



Shapiro Postulates Seed Particles for the Cosmic Radiation; NCA Election in May



DR. SHAPIRO

Dr. Maurice Shapiro, Chief Scientist Emeritus of the Laboratory for Cosmic Physics, U.S. Naval Research Laboratory, and Visiting Professor of Astrophysics at the University of

Maryland, will present results of his current cosmic-ray research at the May National Capital Astronomers colloquium in the National Air and Space Museum.

Where and how cosmic rays get started is an old problem — that of injection. It is proposed that most Galactic cosmic rays are injected from red dwarf stars into the interstellar medium. These are then shock accelerated. This mechanism works well for energies up to about 10 TeV. A considerable body of evidence supports this view. For cosmic rays of higher energy other possible sources of seed particles will be described.

Dr. Shapiro received his Ph.D. in physics from the University of Chicago. For 12 years, he also served as Director of the Nucleonics Division. He has served as Chairman of the Division of Astrophysics of the American Physical Society, and subsequently Chairman of the High-energy Astrophysics Division of the American Astronomical Society, and a member of the Steering Committee of the DUMAND Consortium. His many pioneering contributions have been recognized internationally by medals and other awards.

MAY CALENDAR — *The public is welcome.*

Tuesday, May 1, 8, 15, 20, 29, 7:30 pm — Telescope-making classes at Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 362-8872.

Friday, May 4, 11, 18, 25, 7:30 pm — Telescope-making classes at American University, McKinley Hall Basement. Information: Jerry Schnall, 362-8872.

Saturday, May 5, 5:45 pm — Dinner with the speaker at the Smithsonian Restaurant, 6th and C Streets, SW, inside the Holiday Inn. Reservations unnecessary. Use the 7th Street and Maryland Avenue exit of the L'Enfant Plaza Metrorail station.

Saturday, May 5, 7:30 pm — NCA monthly colloquium in the Einstein Planetarium of the National Air and Space Museum, Seventh Street and Independence Avenue, SW. Enter Independence Avenue side. Annual NCA Election; Dr. Shapiro will speak.

Friday, May 11, 18, 9:00 pm — NCA 14-inch telescope open nights 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 12, 8:30 pm — *Exploring the Sky*, presented jointly by National Capital Astronomers and the National Park Service, on Glover Road south of Military Road, NW, near Rock Creek Nature Center. Planetarium if cloudy.

Saturday, May 28, 400 pm until ... Hopewell Observatory Open House. See page 137.

For other organizations' events of interest see elsewhere in this issue.

APRIL COLLOQUIUM

Mr. Philip Barringer, son of the geologist and mining engineer, Daniel Moreau Barringer of Arizona Barringer Meteor Crater fame, addressed the April colloquium of National Capital Astronomers at the National Air and Space Museum.

He first presented a video tape narrated by Gary Shoemaker, Curator of the museum at the crater and President of Meteor Crater Enterprises, the operating company. It dramatically reenacted the creation of the crater by meteoritic impact, recounted the involvement of our speaker's father, Daniel Moreau Barringer, from 1902, and 30 years of controversy over the crater's origin. The history of the acquisition and management of the property, scientific successes and commercial disappointments, details of the crater, and speculations about impact extinctions of species, all were covered in a spectacular presentation.

The first recorded visits to the crater were in 1871. There was, however, no significant activity until the mid 1880's, when the area was being used for sheep grazing, and meteorites were found on the surface and reported. As a result, Dr. Arthur Foote from Philadelphia visited the crater in 1891, and collected about a hundred meteorites, some as large as 1400 pounds. Barringer showed, and passed around the audience, a fist-sized one of heavy, nickel-iron alloy.

There were many controversies regarding the origin of the crater. As a result of Foote's report, Dr. Grove Carl Gilbert, U.S. Geological Survey, visited the crater in 1891. He noted the volcanic rocks nearby, and also that there was no magnetic anomaly at the crater. He concluded that the found meteorites were irrelevant, and that the crater resulted from either "the fall of a star," or a steam explosion. Being very cautious, he did not publish until 1895, when he published under the title, "The Origin of Hypotheses, Illustrated by Discussion of a Topographic Problem," in which he estimated depths of penetration versus mass of a colliding body. He also noted that the volume of the rim would just fill the crater. From this, he concluded that the crater originated not from a collision, but from a volcanic steam explosion.

In 1897, Daniel Moreau Barringer, our speaker's father, a geologist and mining

engineer, was having very good success mining silver at Pearce, Arizona. In 1902, when he heard of the developments at the crater, he immediately saw the commercial potential; the meteorites are 92% iron, 7% nickel, and the remainder heavy metals, from cobalt to iridium and platinum. In a surge of imagination, he excitedly dropped his cigar.

Barringer's mining success had led to such prominence in the Southwest that his every move was of public interest. He formed a partnership with Ben Tillman in January 1903, and very quietly filed a claim through his brothers in law. He obtained a grant of two square miles encompassing the crater, signed by President Theodore Roosevelt. They incorporated as the Standard Iron Company, with both scientific and commercial objectives.

Barringer was convinced from the start that the crater was meteoritic. On the assumption that a round crater would be formed by a vertical impact, the company drilled four shafts in the center of the crater. The shafts were stopped by quicksand at 200 feet, and another at 300 feet. The impact had pulverized the rock stratum, and water seeped in.

Barringer delivered a paper to the Philadelphia Academy of Natural Science in 1905, entitled "Coon Mountain and its Crater." (Coon Mountain was the former name.) He firmly postulated the meteoritic origin of the crater, saying, "Any theory of the explosive formation of the hole is utterly impossible." He noted the geological parameters, including the "minute magnetic matter," which was insufficient to cause a magnetic anomaly.

By 1908, 28 expensive, unsuccessful holes had been drilled at the crater.

In 1909, Barringer delivered a paper to the National Academy of Sciences, in which he concluded that the crater probably was made by a swarm of small meteorites, rather than a single body. Further, noting that a bullet fired into the ground either vertically or at an angle formed a round hole, he suggested that, by analogy, perhaps the round lunar craters were also formed by angular impacts.

The following decade was spent seeking additional finances. In 1918, the U.S. Smelting and Refining Company agreed to drill ten holes in the south rim. Because the south rim is a hundred feet

higher, than the north rim, it was realized that the impact was from the north. Two years were spent drilling a shaft to 1300 feet in the south rim, where it permanently stuck in what appeared to be a dense meteoritic mass.

In 1926 the National Geographic Society published a paper attributing the impact theory to Dr. Gilbert. Upon Barringer's appeal, however, the Geological Society declined to intercede, but adamantly supported Gilbert's steam explosion theory as late as 1928.

More capital was sought until 1928, to sink a shaft to mine that meteoritic mass. A three-foot shaft was drilled to 600 feet, where again an impenetrable water table was encountered. Water could not be kept out of the shaft, and the shaft could not be timbered any farther down. Pumping was attempted for the following year.

Because of increasing costs and difficulty, an independent analysis of the entire problem was obtained from Dr. Forest Ray Moulton of Chicago. He concluded that both the mass and impact velocity were of critical importance. He calculated that the crater could have been made by a mass of three million tons at a velocity of 7 miles per second, 250,000 tons at 14 miles per second, estimated to be most likely, or 30,000 tons at 40 miles per second. He also concluded that 90 percent of the kinetic energy would be applied to pulverizing and displacing the rock, which, in turn, would produce a violent explosion. Here the two theories seem to merge.

Barringer, not satisfied, consulted others of his scientific friends, including Dr. Henry Norris Russell, and others, who were quite supportive, but his partners decided against any further exploration. This and the stock market crash of 1929, which ended the funding, brought the work to an end. The effect on Barringer was traumatic; he died in the autumn of 1929.

Phil said that although his father suffered many disappointments, he was

gratified by the knowledge that his efforts had led to substantial contributions to science.

Our speaker's family was instrumental in the 1935 founding of the International Meteoritical Society, which is active today.

In 1946, Bob Dietz, one of the scientific consultants to the company, identified shatter cones, rock structures several inches long, found in some impact craters, which point to the direction of arrival of the impacting body. They have been found at most impact craters, recently in southern Montana and eastern Idaho, where old ones were uncovered by the rise of the Rocky Mountains. At the Barringer Crater, however, they are believed to be deeply submerged. The cones are positive identifiers of impact craters.

In 1950, an agreement was signed with the Tremain family to build a museum at the crater. The agreement stipulated that it was to be administered as a public trust, both for visitors, and to encourage and aid scientific research, and that the crater was to be preserved in its natural state.

Frank Lloyd Wright was engaged to provide an architectural design. His plan was in the shape of an airplane overhanging the crater to provide a spectacular view. When he declined to estimate the cost, the plan was dropped. Another architect, Philip Johnson, was engaged, who designed the present structure.

In 1953, the name of the Standard Iron Company, now in the stewardship of our speaker's family (his older brother, Paul, is President), was changed to the Barringer Crater Company. Meteor Crater Enterprises runs the museum. The original objectives are maintained; The crater is held as a public trust, kept in its natural state, and the companies welcome visitors and researchers, assist in funding research, and retain two scientific consultants.

Robert H. McCracken

OPTICAL SOCIETY SCHEDULES MEETING

The Monthly Lecture, Annual Election, and Science Fair Awards Banquet of the National Capital Section of the Optical Society of America will be held on May 15 at the NASA Goddard Recreation Center. Eric Chaisson, of the Space Telescope Science Institute, will speak on

"The Mission of the Hubble Space Telescope."

For information on schedule, dinner reservations, and cost, call Dick Bulova at (703) 323-1283 (H), or (703) 664-6771 (W), or Ron Prater at (703) 780-9116 (H), or (703) 558-7900 (W).

OCCULTATION EXPEDITIONS PLANNED

Dr. David Dunham is organizing observers for the following occultations. For further information

Date	Time	Place
04-14-90	06:01	Burtonsville, MD
05-29-90	02:05	Raleigh, NC

call the NCA-IOTA Information Line (301) 474-4945 (Greenbelt, MD).

Vis Mag	Pent Sunlit	Cusp Angle	Min Aper
2.1	83	3S	5 cm
7.5	27	14N	5 cm

NCA TO ELECT FISCAL 1991 OFFICERS

The annual National Capital Astronomers election will be held at the May 5 meeting. The election will be the only business preceding the colloquium. The nominating committee offers the following candidates:

President, Kenneth R. Short; Vice President, Daniel J. Costazo; Secretary, Nancy Byrd; Treasurer, Jeffrey B. Norman;

Trustee, Dr. Maurice M. Shapiro; Trustee to fill unexpired term of Stanley G. Caweltt, Richard J. Byrd; Chief Engineer, Eric O. Nystrom.

Additional nominations may be made by petition of 10 regular members in good standing, presented to the secretary prior to the election.

UNIVERSITY OF MARYLAND ASTRONOMY COLLOQUIA SCHEDULED

The University of Maryland Astronomy Program Colloquia are held each Wednesday at 16:00 at the UMD Computer and Space Sciences Building (CSS), Room 1113.

2 May - "Optical Interferometry," Dr. Kenneth Johnson, Naval Research Laboratory

9 May - "Active Galactic Nuclei - A Review of Recent Progress," Dr. Donald

Osterbrock, Lick Observatory.

The colloquia are preceded by tea at 15:30, and are followed by refreshments. Park at meters in the garage (Note that the meters take quarters only - ed.) at the corner of Regents Drive and Stadium Drive, across the street from the CSS Building. For more information, call Dr. Roger Bell, Astronomy Program, (301) 454-3005.

UNIVERSITY OF MARYLAND OPEN HOUSE SCHEDULED

The Astronomy Program, University of Maryland, holds open house on the 5th and 20th of each month at the University's observatory on Metzert Road in College Park. Talks and slide shows are presented at 9:00 pm, followed by telescopic sky viewing, weather permitting. The public is invited; there is no charge.

Saturday, May 5, - "The Early

Universe," Dr. K. Papadopoulos, University of Maryland.

Sunday, May 20, - "Maryland's Window on the Universe," Dr. Leo Blitz, University of Maryland.

No reservations are necessary for individuals. Groups larger than ten should call (301) 454-3001 at least 5 days prior to the program.

SPSE SCHEDULES CONFERENCE ON IMAGING TECHNOLOGY

During the week of May 20 to 25, at the Center for Imaging Science, Rochester Institute of Technology, The Society for Imaging Technology, formerly the Society of Photographic Scientists and Engineers (SPSE) is holding a six-day conference on many aspects of modern imaging technology, including optical, photochemical, solid-state electronic, digital and linear processing, colorimetry, image conservation, restoration, enhancement, and many others.

The many tutorials on the entire field

of modern imaging technology, led by experts in their specialties, are to be interspersed with interesting social activities, a gala reception at the International Museum of Photography at the George Eastman House, the College Alumni Union, and the Margaret Woodbury Strong Museum, with tours of the museums and special programs.

For further information on the program, costs, and registration, call SPSE at (703) 642-9090, in Springfield, VA.

NCA AGAIN INVITED TO HOPEWELL CORPORATION OBSERVATORY FOR ANOTHER TRY

NCA members, families, and guests are again invited to open house at Hopewell Observatory on Saturday evening/Sunday morning, May 26/27, to view the cosmos in general, and Comet Austin (1989c1) in particular.

EDT

20:25 Sunset
20:56 Civil twilight ends
22:17 Astronomical twilight ends
22:21 Moonset
22:32 Comet Austin rises, Az = 90°
03:59 Astronomical twilight begins.
Comet altitude = 50°
06:16 Sunrise

If you wish, come early (any time after 16:00) and bring your prepared picnic dinner (...and stay overnight for the

comet, of course!) Coffee, tea, cocoa, and soft drinks will be provided by the Hopewell Corporation.

From the Beltway, go west on I-66, 25 miles to the Haymarket exit at U.S. 15. Left on 15, 0.25 mile to traffic light, right on Route 55, 0.75 mile to County Road 681. Right on 681, 3.2 miles to end, left on County Road 601 (gravel) 1.2 miles to County Road 629, Right on 629, 0.9 mile to narrow paved road at open gate on right. (Directly across from an entrance gate with stone facing on left). Turn right, go 0.3 mile to top of ridge, go around microwave station and continue on dirt road through woods a few hundred feet to the observatory. Further information? Call NCA: 320-3621.

NASA GODDARD COLLOQUIA SCHEDULED

During the academic year, Goddard Space Flight Center at Greenbelt, Maryland, holds weekly colloquia on Fridays, and biweekly seminars on alternate Tuesdays, on a wide variety of scientific subjects, frequently astronomy-related.

The Laboratory for Atmospheres Seminar Series is held in Building 21, Conference Room 183, at 15:30 preceded by

coffee and tea at 15:00.

Tuesday, May 8, 1990: "The Neptune Atmosphere after Voyager." Dr. Sushil K. Atreya, University of Michigan, will discuss our present understanding of the photochemical, thermodynamical, and mixing processes in the atmosphere of Neptune. Stop at the main gate guardhouse and request guest parking permit. For further information, call (301) 286-5002.

U.S. NAVAL OBSERVATORY TOURS IN MAY

The next Monday night public tours of the Naval Observatory are scheduled to begin at 20:30 EST on May 7, 14, and 21.

Passes will be issued to the first 100 persons in line at the gate across from the British Embassy, at Massachusetts Avenue and the southeast side of Observatory

Circle, at the end of the circular road. Some form of photoidentification will be required. Parking for the tours is not allowed on the grounds except for the handicapped; ample parking is available near the gate. Information: 653-1541.

AIR AND SPACE MUSEUM OFFERS PROGRAMS IN MAY

The following free public programs will be offered during May in the National Air and Space Museum:

Saturday, May 5, 09:30, Albert Einstein Planetarium - Monthly Sky Lecture: "The Search for Extraterrestrial Intelligence," Ellen Sprouls, Planetarium Staff. The search, known as SETI, was launched in 1960 by Dr. Frank Drake at the National Radio astronomy Observatory at Green Bank, WV, with "Project Ozma." Since then, about 50 programs have been conducted at various locations. With

improvements in technology and instrumentation, the chances of discovering ETI, if it is out there, are greatly improved. Join Ellen to learn about new and upcoming efforts.

Wednesday, May 9, 19:30, Albert Einstein Planetarium - Exploring Space Lecture Series: "Millisecond Pulsar Searches," Ramesh Narayan, University of Arizona, Tucson. Several very short-period pulsars have been discovered in recent years. Narayan has developed techniques to find these elusive objects.

ASTRONOMY AND PERSONAL COMPUTERS Joan B. Dunham

Computer History — An account of the development of IBM's 360 system of computers was published in the *American Heritage of Invention and Technology*, vol 5 no 3, the winter 1990 issue. This interesting article mentions that the number of bits in a byte was hotly debated, with some (Amdahl, for one) wanting six bits, and others, eight. The eight-bit byte won, and is now the almost universal standard. Some of the design concepts of the 360 system are still used today. One was that the entire system was to accept the same peripheral devices, another was that processors and computer languages be able to serve both scientific and business needs. The first 360's were shipped in April 1865. There are undoubtedly still 360's in use today, though today the 360 system is considered obsolete. Those still in use will eventually be "finished off" by the lack of spare parts and maintenance costs. But while the 360 system is gone, its design concepts are not forgotten. They live on in many successor systems, the 370 system one in particular.

Rules: 1. Always look where you put your floppy disks. Even if you have moved a floppy into a drive a hundred times, look where you do it. This will keep you from folding your floppy, or discovering slits above or below the drive large enough to take a floppy. It also keeps you from attempting to force a disk into an already occupied drive.

2. Forget those sticky white-protect tabs for 5.25-inch disks. They only go on, never come off. Most of the tab will come off if you try, but there will be a sticky residue as a reminder that once the disk was write protected. If you are worried about losing important data, buy more diskettes and make copies. Diskettes are cheap.

3. Never set your coffee cup on top of your diskettes.

Buying a Computer — The 1990 winter issue of *Washington Consumer's Checkbook* (vol 7 no 3) has an article on buying

computer equipment. They suggest ways in which a computer might be used to help prospective owners decide if that is a use they might want. Whether or not you agree with their ratings of local stores, the article has many useful suggestions on picking computer hardware.

They do mention the problems consumers have with comparing prices for computer equipment. The prices and equipment change so quickly that surveys are frequently outdated by the time they are finished. Also, it is not always easy to know if two pieces of computer hardware being compared are really the same. For example, a recent PC Week article discussed the pricing of VGA (high quality graphics) monitors. Some of the lower-cost VGA monitors are lower in cost because they were built with components that cannot really give the high resolution of the VGA standards. The article mentioned that knowledgeable purchasers often choose the less-than-VGA monitors anyway, since they considered the display acceptable, and wanted the ability to use software written for the VGA without paying the higher price. But not all of the purchasers realized that they were getting a lower quality monitor.

Physics Academic Software is a project of the AIP to help make good quality software available for education on physics. Individual authors submit programs which, if selected, are published and sold by the AIP. The prices are not high in comparison with most commercial software. Software developers do not expect to become rich writing for PAS. It is more a matter of providing a public service, helping develop the next generation of scientists. While all of the current offerings are for the PC family, they are reviewing Macintosh software. If you are interested in submitting software to the PAS, contact Dr. John S. Risley, Department of Physics, North Carolina State University.

NCA WELCOMES NEW MEMBERS

Robert Beatty
9109 Ashland Woods Lane, B3
Lorton, VA 22079

John and Tracie Potemra
11995 Coverstone Hill Circle #1222
Manassas, VA 22110

Dr. Maurice M. Shapiro
205 Yoakum Parkway, #1720
Alexandria, VA 22304



National Capital Astronomers, Inc.

is a non-profit, public-service corporation for advancement of the astronomical sciences. NCA is the astronomy affiliate of the Washington Academy of Sciences. For information, call NCA: (301) 320-3621.

SERVICES AND ACTIVITIES

A Forum for dissemination of the status and results of current work by scientists at the horizons of their fields is provided through the monthly NCA colloquia held at the National Air and Space Museum of the Smithsonian Institution. All interested persons are welcome; there is no charge.

Expeditions frequently go to many parts of the world to acquire observational data from occultations and eclipses which contribute significantly to refinement of orbital parameters, the coordinate system, navigation tables, and timekeeping. Other results of this work under continuing study include the discovery of apparent satellites of some asteroids, discovery of apparent small variations in the solar radius, and profiles of asteroids.

Discussion Groups provide opportunities for participants to exchange information, ideas, and questions on preselected topics, moderated by a member or guest expert.

Publications received by members include *Sky & Telescope* magazine and the NCA newsletter, *Star Dust*.

The **NCA Public Information Service** answers many astronomy-related questions, provides predictions of the paths and times of eclipses and occultations, schedules of expeditions and resulting data, assistance in developing programs, and locating references.

The **Telescope Selection, Use, and Care Seminar**, held annually in November, offers the public guidance for those contemplating the acquisition of a first telescope, and dispels the many common misconceptions which often lead to disappointment.

Working Groups support areas such as computer science and software, photographic materials and techniques, instrumentation, and others.

Telescope-Making Classes teach the student to grind and polish, by hand, the precise optical surface that becomes the heart of a fine astronomical telescope.

NCA Travel offers occasional tours, local and world-wide, to observatories, laboratories, and other points of interest. NCA sponsored tours for comet Halley to many parts of the southern hemisphere.

Discounts are available to members on many publications and other astronomical items.

Public programs are offered jointly with the National Park Service, the Smithsonian Institution, the U. S. Naval Observatory, and others.

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If family membership, list names of additional participating immediate family members in same household, with birthdates of all those under 18 years old:

NOTE: If you already subscribe to *Sky & Telescope*, please attach a recent mailing label, or indicate expiration date: _____. An adjustment will be made. Make check payable to National Capital Astronomers, Inc., and send with this form to Nancy Byrd, Secretary, 4215 Holborn Avenue, Annandale, VA 22003.

The following information is optional. If you would like to participate actively in NCA affairs, please indicate briefly any special interest, skills, vocation, education, experience, or other qualifications which you might contribute. Thank you, and welcome!

EXCERPTS FROM THE IAU CIRCULARS Robert N. Bolster

- 1. March 1 — Huang, Condon, and Yin, National Radio Astronomy Observatory, and Thuan, University of Virginia, detected a probable radio supernova in NGC 3690.
- 2. March 16 — Altenhoff, Kreysa, Schmidt, and Schranl, Max Planck Institut fur Radioastronomie, and Thun, Institut de Radioastronomie Millimetrique, Canada, observed 250-GHz emission from Comet Austin with the IRAM 30-m telescope. The comet was at a distance of 1.47 AU, probably the greatest distance at which radio signals from a comet have been

- detected. They reported That the grain halo of Comet Austin was similar to that of Comet Halley in 1986 April.
- 3. April — British and Australian researchers reported the radio detection of two pulsars with periods of 5.44 and 378.59 ms in globular cluster NGC 6624.
- 4. April 17 — AAVSO observers reported that dwarf nova U Geminorum was undergoing an outburst, having brightened to magnitude 9.4 from fainter than 13.9.

FOR SALE

Video camera with removable lens, model JVC-GX-8. Rated sensitivity 10 lux.

Price negotiable. Vaughan Pischke, (70) 241-2272.

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