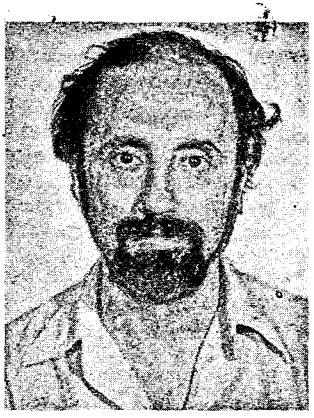
★ STAR DUST

Volume XXXVII November 1980 Number 3

EFFECTS OF STELLAR WINDS, SUPERNOVAE KAFATOS' TOPIC



DR. KAFATOS

Dr. Minas Kafatos, of the Laboratory for Astronomy and Solar Physics, Goddard Space Flighe Center, NASA, will speak at the November 1 meeting of National Capital Astronomers. He will discuss stellar winds, supernovae, superbubbles, and supershells.

The combined effect of stellar winds and supernovae, originating from stars in typical OB associations, interacting with the interstellar medium produces vast hot, low-density cavities called superbubbles. They have been detected along their boundaries as supershells emitting 21-cm (neutral hydrogen) radiation. One which emits X-rays has been detected in Cygnus; there are probably many more.

Observable remnants are apparently produced by only about 15 percent of supernovae near the galactic center, and nearly none farther than 15 kiloparsecs from the center. This explains the difference between the large supernova rates in the Milky Way galaxy derived from pulsar statistics and from SN events in external galaxies, and the smaller rates derived from galactic SN remnant statistics. Most SN events occur within the cavities; only those outside produce the observed remnants.

Born in Crete, Greece, Minas Kafatos received his B. A. in physics, Cum Laude, from Cornell University in 1967, and the Ph. D. in astrophysics from MIT in 1972. Before coming to NASA in 1973, he worked at the Joint Institute for Laboratory Astrophysics, University of Colorado, Boulder, and is also an Associate Professor in the Physics Department of George Mason University.

Dr. Kafatos is a member of the American Astronomical Society, American Physical Society, and International Astronomical Union, has refereed for the Astrophysical Journal, and has published extensively.

NOVEMBER CALENDAR — *The public is welcome.*

Saturday, November 1, 6:15 PM — Dinner with the speaker at the Thai Room II, 527 13th Street, NW. Reservations unnecessary.

Saturday, November 1, 8:15 PM — NCA monthly meeting at the Department of Commerce Auditorium, 14th and E Streets, NW. Dr. Kafatos will speak.

Tuesday, November 4, 18, 25, 7:30 PM — Telescope-making classes at Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 362-8872.

Friday, November 7, 14, 21, 28, 7:30 PM — Telescope-making classes at American University, McKinley Hall basement. Information: Jerry Schnall.

Friday, November 7, 14, 28, 8:00 PM — Observing with the NCA 14-inch telescope with Bob Bolster, 6007 Ridgeview Drive, south of Alexandria off Franconia Road between Telegraph Road and Rose Hill Drive. Call Bob at 960-9126.

OCTOBER LECTURE

The October 4 meeting of National Capital Astronomers heard Dr. William E. Brunk, NASA Headquarters, describe the NASA infrared observatory on Mauna Kea, Hawaii.

At an altitude of 13,600 feet, the facility is the highest ground-based observatory in the world. Extensive site tests indicated that the site, selected by Gerard Kuiper, is probably the best in the world, with a typical seeing disk of 0.5 second, and exceptionally low sky noise. The tenuous atmosphere above a typical 10,000-foot cloud layer is extremely dry; the atmospheric infrared windows are appreciably widened. The low scatter and dark background are ideal for a planetary observatory; faint, low-contrast satellites can be studied near bright planets.

Mauna Kea (White Mountain) is an extinct (?!) volcano. Nearby Mauna Loa (Long Mountain) is dormant; it occasionally "boils up over the lip," but not explosively. A rather difficult road to the observatory helps to control undesired traffic.

Observers are acclimated to the high altitude by sleeping at the 9,500-foot camp before observing. Testing of components, calculations, and other activities requiring mental alertness are also done there.

NASA installed the first telescope on Mauna Kea in about 1965. The 2.24-m instrument is mounted on a bent fork adapted to the low (20°) latitude. A 60-cm planetary telescope was added as a part of a world-wide patrol network. The results were excellent. In subsequent development of the site, besides the NASA 3-m infrared instrument, others followed. The United Kingdom has installed a 3.8-m infrared telescope, now the largest infrared instrument in the world. The 3.6-m Canada-France-Hawaii telescope, designed for the visual spectrum, is now mostly operational. Others include a 60-cm Air Force instrument, now used by the University of Hawaii.

The NASA 3-m infrared telescope has an extremely small secondary of about 30-cm diameter to allow background subtraction by secondary oscillation. For this reason, the Cassegrain focal ratio is f/35, the Coudè, f/105. It is rigidly mounted on a relatively light yoke.

While the telescope was under construction as designed for a two-story building, budget cuts limited the building to one story. The resulting forced adaptation has proved to be fortuitous. There are no stairs, a very real advantage at the 14,000-foot altitude, where even slight exertion becomes laborious. The observing platform is a 15 x 20 foot elevator.

For day use, 20° offset control from bright stars allows setting to within 2 arcseconds of any part of the sky.

Cryogenic dewars enclose the infrared detectors and about 10 externally selectable filters. Two such dewars can be mounted simultaneously.

All telescope operations are remotely controlled. Two television cameras on the telescope provide monitoring from the control room.

Although the primary purpose of the 3-m instrument is for planetary study, it is also occasionally used by NASA and universities for stellar and other work. Planetary atmosphere and surface compositions and thermal budgets are among the principal NASA studies.

When Brunk joined NASA Headquarters in 1964, he was expected to close out the astronomy program, since space probes would make it unnecessary. Instead, planetary astronomy has proved to be a vital, growing field.

"The astronomy program is the backbone of the space program," Brunk said. "The two are highly complementary. We cannot do the exploration of the planets with spacecraft without the work from the ground. On the other hand, we need the ground truth from the spacecraft in order to interpret the ground-based observations."

rhm

OCCULTATION EXPEDITIONS PLANNED

Dr. David Dunham is organizing observers for the following asteroidal and grazing lunar occultations in November. For further information, call Dave at 585-0989.

UT Date	Time	Place	Vis Mag	Pcnt Sunlit	Cusp Angle	Min Aper
LUNAR:						
11-01-80	07:43	Fredericksburg, VA	8.7	33	8N	15 cm
11-01-80	10:32	Montreal Q. or Maine	1.3	33	1S	3 cm
11-12-80	00:33	Bellwood, VA	5.0	15	1N	5 cm
11-14-80	23:20	Sligo, NC	6.0	42	4S	5 cm
11-16-80	01:43	Washington, DC	4.4	54	5S	3 cm
11-29-80	05:57	New Market, MD	9.0	51	7N	20 cm
11-29-80	07:03	Germantown, MD	9.3	51	5N	20 cm
12-02-80	09:48	Reisterstown, MD	9.0	22	1S	15 cm
12-04-80	10:05	Woodstock, MD	6.7	9	1S	5 cm

ASTEROIDAL:		Star Mag	Magnitude Decrement	Name of Asteroid	
11-10-80	22:36	NE U.S.A. 9.5	3.6	(28) Bellona	13 cm
11-21-80	01:07	SA or Mexico? 6.8	3.6	(216) Kleopatra	3 cm
11-24180	04:14	U.S.A. 8.3	3.5	(134) Sophrosyne	5 cm

NEW MEMBERS WELCOMED

Frank Huband
1206 N. Stafford Street
Arlington, VA 22201

Juliette and Robert Muscat
7375 Mont Calm Drive
Vienna, VA 22101

Alexander M. Ross
1608 44th Street, NW
Washington, DC 20007

William H. Shuey
96 Carrollview Avenue
Westminster, MD 21157

John and Ellen Stolarik
4310 Van Buren Street
University Park, MD 20782

CURRENT RESEARCH NOTES

Diffraction-limited images can be recovered from an optically very poor telescope, even severely out of focus, under certain conditions. As early as 1973, J.C. Dainty pointed out this fascinating theoretical possibility (*Opt. Com.*, 1, 129-134). Paradoxically, what is necessary is that the atmospheric turbulence — seeing — be even worse than the telescope aberrations! Speckle photography and appropriate image processing can then recover diffraction-limited images. Subsequent workers have confirmed the practicality of Dainty's idea.

A simplified procedure is now reported by F.M. Cady and R.H.T. Bates of Christchurch, New Zealand. Writing in *Optics Letters*, October 1980, they describe their "shift and add" method of combining the speckle images to restore diffraction-limited performance. Examples of their laboratory experiments show very little loss of resolution with seeing disk diameters of the order of 100 times normal.

Further work is under way. The authors suggest that it may be possible to relax significantly the mutual collimation specifications on mirror arrays for aperture synthesis. rhm

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EXCERPTS FROM THE IAU CIRCULARS

1. August 21 — Nicholson and Jones, Mount Stromlo Observatory, observed the occultation of a star by Neptune. At least ten sharp spikes in the light curve were recorded at emersion. A possible secondary occultation 1.5 seconds long occurred 55 minutes later, corresponding to a radius 1.5 times that of Neptune.

2. September — J.Y. Lambert, New Mexico State University, and J. Africano, Cloudcroft Observatory, reported that photometry of (201) Penelope revealed an unusually short rotation period and high light-curve amplitude. The period of 3.747 hours is the second-shortest known for asteroids in the main belt.

3. September 28 — Kenneth S. Russell, U.K. Schmidt Telescope Unit, discovered another comet (1980o) of 17th magnitude in Piscis Austrinus on an exposure taken by J. Barrow.

FOR SALE

Celestron-8 telescope, 7 oculars, perfect condition. $650.00. Joe Macrie, 4728 Kenmore Avenue, Alexandria, VA 22304, 370-6874.

★ STAR DUST WASHINGTON, D.C.

Published 11 times yearly by NATIONAL CAPITAL ASTRONOMERS, INC., a non-profit, public-service organization for the promotion of astronomy and related sciences. President: Mary Ellen Simon.

STAR DUST: Editor, Robert H. McCracken. Lecture reviews, James K. Crowley, John B. Lohman, Mark M. Trueblood. IAU Excerpts, Robert N. Bolster. Production and distribution, Robert H. McCracken and Paul F. Hueper. Deadline: 15th of preceding month. For information, or to submit material for publication: Robert H. McCracken, 5120 Newport Avenue, Bethesda, MD 20016. (301) 229-8321.

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