet.

Down.

1/ British Radio Telescope.
2/ Orbiting body around a Star.
3/ The only way to map Venus.
4/ The centre of our Solar System.
5/ Saturns largest Moon.
6/ Gaseous cloud in space
8/ Morning or Evening Star.
12/ Our Sun is one.
14/ Red Planet.
15/ Star Cluster could be found flying at the circus.
17/ Transport in outer space.
18/ Mars smallest Moon.
19/ nearest Planet to the Sun.
21/ Our own satellite.
24/ They're called Maria on the Moon.
25/ Jupiter has a red one.

COMPILED BY
J. WALSH.

PROGRAMME FOR OCTOBER-1992

DAYS &DATES	DIRECTORS	SECTION & ADDRESSES	PHONE INC. STD CODE
Mondays	from 7.30pm	GENERAL OBSERVATION SECTION	
5,12,19,26	Mr R Newman	, Felixstowe, IP11 9DY	
	Mr J King	, Felixstowe, IP11 9LQ	
Tuesdays	form 7.30pm	GENERAL OBSERVATION SECTION	
6,13,20,27	Mr R Newman	(Address above.)	(Number above)
	Mr J King	(Address above.)	(Number above)
Wednesdays	from 8.00pm	NEBULA & FAINT OBJECTS SECTION	
7,14,21,28	Mr M Cook	, Ipswich, IP4 5PZ	
	Mr D Payne	, Wickham Market, IP13 0SD	
Thursdays	from 7.30pm	OBSERVATORY VISITS FROM OUTSIDE GROUPS	
1,8,15,22,29	Mr P Richards	, Nacton, Ipswich, IP10 0HS	
	Mr G Marriott	, Ipswich, IP4 4JB	
Fridays	from 7.30pm (may be postponed to Saturday)	PLANETARY & LUNAR SECTION	
2,9,16,23,30	Mr P Richards	(Address above.)	(Number above)
	Mr R A Lobbett	, Felixstowe, IP11 8UJ	
	Mr G Marriott	(Address above.)	(Number above)

All members are welcome to come but, on nights other than Wednesdays please check with directors that the observatory will be open. Directors will also be able to tell you if a group visit is taking place. All of the sections observe anything of interest but the title of each section suggests a popular subject.

Lectures and other events: COMMITTEE MEETING

The next committee meeting is on Saturday 24th October at 2000 in the observatory. Asusual this is an open meeting and any member who wishes is welcome to attend.

1992 COMMITTEE

			Home Phone:	Work Phone:
CHAIRMAN	D Payne	(Address above)		
VICE CHAIRMAN & MEMBERSHIP SECRETARY	D Barnard	, Ipswich, IP3 8RN		
SECRETARY	R Gooding	, Ipswich, IP1 6AE		
TREASURER	M Nicholls	, Capel St Mary, Ipswich, IP9 2EX		
MAINTENANCE CO-ORD	M Cook	(Address above)		
JOURNAL CO-ORDINATOR	E Sims	, Ipswich, IP1 4HA		
PUBLICITY & VISIT CO-ORD	P Richards	(Address above)		
EQUIPMENT CURATOR	J King	(Address above)		
SPECIAL EVENTS CO-ORD	A Smith	, Ipswich, IP4 5RZ		