



## BRUECKNER ON SOLAR WIND; ELECTION IN MAY



DR. BRUECKNER

Dr. G. E. Brueckner, Head of the Solar Physics Branch of the U. S. Naval Research Laboratory, will address the May 2 meeting of National Capital Astronomers. Dr. Brueckner will speak on the origin of the solar wind.

Like other stars, the Sun emits a continuous stream of matter through interplanetary space. Satellite measurements during the last two decades have shown this solar wind to be highly structured and variable. The hot solar corona, also highly structured and variable in density and temperature, was originally thought to be the source of the energy which drives the solar wind. The discovery that high-velocity solar-wind streams originate in the cool, less-dense coronal holes has cast considerable doubt on the assumption that the thermal energy of the corona feeds the solar wind. Dr. Brueckner

will discuss possible alternatives. Recently discovered jets of gas emerging from the solar surface at very high velocity may be driving the solar wind.

Dr. G. E. Brueckner received his Ph.D. in 1961 from the University of Gottingen, Germany, where he subsequently engaged in high-resolution solar spectroscopy and the construction of large solar spectrographs. In 1968 he joined the U. S. Naval Research Laboratory, where he became Head of the Solar Spectroscopy Section in 1971. Until 1973 he participated in the design, construction, and testing of the two NRL ultraviolet instruments flown on Skylab. He engaged in the design and construction of high-resolution telescopes and spectrographs flown on sounding rockets, and obtained the first high-resolution far-ultraviolet spectra of the Sun. He is now Head of the Solar Physics Branch.

Dr. Brueckner is a member of Sigma Xi, the International Astronomical Union, and several NASA committees.

### MAY CALENDAR — *The public is welcome.*

Friday, May 1, 8, 15, 22, 29, 7:30 PM — Telescope-making classes at American University, McKinley Hall basement. Information: Jerry Schnall, 362-8872.

Friday, May 1, 8, 15, 22, 29, 9:00 PM — Use 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.

Saturday, May 2, 6:15 PM — Dinner with the speaker at the Thai Room II, 527 13th Street, NW. Reservations unnecessary.

Saturday, May 2, 8:15 PM — NCA monthly meeting at the Department of Commerce Auditorium, 14th and E Streets, NW. Dr. Brueckner will speak.

Saturday, May 9, 10:00 AM to 4:00 PM — Open house at U. S. Naval Observatory. See Page 35.

Saturday, May 9, 9:00 PM — *Exploring the Sky*, presented jointly by NCA and the National Park Service. Glover Road south of Military Road, NW, near Rock Creek Nature Center. Planetarium if cloudy. Information: Bob McCracken, 362-8872.

## APRIL LECTURE

Dr. Kenneth J. Johnston, U.S. Naval Research Laboratory, addressed the April 3 meeting of National Capital Astronomers. Dr. Johnston spoke on the peculiar galactic object SS433, its interpretation, and its significance as a clue to the nature and behavior of quasars.

Dr. Johnston opened with a description of NRL's work on high-resolution radio astronomy, explaining why NRL is involved. Such work includes maps of radio sources, positions, parallax, and proper motions, studies of the atmosphere and the ionosphere, frequency standards, spacecraft navigation, intercontinental surveys with uncertainties of about 5 cm, measurement of UT 1 and polar motions, extremely accurate transfer of time over long distances, antenna gain calibration, and derivation of an "almost inertial" reference frame. He pointed out the close relationship between this work and that of the Naval Observatory.

Optically, SS433 appears as a star with a most peculiar spectrum. (the SS catalog covers emission-line stars.) Its radio image is that of a compact source surrounded by the supernova remnant W50. The optical spectrum shows emission lines identifiable as those of hydrogen and helium moving at huge velocities — from +50,000 to -30,000 km per second; 30 kps is the highest observed blue shift. The velocities vary cyclically, with irregularities. Interpreted in terms of Keplerian orbits, they imply a central object with a mass of about  $10^{10}$  solar masses ( $M_{\odot}$ ), which rules out such an interpretation. (Ed. note: The total mass of the galaxy is about  $1.4 \times 10^{11} M_{\odot}$ .)

Observations by Dr. Johnston and colleagues using the VLA in New Mexico and VLBI networks lead to interpretation of SS433 as consisting of a neutron star of about  $1M_{\odot}$  orbiting a very massive star in about 13.5 days. In addition, rapid mass transfer from the primary star, much of it to the neutron star, generates a pair of intense matter beams rotating with a period of about 164 days and precessing. The mass is ejected in blobs at about .25 the speed of light. A 5-parameter model fits this interpretation very well. It is notable that the apparent velocities of the beam approaching us and the receding beam are significantly distorted by relativistic effects; to be interpreted correctly the observations *must* be corrected for them. What we see is the *twin paradox* of relativity in which apparent velocities and the apparent rate of passage of time are markedly changed as the source approaches and recedes. The model permits inferring much detail: magnetic field, mass, distance, etc.

As a result, SS433 can be used as a miniature model for interpreting quasars: the quasars are very distant (billions of light years) and, instead of a neutron star, far more massive — perhaps  $10^9 M_{\odot}$  — so the relativistic corrections become dominant. Dr. Johnston calls this interpretation a Rosetta stone for the understanding of quasars. Both the apparent superluminal velocities of about  $5c$  and the very rapid variations in radiation are much distorted by the twin-paradox effect: actual variations — about .5c — are huge but reasonable. Detailed models fit the data well. Quasar redshifts seem to be truly cosmological; apparently they are truly tremendously far away. (Ed. note: These interpretations seem not yet to have been noted, much less accepted, by many theoreticians. Thus, a recent issue of *Nature* contains an article, "Why Superluminal Velocities must be Taken Seriously," and another on SS433 that does not mention a relativistic interpretation. This may be another "first.") jbl

## NATIONAL AIR AND SPACE MUSEUM PRESENTS GORENSTEIN

Dr. Paul Gorenstein, Harvard astronomy lecturer and astrophysicist at the Smithsonian Astrophysical Observatory, will speak on X-ray astronomy at the NASM on Thursday, May 13, at 7:30 PM. Dr. Gorenstein is a principal investigator on the HEAO satellite.

## NOMINATING COMMITTEE OFFERS SLATE

The Nominating Committee, James H. Trexler, Chairman, Mary Ellen Simon (ex officio), G. R. Wright, and Mabel Sterns, offer the following candidates for fiscal 1982 NCA officers:

President	Daniel G. Lewis
Vice President	Mark M. Trueblood
Secretary	Nancy L. Hueper
Treasurer	Ruth S. Freitag
Sergeant at Arms	Georrey R. Chester
Trustee (4-year term)	Mary Ellen Simon

Additional nominations may be made by written petition by ten full members in good standing, submitted to the trustees prior to the May 9 election.

## OCCULTATION EXPEDITIONS PLANNED

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

Date	UT Time	Place	Vis Mag	Pcnt Sunlit	Cusp Angle	Min Aper
<b>LUNAR:</b>						
05-10-81	01:31	Conowingo Dam, MD	4.2	41	4N	3 cm
05-23-81	06:45	Gaston, NC	5.6	84	9S	5 cm
<b>ASTEROIDAL:</b>						
		Star	Mag		Asteroid	
		Mag	Decr.			
05-20-81	00:20	Newfoundland	10.3	2.3	(451) Patientia	15 cm

## NCA WELCOMES NEW MEMBERS

Jon Corrado, Apt. F  
47 Maryland Avenue  
Annapolis, MD 21401

Karen Horwath  
3608 North 27th Street  
Arlington, VA 22207

Ronald G. Miller  
8513 Virginia Avenue  
Annandale, VA 22003

Steven T. Strouse  
10503 S. Dunmoor Drive  
Silver Spring, MD 20901

## KAREN HORWATH WINS NCA SCIENCE FAIR AWARD

Swanson Intermediate School student Karen Horwath, of Arlington, Virginia, has won the 1981 annual NCA Science Fair Award for her independent measurement of differential solar rotation.

The ninth-grade student plotted the progress of sunspots at different latitudes over an extended period. Not yet having learned trigonometry, she contrived her own method of graphically calculating the angles and deriving the rotational periods.

Miss Horwath will be awarded a junior NCA membership for one year, including *Sky and Telescope* magazine. Dr. John Lohman judged for NCA.

## NAVAL OBSERVATORY PLANS MAY 9 OPEN HOUSE; NCA TO PARTICIPATE

The U. S. Naval Observatory will open to the public on Astronomy Day, Saturday, May 9, from 10:00 AM to 4:00 PM. Invited to participate, NCA will display examples of activities and offer solar viewing with the NCA 14-inch Celestron and 8-inch Clark refractor. The latter will be equipped with a very narrow-band hydrogen-alpha filter for disk features. Telescope-making and optical testing will be demonstrated, typical results of occultation expeditions will be displayed, and other activities will be represented with photographs and other materials.

## EXCERPTS FROM THE IAU CIRCULARS

1. September 20 — Stern and Underwood, Jet Propulsion Laboratory, and Antiochos, Stanford University, observed an X-ray flare from the binary system HD 27130 in the Hyades with the Einstein Observatory. The flux at 0.3 to 6.0 nm increased by a factor of 40.

2. February 6 — N.G. Thomas, Lowell Observatory, discovered a probable Amor-type object (1981 CW) of 16th magnitude in Auriga with the 33-cm telescope at the Anderson Mesa station.

3. March 25 — AAVSO observers reported that GK Persei continued to brighten, reaching 10th magnitude.

4. April 2 — Minoru Honda, Kurashiki, Japan, discovered a nova of 7th magnitude in Corona Australis.

## NAVAL OBSERVATORY COLLOQUIUM SCHEDULED

On Thursday, May 7, at 3:00 PM, Dr. James A. Hughes, Director of the Transit Circle Division of the Observatory, will speak on "The New Angles in Astrometry."

The colloquia are held in Building 52, Room 300. Coffee and tea are served in the foyer at 2:40 PM. Enter the main gate at 34th Street and Massachusetts Avenue, NW, where the guard will require identification and provide directions.

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★ STAR DUST



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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