

DARK SKIES for January 2021:

F/S Jan.	1/2	6:19 p.m.	-	7:16 p.m.
S/S Jan.	2/3	6:19 p.m.	-	8:26 p.m.
S/M Jan.	3/4	6:20 p.m.	-	9:37 p.m.
M/T Jan.	4/5	6:21 p.m.	-	10:49 p.m.
T/W Jan.	5/6	6:22 p.m.	-	12:01 a.m.
W/T Jan.	6/7	6:23 p.m.	-	1:14 a.m.
T/F Jan.	7/8	6:24 p.m.	-	2:29 a.m.
F/S Jan.	8/9	6:25 p.m.	-	3:45 a.m.
S/S Jan.	9/10	6:25 p.m.	-	5:01 a.m.
S/M Jan.	10/11	6:26 p.m.	-	5:49 a.m.
M/T Jan.	11/12	6:27 p.m.	-	5:49 a.m.
T/W Jan.	12/13	6:28 p.m.	-	5:49 a.m.
W/T Jan.	13/14	6:29 p.m.	-	5:49 a.m.
T/F Jan.	14/15	6:31 p.m.	-	5:48 a.m.
F/S Jan.	15/16	7:40 p.m.	-	5:48 a.m.
S/S Jan.	16/17	8:47 p.m.	-	5:48 a.m.
S/M Jan.	17/18	9:51 p.m.	-	5:47 a.m.
M/T Jan.	18/19	10:53 p.m.	-	5:47 a.m.
T/W Jan.	19/20	11:54 p.m.	-	5:46 a.m.
W/T Jan.	20/21	12:54 a.m.	-	5:46 a.m.
T/F Jan.	21/22	1:55 a.m.	-	5:45 a.m.
F/S Jan.	22/23	2:57 a.m.	-	5:45 a.m.
S/S Jan.	23/24	3:59 a.m.	-	5:44 a.m.
S/M Jan.	24/25	5:00 a.m.	-	5:43 a.m.
M/T Jan.	25/26	none		
T/W Jan.	26/27	none		
W/T Jan.	27/28	none		
T/F Jan.	28/29	none		
F/S Jan.	29/30	none		
S/S Jan.	30/31	6:48 p.m.	-	7:26 p.m.
S/M Jan.	31/1	6:49 p.m.	-	8:39 p.m.

Times listed are for Dodgeville, Wisconsin when

- (1) Moon is below the horizon
- (2) Sun is $> 18^\circ$ below the horizon
(astronomical twilight)

Please minimize your use of outdoor lighting during these times to give everyone the best possible view of the night sky.

Time Travel

conducted by David Oesper

Continued from last month...

Hunting for Comets and Planets*

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(Received 1991 November 4)

I envisage a combined search for comets and planets, with the detection equipment in each telescope switching on and off, using 54 s in each minute for comets and 6 s for planets. We would then have complete coverage of planetary lensing events using only 10 per cent of the time, while losing only 10 percent of the comets. The possible discovery of an occasional planet comes as an almost free

bonus, while the exploration of the Kuiper Belt continues. The fraction of time and effort devoted to planets would be adjusted after the array is operating. If some real lensing events were seen we would probably decide to look at them for more than 10 per cent of the time.

Several ongoing ventures in occultation astronomy are already in progress, aimed at the discovery of dark objects of various kinds. Charles Alcock at the Lawrence Livermore Laboratory is running a comet-hunt using tiny one-inch telescopes with wide-field CCD cameras (Alcock, Axelrod & Park 1990). He will monitor bright stars and will only see occultations by objects bigger than ordinary comets in the Kuiper Belt. Another project, suggested 5 yrs ago by Bohdan Paczynski, is going ahead in France (Paczynski 1986a). Paczynski's idea is to look for putative black holes or other dark objects in our Galaxy by observing lensing of background stars in areas of the sky where we can find 10^5 stars within the field of a single large CCD detector. The best places to look are in the Magellanic Clouds or in the window where we can see the central bulge of our Galaxy close to the galactic plane. The stars to be monitored are very faint and the project is definitely not for amateurs. It requires a large telescope with modern detection equipment. A third project, also following Paczynski's suggestion and using large telescopes, is an international collaboration rejoicing in the name MACHO (Massive Compact Halo Objects). The MACHO group includes Charles Alcock and eleven other astronomers in California and Australia. They are now ready to begin the search for lensing events in the central bulge of our Galaxy (Griest *et al.* 1991).

I have not attempted a complete survey of projects in occultation astronomy. So far as I know, none of them has yet produced any positive results, and none of them exploits the sociological opportunities that have been opened by recent developments in the technology of small telescopes.

5 MULTIPLE TELESCOPE ROBOTIC OBSERVATORIES

The international community of amateur astronomers has changed its character over the last 10 yrs. Until 10 yrs ago, the typical serious amateur astronomer was somebody who loved to spend long hours grinding and polishing mirrors. The chief object of the game was to build a home-made telescope that could take photographs of celestial objects beautiful enough to publish in magazines such as *Sky and Telescope*. But the devoted lens-grinder is a vanishing species. Today the typical serious amateur is a computer hacker, somebody whose chief pleasure in life is messing around with electronics and software. As a consequence of this sociological revolution, there is now a network of amateur astronomers capable of doing good quantitative measurements, with a precision and sophistication previously available only to professionals.

* The text of the Milne Lecture, delivered 1991 October 24.

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To be continued next month...