



SOLAR FLARES — A CONTINUING ENIGMA



DR. ELSKE v. P. SMITH

The first recorded observation of a solar flare was that of Carrington in 1859 — in white light. During recent solar cycles, observations of flare radiation over the entire electromagnetic spectrum have described the behavior and effects of flares in broad perspective, but still have not fully disclosed their cause.

One clue to the nature of flares lies in the behavior of magnetic fields in the vicinity of the flaring area. Spectra of flares in the visible region have led to models specifying the temperature, density, and mass motions, in the chromospheric portions of flares. Ultraviolet data from the Orbiting Solar Observatories (OSO) suggest that flares start their outburst in the transition zone between the chromosphere and the corona. Very high coronal temperatures are deduced from an analysis of the lines of

highly ionized elements seen in the soft X-ray region. Recent gamma-ray observations indicate that nuclear reactions occur during flares. Flares also accelerate protons and other particles into interplanetary space; these are observed by space probes and by their effects on the earth's atmosphere.

Visually, the most spectacular aspects of flares are seen in the light of hydrogen alpha. A motion picture from Big Bear Solar Observatory of the flares of August 1972 will be shown.

Dr. Elske v. P. Smith, Associate Professor of Astronomy at the University of Maryland since 1963, received her Ph.D. from Radcliffe College in 1956. She was a Research Associate at Sacramento Peak Observatory from 1955 to 1960, and a Fellow at the Joint Institute of Laboratory Astrophysics at Boulder, Colorado, in 1961 and 1962. Her extensive background includes teaching, research, and co-authorship of several books on solar physics and astronomy.

FEBRUARY CALENDAR

Friday, February 2, 9, 16, 23, 7:30 PM — Telescope-making classes at American University, McKinley Hall basement. Information: Jerry Schnall, 362-8872.

Saturday, February 3, 6:15 PM — Dinner with the speaker at Bassin's Restaurant, 14th Street and Pennsylvania Avenue, NW. No reservations needed.

Saturday, February 3, 8:15 PM — NCA monthly meeting at the Department of Commerce Auditorium, 14th and E Streets, NW. Dr. Elske van P. Smith will speak on solar flares. During the business session a proposed change in the NCA quorum will be discussed.

Monday, February 5, 12, 19, 26, 7:30 PM — Telescope-making classes at the Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 362-8872.

PROPOSED CHANGE IN THE CONSTITUTION

In September 1972, members petitioned the trustees, requesting that the quorum required to do business at an NCA meeting be reduced from 20% to 15% of voting power. This proposed change will be discussed by the members at the February meeting; voting will be by mail ballot. The ballots to be mailed to members must be returned to Secretary Estelle Finkle. They will be counted at the March meeting.

JANUARY LECTURE

Mrs. Ellie Euler, Director of the West Springfield High School Planetarium, demonstrated this facility's capability and discussed astronomy education in Fairfax County at the January 6 meeting.

Our lecturer began by reproducing the Springfield sky on the dome (under which about 75 people can sit). She then used the \$70,000 installation, built around a Spitz planetarium projector, for a series of audience-participation exercises in celestial mechanics. The audience had to decide from apparent stellar motion what astronomical motions were being demonstrated. Diurnal, annual, and seasonal motions, precession of the equinoxes, and apparent retrograde motion of the planets were shown. Projection of celestial-coordinate grids helped us visualize complex motions.

Mrs. Euler answered many questions from NCA members about the widespread use of planetariums in Fairfax County Schools (nine Spitz installations). Many non-County residents are surprised at the lack of publicity these astronomy classrooms receive. They are used in specialized classes ranging from physics to literature, and also in adult education.

NOTES FROM MEMBERS

Treasurer Dick Horwitz will leave Washington in February to become head of the Boston Photo Bureau of the Associated Press. We will greatly miss him and his many services to NCA. Happily, Dick continues as a member.

Ray Finkleman, home on Christmas vacation from Vanderbilt University, where he is studying astronomy, showed us a number of deep-sky, short-exposure photographs he took with the Dyer Observatory 24-inch reflector.

Jerry Schnall and Rene Lamadrid observed at Bob Bolster's Ridgeview Observatory in Virginia until the wee hours following the January meeting. At the same time, Horwitz, Winkler, and McCracken were poring over the NCA records at Dick's Arlington residence.

Skies were very clear on the night of a January 13 party at the Jerry Hudsons' in Knoxville, Maryland. A number of interesting spectral class N variables of unknown period were observed in Orion. Even with the moon past first quarter, limiting magnitude for 10X50 binoculars was 8.

June LoGuirato recommends the new journal, *The Planetarian*, to those interested in planetarium education. Contact Editor Frank C. Jettner, Department of Astronomy and Space Science, State University of New York at Albany, Albany, New York 12222, for information. The International Association of Planetarium Educators also publishes Norman Sperling's *A Catalog of North American Planetariums* at \$1.00.

PUBLIC OBSERVING WITH 16- AND 24-INCH TELESCOPES

On the 5th and 20th of each month, Maryland University Observatory at College Park offers observing with its 16-inch reflector. Call 454-3001 for information. Three times a month, between first quarter and full moon, the U. S. Naval Observatory hosts the public at its 26-inch Clark refractor. Call 254-4569 *well in advance* for reservations.

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ARMAND N. SPITZ MEMORIAL FUND

It was reported in the September 1972 *The Planetarium* that a group of friends formed an *ad hoc* committee for the establishment of the Armand Spitz Memorial Fund. Committee members are Von Del Chamberlain, Abrams Planetarium, Jack Spoehr, Spitz Laboratories; NCA member Margaret Noble; Charles Hagar, San Francisco State College; Jack C. Howarth, San Antonio College. Initial contributions were deposited in a Lansing, Michigan bank.

This memorial fund was established with the hope of continuing some of the work Spitz might have done had he lived longer in good health. The fund is intended to further and improve planetarium instruction. This might be through scholarships, awards, grants, and loans. The exact uses will be determined by the Council of the International Society of Planetarium Educators in communication with Mrs. Grace Spitz. Contributions are invited from planetarium educators, foundations, and other interested groups and individuals. Contributions are tax deductible. Comments and suggestions are desired. Please make checks payable to the Armand N. Spitz Memorial Fund and send them to: Von Del Chamberlain, Abrams Planetarium, Michigan State University, East Lansing, Michigan 48823.

HOW DISTANT ARE QUASARS?

Among the controversies concerning the nature of quasi-stellar objects is their distance. Since quasars all show greatly red-shifted spectral lines, probably the majority of theorists believe that these are near the edge of the observable, expanding universe as called for by a Doppler shift interpretation and application of Hubble's constant to their spectra. Among those who interpret the red shift as being "discordant" or of non-Doppler origin is Halton C. Arp of the Hale Observatories. The well-known astrophysicist gave a lecture entitled "Evidence for Discordant Redshifts" on December 30 at the AAAS Annual Meeting held in Washington. Probably because of poor publicity, few NCA members attended. This short summary is based on Arp's lucid preprint for the press, obtained by Dick Horwitz.

In his lecture, Arp gave many examples of different types of galaxies and also of quasars that have very large redshifts but which, he concludes from best available evidence, are relatively close to our own galaxy. Crucial to the quasar distance question is the accuracy of estimates of distance to extra-galactic objects *not* based on Doppler-shift expansion. Trigonometric parallaxes are of little value beyond 20 light years. Distance estimates based on stellar luminosity calculations (Cepheid variables, novae, globulars) are ineffective beyond our local galaxy group (which includes M31 in Andromeda). The distance to more remote objects is estimated by (1) statistical studies of galaxies thought to be physically clustered together and (2) by comparison of objects apparently physically connected by visible filaments or that are gravitationally disturbing each other.

Arp said, "I wish to emphasize that there is no way of ever producing any discordance with the redshift-distance relation for even one single object when operating from the base of current assumptions. This is true because no matter where a galaxy point falls in the redshift-apparent magnitude diagram, its position can be explained in terms of high or low intrinsic luminosity." Briefly, Arp studied rather bright, low-redshift objects in the above classes (1) and (2) and developed physical and statistical arguments that faint, often peculiar galaxies and also quasars having large redshifts were, in fact, physically associated with the low-redshift objects and therefore at the same relatively small distances. Hence, Arp concludes, there is strong evidence that the large redshifts of many remote objects do not indicate that they are at great distances and rapidly moving away from us, but that these objects are relatively close to us as are their nearest galactic companions. The large redshifts are partially due to physically unknown causes.

Continued on page 24.

Arp case studies of objects and groups of objects having discordant redshifts and also visible in telescopes larger than 6 inches:

Class (1)

Clusters of galaxies – Galactic cluster in Virgo, galactic cluster in Coma Berenices

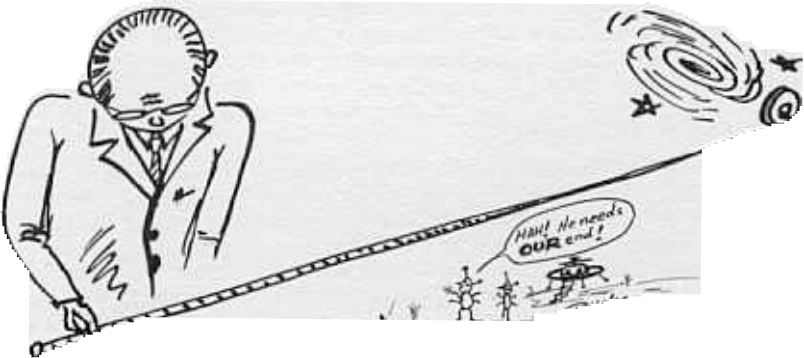
Chains of galaxies – NGC 5128, photographic magnitude (m_p)=7.2, in Centaurus; NGC 4736, m_p =8.9, in Canes Venatici; NGC 4038, m_p =11.0, in Corvus

Class (2)

Galaxies connected by filaments – NGC 772, m_p =11.1, in Aries; NGC 4151, m_p =11.3, in Canes Venatici

Strongly interacting galaxies – NGC 7585, m_p =12.7, in Aquarius; NGC 1199, m_p =12.7, in Eridanus

These can all be found with the aid of your *Skalnate Pleso Atlas and Catalog*.



"There seems to be some fundamental problem..."

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