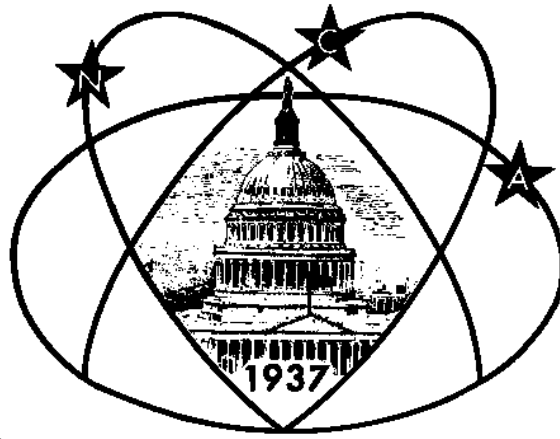


# Star



# Dust

National Capital Astronomers, Inc.

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## Dr. Kirk Borne, “Cosmic Train Wrecks: Hot Galaxy Collisions” Submitted by Gary Joaquin

Dr. Kirk Borne will present the featured talk for the January 5 meeting of National Capital Astronomers, “Cosmic Train Wrecks: Hot Galaxy Collisions”. The meeting will be held in the Bethesda-Chevy Chase Regional Services Center of Montgomery County, 4805 Edgemoor Lane (Second Floor), Bethesda, MD at 3:00 P.M.

### Synopsis

Dr. Kirk Borne will review results from a large Hubble Space Telescope survey of Ultra-Luminous InfraRed Galaxies (ULIRGs). ULIRGs are almost exclusively involved in collisions and/or mergers between closely interacting galaxies. The results will be set in the more general contexts of interaction-

*(Continued on page 2)*

## “Why do Planets Explode?” A Talk by Dr. Tom Van Flandern Reviewed by Dr. Wayne H. Warren Jr

This lecture by Dr. Thomas C. Van Flandern of Meta Research and the NCA, was given to NCA on October 6, 2001.

I must declare at the outset that, although I do not agree with all of Dr. Van Flandern’s theories, I do believe that there is considerable evidence to support some of his planetary and small bodies ideas. I also greatly

respect Tom’s strict adherence to rigorous scientific methods and his desire to learn the truth through strictly scientific investigations.

It should also be noted that interested readers can find thorough discussions of Dr. Van Flandern’s ideas in the recently published second edition of his book *Dark Matter*,

*(Continued on page 3)*

## “Cultural Implications of E.T.” A Lecture by Dr. Steven Dick Reviewed by Nancy Byrd

At the December 1, 2001 NCA meeting, Dr. Steven Dick presented a romp through the history of our ideas concerning extraterrestrial life, our efforts and current evidence for it in a talk entitled “Astrobiology and Its Cultural Implications.” Dr. Dick, author of numerous publications on the subject and astronomer and science historian at the U.S. Naval Observatory, began his talk with a review of the history of various cosmological

views and how these shaped the progress, or lack of it, of astronomical science.

### History

While the ancient Greeks, Democritus and Leucippus, believed in an infinite number of worlds, Aristotle believed in only a single world. Aristotle’s belief held sway throughout the Middle Ages. Our speaker showed an

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## The President’s Corner

I first want to inform everyone that I’ve renewed our use of our present Bethesda meeting place through March. We aren’t allowed to sign up for more than three months at a time.

We have space for more attendees. As I said at the last meeting, I would like to have someone take responsibility for contacting some of the local newspapers. It’s a job that involves probably very little time and would have a number of benefits. The first is the potential for more members. Our membership has been slowly decreasing and I would like to turn that around. Also, we have discussed again becoming members of the Astronomical League, but this requires an increase in membership to pay for it. Lastly, I feel that advertising our meetings more widely will further cement our being allowed continued use of our present location by showing that our meetings are truly public.

Speaking of the Astronomical League, it is the largest amateur organization in the country. While most amateurs are members through their local club, I would like to point out that they also have a “Member at Large” category for individuals. I am a “MAL”. Until NCA, rejoins the AL I encourage others to join. See [www.astroleague.org](http://www.astroleague.org).

Jay H. Miller

## NCA Events This Month

### The Public is Welcome!

NCA Home Page: <http://capitalastronomers.org>

**Wednesdays, January 2, 9, 16, 23, & 30 from 7:00 to 10:00 P.M.** The NCA Mirror-Making Class will continue to be on *Wednesdays* in January.

**Fridays, January 4, 11, 18, & 25, 8:30 P.M.** Open nights with NCA's 14-inch telescope at Ridgeview Observatory near Alexandria, Virginia. See below.

**Saturday, January 5, 3:00 P.M.** - NCA meeting in the Bethesda-Chevy Chase Regional Services Center of Montgomery County, 4805 Edgemoor Lane, (Second Floor), Bethesda, MD. See the map and directions on Page 8.

Dr. Kirk Borne will present the featured talk "Cosmic Train Wrecks: Hot Galaxy Collisions".

**Saturday, January 5, following the meeting,** dinner with the speaker and NCA members at a restaurant to be announced at the meeting.

See Page 5 for more National Capital Area astronomical doings.

To join NCA, use the membership application on Page 9.

## Dr. Kirk Borne

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induced activity in galaxies and of hierarchical galaxy assembly. It is believed that our most powerful survey instruments are just beginning to witness the hierarchical merging phase of galaxy assembly through deep survey observations, such as the Hubble Deep Fields. Future projects (such as SIRTf, Herschel, ALMA, NGST) will examine in detail these galaxy formation processes and test our current paradigms of hierarchical assembly and of an interaction-activity connection among galaxies.

### Bio

Dr. Kirk Borne was born in Baton Rouge, Louisiana, and lived in many other places as the child of an Air Force officer. He received a B.S. in Physics from Louisiana State University, and then received an M.S. and Ph.D. from the California Institute of Technology, where he studied with Jim Gunn. He spent 3 years teaching at the University of Michigan and 2 years as a Carnegie Fellow at the Carnegie Institution of Washington. He then spent 10 years supporting the Hubble Space Telescope

Science Institute in Baltimore. In 1995, he transferred to Raytheon Information Technology and Scientific Services company at NASA's Goddard Space Flight Center, where he manages the astrophysics support staff in the Astrophysics Data Facility and in the Astronomical Data Center. He has research experience in both observational and theoretical astrophysics, including numerical simulations, ground-based observations, and space-based observations of a variety of disturbed, colliding, and starbursting galaxies. The broad goal of his research has been to obtain a global, objective determination of the rate and significance of galaxy-galaxy collisions and mergers in the overall scheme of galaxy formation and evolution. That some of the most luminous (optical, radio, and infrared) objects in the universe are involved in such collisions makes this group of objects particularly important in our quest to understand the birth rate, current state, and ultimate fate of galaxies in the cosmological setting. He has used the Hubble Space Telescope (HST) extensively in these stud-

ies. His HST observations of the starburst ring in the Cartwheel Ring Galaxy and his discovery of multiple-merging super-starburst galaxies were the subjects of NASA press releases in 1995 and 1999, respectively. In addition to these scientific research endeavors, Dr. Borne has nearly 15 years of professional experience in developing and managing science data management systems, archive research support facilities, on-line user services, and education and public outreach for NASA space astronomy missions. His technical interests include scientific information systems, particularly as it applies to the new National Virtual Observatory initiative, as well as on-line data mining, knowledge discovery, and visualization of large scientific data sets. Dr. Borne once served as the Deputy Editor for the Publications of the Astronomical Society of the Pacific, and is now on their Publications Committee. He is also a member of the IAU International Task Force on Electronic Publishing in Astronomy and a member of the IAU Task Group on Astronomical Names.

## Observing with the NCA C-14 by Bob Bolster

**Date** (All at 8:30 p.m.)

January 4, 11, 18

January 25

**Prime Objects**

Saturn, Jupiter, Orion  
Nebula

Saturn, Jupiter, 12-day  
Moon

At Ridgeview Observatory in Bob Bolster's backyard, 6007 Ridge View Drive, Franconia, Virginia (off Franconia Road between Telegraph Road and Rose Hill Drive).

Call Bob at 703-960-9126 before 6:00 p.m., to let him know you are coming.

## Dr. Steven Dick

*(Continued from page 1)*

illustration of Aristotle's Earth-centered cosmology, which did not provide for the possibility of other worlds and a photo of the spot where Giordano Bruno was burned at the stake in 1600 for numerous heresies, not the least of which was his belief in the plurality of worlds and the Copernican system.

Descartes carried the plurality idea further with a plurality of solar systems, and while Descartes did not publicly explore whether there were planets in these star systems, others did. For instance, in 1686 poet and philosopher Bernard le Bovier de Fontenelle published *Conversations on the Plurality of Worlds*, perhaps the most popular book

*(Continued on page 5)*

## Dr. Tom Van Flandern

(Continued from page 1)

*Missing Planets, and New Comets, 2<sup>nd</sup> ed.*, Berkeley, North Atlantic Books, 1999. Additional information is also available at the Meta Research website <http://www.metaresearch.org>.

Dr. Van Flandern began his talk by discussing theories of planetary formation. The currently most popular theory is the Primeval Solar Nebula Hypothesis of Laplace. An alternate early model was the fission hypothesis, which was originally tied to the close passage of another star that would have pulled material from the Sun. When the passing star scenario was recognized as not feasible, the Laplace theory gained momentum and became the dominating theory. This theory involves the collapse of a protostellar cloud, triggered perhaps by a nearby supernova shock front. The planets would have formed by the accretion of planetesimals left over after the Sun formed. There are several problems with this model, however:

- the accretion of planetesimals doesn't work for particles in closely similar orbits because they are forced to librate and avoid collisions
- while 99 percent of the mass of the Solar System is in the Sun, 98 percent of the angular momentum is in the planets
- planetary rotation is predominately prograde, while roughly equal retrograde motion would be expected in the Laplace model; this is the case for moons as well

The fission model, which attributes planetary formation to the breaking off of material from the parent body as a result of high rotational velocity, explains some of the above problems:

- planets and moons originate with nearly their final masses, then cool and contract, so they have no issues with accretion
- contracting bodies spin up, become prolate, then fission at the two elongated lobes, with most of the angular momentum going to the lobes
- prograde rotation would occur everywhere that was not subsequently altered
- similar fission-origin ideas can be applied to almost all stars, planets, and moons
- all original major planets and all major moons of gas giants should occur in twin pairs, as observed (in most cases)

Dr. Van Flandern next turned to the "Exploded Planet Hypothesis" (hereinafter EPH). The first indication of a possible "missing" planet resulted from the discovery of the Titius-Bode law of planetary spacing, (often called simply Bode's Law), which relates the distance of a planet from the Sun in astronomical units, as  $D = (d + 4)/10$ , where  $d = 0, 3, 6, \dots, 96$ . Everything fell into place except for  $d = 24$  ( $D = 2.8$  au), where no planet was found – that is, not until the discovery of the asteroid Ceres by Piazzi on New Year's Day in 1801. Soon thereafter, the minor planets Pallas, Juno, and Vesta were found, followed in 1845 by Astraea and numerous others. The Danish astronomer Olbers then quickly suggested that there had once been a planet at 2.8 au that exploded. Lagrange suggested in a paper published in 1814 that cometary orbits fit this picture if comets were interpreted as the explosive debris that had been hurled outward approximately perpendicular to the orbit of the exploded planet. Unfortunately, Lagrange was not around to defend his hypothesis for very long, having died about 6 months after his paper was published.

According to Dr. Van Flandern, the EPH is favored by the following observations:

- young exposure ages of meteorites
- comet and asteroid similarities
- tracebacks of new comet orbits indicate origins at  $3.2 \times 10^6$  years
- explosion signatures in main asteroid belt
- energy distribution of new comets
- the strange hemispherical dichotomy in the albedo of Iapetus and other airless, slow rotators,

while the following predictions of the EPH have been confirmed:

- satellites of asteroids (14 cases presently recognized) and comets (Hale-Bopp companions found) do exist
- "roll marks" on asteroids (Eros, for example)
- water in meteorites is salty (as from a planetary ocean) rather than primitive; this may also be true in comets, where the sodium, but not yet the chlorine, of salt, has now been identified
- time and rate predictions for meteor showers (the 2001 Leonid storm results have come in since the lecture, and the EPH-based models were again the most successful this year)

Dr. Van Flandern next turned to the evidence supporting a multiple exploded planet hypothesis (MEPH). One is motivated to look for multiple events because there is more than one asteroid belt, the second belt being the so-called Kuiper Belt beyond the orbit of Neptune. The following observations support the MEPH:

- there is strong evidence that many of the geological periods in Earth's history are separated by one or more major impact events
- there are three or four distinct meteorite classes, indicating that known meteorites may be a mixture of debris from different parent populations
- oxygen isotopes are inconsistent with a single parent body
- there are two distinct classes of main-belt asteroids
- cosmic-ray exposure ages are grouped
- the total mass of known and expected comets is insufficient to add up to a planet

Other evidence for earlier planetary explosions includes the "Late Heavy Bombardment", which was a heavy influx of objects in the inner Solar System that occurred about  $4 \times 10^9$  years ago. There is also now quite a bit of evidence that the K-T extinction event was caused by multiple impacts, only the largest of which was the Chicxulub event.

The foundation of Dr. Van Flandern's Solar System evolutionary scheme is the fission model, whereby planets form in pairs by separating from the central gaseous object. This could have happened at different epochs to form the known planets, as modified later by explosion events. Dr. Van Flandern described a model that classifies Mercury as an escaped moon of Venus, Mars as an escaped moon of his planet V, and the Pluto-Charon system as escaped moons of Neptune. After removing the above small planets, one can envision a model with six planet-forming fission events producing two planets each: (X, T); (Neptune, Uranus); (Saturn, Jupiter); (B, A); (K, V); (Earth, Venus). The lettered planets are now exploded into asteroids and comets. The A and B explosions produced the "late heavy bombardment"; T and X produced the two newly found asteroid belts beyond Neptune; the most recent

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# Dr. Tom Van Flandern

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explosions of planets V and K produced the inner and outer main asteroid belts. The major moons of the gas giant planets likewise tend to occur in twin pairs with certain fixed relationships. Dr. Van Flandern displayed tables of planetary pairs and characteristics of the planets and moons.

If planets do form in pairs, then extrasolar planetary systems should show such characteristics. Most systems found to date seem to contain single planets in highly elliptical orbits, but these could actually be pairs of planets on more circular orbits that are masquerading as single objects. The fission model predicts this and one such system originally thought to be a single object in an elliptical orbit has recently been found to actually be a pair of planets in circular orbits. Dr. Van Flandern predicts that many more such cases will be seen in the near future.

Finally, Dr. Van Flandern turned to possible models for explosions of planets. Such models must account for periodic explosion events and must account for single catastrophic explosions powerful enough to disintegrate an entire solid planet. The models highlighted by Dr. Van Flandern include:

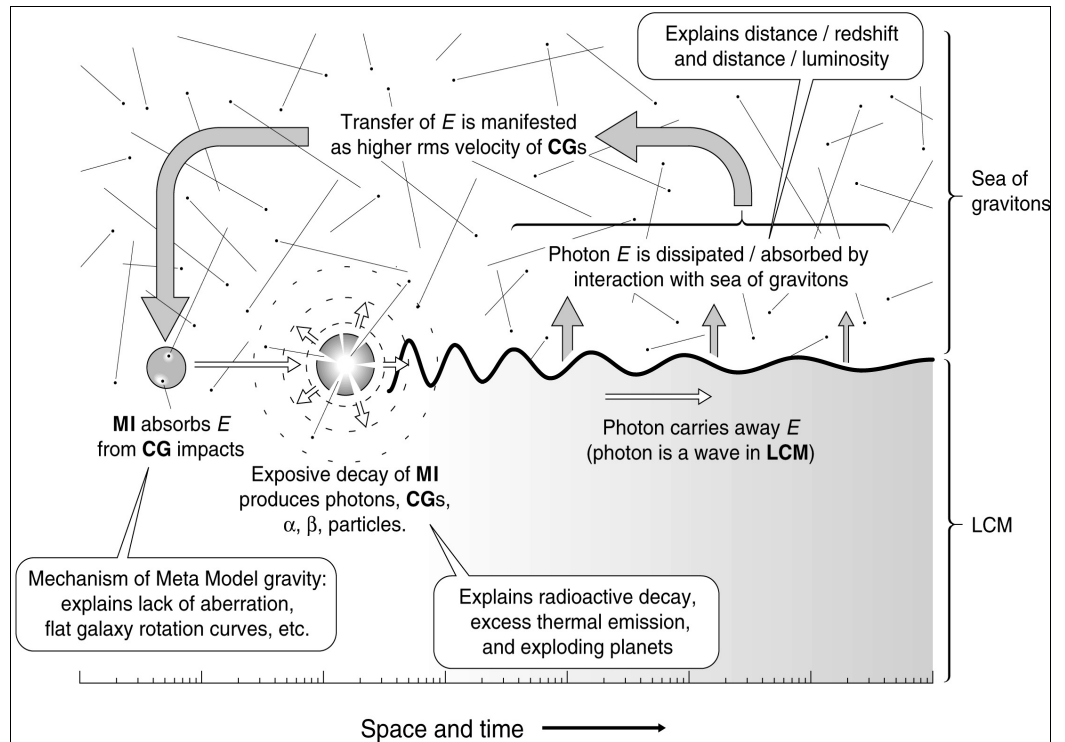
1. Change of state: sudden changes in volume because core temperatures hit a critical point, resulting in catastrophic explosions or implosions. This process is most effective for moons and small planets.
2. Natural fission reactor: concentrations of radioactive elements reach critical mass, resulting in nuclear explosions. This process is known to have happened on Earth's surface about two billion years ago.
3. Graviton heating: internal heating by an intense flux of gravitons.

In connection with the third point, Dr. Van Flandern discussed two different interpretations of General Relativity; namely, the geometric concept of curved spacetime and the field interpretation. Problems with the former led Einstein to favor the latter, al-

though he was never able to satisfactorily explain gravity. Dr. Van Flandern described the geometric interpretation with the rubber sheet analogy, explaining that a second mass placed near a larger mass in space far from any other bodies could not begin to move toward the larger object because curvature alone, in the absence of a force, cannot initiate motion. One interpretation of the field theory is due to 18<sup>th</sup> century physicist LeSage, who speculated that the Universe is filled with particles called gravitons and that the rain of these particles on an object causes it to be *pushed* toward another object to which it seems to be attracted because each object shadows the other from some graviton impacts. To reproduce the other phenomena of general relativity, however, another major departure from conventional theory is needed: the so-called "space-time medium" invoked by general relativity as the light-carrying medium and the vehicle for gravi-

sity that blocked the free flow of elysium, the graviton heating would cause an explosion almost immediately. This may also serve as the long-sought mechanism to explain the trigger for supernova explosions.

Dr. Van Flandern ended by describing *The Meta Cycle*, which describes the interaction of gravitons with matter. Assuming that everything is embedded in a graviton sea, energy is transferred from absorbed gravitons to atoms and nucleons until such particles explode. The explosions on that scale produce both particles (radioactive decay products) and shock waves (photons). The photons carry energy back to the graviton sea, losing it by friction to produce an apparent redshift. This process repeats itself much like the hydrological cycle on Earth, thus resulting in no loss or gain in energy. This model predicts that the Universe is a stable system that will die neither a heat nor a cold death.



**THE META CYCLE** Credit: Boris Starosta (<http://www.starosta.com/>)

tional waves must be replaced by a material medium called "elysium".

How the above mechanism applied to the EPH was explained by Dr. Van Flandern as a combination of high graviton flux and the carrying off of heat by elysium. If a sudden collapse of a planet were to occur, with a corresponding increase in core den-

The NCA thanks Dr. Van Flandern for presenting this interesting lecture. The writer thanks him for reviewing this material prior to publication and for valuable comments that significantly improved the text. He also thanks Gary Joaquin for operating Dick Byrd's video camera to produce a useful record of the lecture that was used to prepare this review.

# Dr. Steven Dick

(Continued from page 2)

of the 17<sup>th</sup> century, which depicts many solar systems with planets. Dr. Dick noted that “already, by the end of the 17<sup>th</sup> century, this idea became engraved in the European consciousness that we have many solar systems out there. The trick was to prove it and we’ve only done that within the last five years.” He also cited another book as an example of the evolution of world views: *Astrotheology* by William Derham, published in the middle of the 18<sup>th</sup> century, was an attempt to show God’s magnificence because of the many inhabited worlds.

A pervasive theme in Dr. Dick’s talk was that world views drive the kinds of questions we ask in science, and that the idea that extraterrestrial life exists is a world view with large implications, much as the Copernican or Darwinian theories are world views. Moreover, he suggested that we are currently trying to decide between two world views. He called these two world views: the “physical universe” and the “biological universe.” Do we live in a universe where cosmic evolution normally ends in just stars, planets and galaxies – dead matter? Or do we live in a universe, he asked, where cosmic evolution normally ends in life and intelligence? But, he cautioned, discriminating between world views is difficult to do; it does not happen overnight.

He showed two NASA illustrations: one from the 1980s, shows cosmic evolution originating in the Big Bang, the formation of planetary systems, and ending with intelligent life (astronomers of course). The more recent second illustration, taken from the Origins program, shows cosmic evolution ending in primitive life. He pointed out that the apparent difference in world view depicted may simply be due to the fact that Congress has forbidden NASA to look for intelligent life. (Government funding of the SETI (Search for ExtraTerrestrial Intelligence) program was terminated in 1993.) Finally, he showed how world views have changed within the last 100 years. He displayed an illustration from A.R. Wallace’s *Man’s Place in the Universe*, a scholarly synthesis of accepted scientific theory by the co-founder with Darwin of the theory of natural selection. The picture shows the Solar System at the center of the universe, which extends no further than the Milky Way Galaxy, 3600 light years in diameter.

In contrasting to this, he showed the recent deep field image from the Hubble Space Telescope, 10 to 12 billion light years away.

## Science

The science behind the search for extraterrestrial life got off to a rocky start with Percival Lowell’s reports of “canals” on Mars. Lowell was convinced that such structures existed and were evidence of intelligent life on Mars. The structures were illusory. But before being discredited, Lowell and his ideas caused a great cultural stir. This was especially true in science fiction: Edgar Rice Burroughs’s adventures of John Carter under the Moons of Barsoon, H.G. Wells’ *War of the Worlds*, in 1897, and the very different view – Kurd Lasswitz’s *Two Planets*. Werner Von Braun credited the latter book, also published in 1897, with providing him his inspiration.

What is the evidence on Earth? Dr. Dick showed a diagram of some currently held views of the history of the earth, beginning 4.5 billion years ago, and divided into periods of chemical evolution, with possible life by the end of the first billion years, biological evolution yielding conversion mostly by blue-green algae, of the atmosphere from reducing to oxidizing, followed by rapid biological evolution within the last billion years.

Everywhere we have looked, we have found life. At the bottom of the ocean at the Black Smokers (fumaroles on the East Pacific Rise belching sulphurous hot water 113°C, 250 ATM), there in a realm deadly to us, we have found abundant life. We have found creatures previously unknown to us such as the 6-foot long tube worms. Deep in the Earth and in very acidic conditions life also occurs. The point is that life is much more adaptable than we previously realized.

What about life elsewhere? While the canals of Mars proved false, we have seen evidence of abundant water early in that planet’s history. With the Viking Lander, we did not find any unequivocal evidence of microbial life. The Martian meteorite, ALH84001, continues to be tantalizing, although now in disfavor because of the small size of the included structures and possible contamination. However, there is agreement that the rock came originally from Mars, and it contains evidence of a warmer, wetter climate on Mars. Also, Eu-

ropa appears to have liquid water underneath a mantle of ice. Tidal heating from Jupiter’s gravity may provide the heat for life to survive on Europa.

In 1995, scientists first detected a planet around another solar type star. Since that time, we have found a number of planets. Although we have not yet found any Earth-like planets, with the revival of the nebular hypothesis in the 1940s, the probability of planet formation is much greater than in the old close encounter theory, in which planets were formed when material was pulled out of passing stars. Another piece of evidence is that we have detected complex organic molecules, even amino acids in outer space. But these are not life; precursors of life, but not life. In short, we have no direct evidence of life.

SETI is now privately funded and run by the SETI Institute and others. Many volunteers provide computer power with the SETI at Home program. Perhaps you are among them. They are now working on the Square Kilometer array and many other active research programs. These programs are research. There are no positive results to date. The NASA Origins program is an umbrella program begun in 1995 and contains the astrobiology program. It is also a thriving research program.

## Cultural Implications

We all have world views at various levels. For instance, there are the political – social world views, philosophical – religious world views and cosmological – scientific world views. Dr. Dick’s contention is that all these world views should be better informed by what science has discovered. He cited a number of meetings and workshops and/or their resultant publications, which further that end. Among them, a Workshop on the Societal Implications of Astrobiology, an earlier program (1991-1992) - Social Implications of the Detection of an Extraterrestrial Civilization, the report of the Workshops on the Cultural Aspects of SETI, When SETI succeeds: The Impact of High Information Contact, Many Worlds, a conference and resultant publication on extraterrestrial life and theological implications, and others.

The meeting was followed by a lively question and answer period.

The author wishes to thank Dr. Dick for his excellent proofing of the draft of this re-

## Other National Capital Area Meetings

**Northern Virginia Astronomy Club** (NOVAC) meets 7:00 p.m. on the second Sunday of every month.

January speaker - Ed Witkowski - "Observing Star Clusters"

The meeting site is Enterprise Hall, Room 80 at George Mason University. The meeting hall is in the basement floor of the building. It is best to park in parking lot B and walk up the hill to the rear of Enterprise Hall.

Source: <http://novac.com>

### Stellar & Extragalactic Astronomy Lunch

Talks are Wednesdays at 12:00 Noon in Room 191 of Building 21, GSFC. The BWSS talks are on Tuesdays at 12:00 noon, in the Aerospace building at 10210 Greenbelt Road, room 480 on the 4th floor; a free pizza lunch will be provided by the LASP for those talks. To get to the Aerospace building, go out the main gate of GSFC, turn left and go about 3/4 mile. The Aerospace building will be on your left, just after a Lutheran church. Tuesday, January 15 at SSAI, Marco Sir-

ianni, JHU, "The young cluster NGC330", (BWSS)

January 23, Sasha Kashlinsky, GSFC/SSAI, "Determining the CMB Structure from Peaks"

January 30 Harry Teplitz, GSFC/NOAO, "Emission-Line Galaxies in the STIS Parallels"

For more information, contact Jon Gardner, email [gardner@harmony.gsfc.nasa.gov](mailto:gardner@harmony.gsfc.nasa.gov).

Source: <http://hires.gsfc.nasa.gov/~gardner/seal>

### NASA/GSFC LEP Seminar Laboratory for Extraterrestrial Physics

**Brown Bag Seminar.** The Laboratory for Extraterrestrial Physics (LEP) at NASA's Goddard Space Flight Center conducts weekly science seminars Fridays at noon in Room 8 in Building 2 at Goddard.

January 25 Dr. Adam Szabo, NASA Goddard Space Flight Center, "Interplanetary Disturbances in the Magnetosheath".

February 1 Dr. Vladimir Osherovich,

NASA Goddard Space Flight Center, "Resonances as a Diagnostic Tool All the Way From the Earth's Ionosphere to Neutron Stars and Black Holes".

Source: [http://lepjas.gsfc.nasa.gov/~seminar/lep\\_seminar.html](http://lepjas.gsfc.nasa.gov/~seminar/lep_seminar.html)

### Montgomery College's Planetarium

Fenton St. in Takoma Park, MD. Astronomy is the oldest science and one of the few sciences that welcomes amateurs. Astronomy is one of the few sciences accessible to any inquiring mind. Come to a public planetarium program and explore the universe with us. Everyone who looks up at the stars with wonder is an astronomer. The next program is Saturday, January 26 at 7:00 P.M., "How are Stars Born?".

The program will explore how hydrogen and helium gas, under the action of gravity, form stars - not only 5 billion years ago, when our own sun and solar system were formed, but right now throughout our galaxy. Some of the latest theoretical calculations of star formation will be shared with the audience.

## Meteor Showers

### January Radiants

Full Moon: January 28

### Major Activity

Radiant	Duration	Maximum
Quadrantids (QUA)	December 28-January 7	Jan. 3 at 17:50 UT

### Minor Activity

Radiant	Duration	Maximum
Zeta Aurigids	December 11-January 21	December 31/January 1
January Bootids	January 9-18	January 16-18
Delta Cancriids (DCA)	December 14-February 14	January 17
Canes Venaticids	January 13-30	January 24/25
Eta Carinids	January 14-27	January 21/22
Eta Craterids	January 11-22	January 16/17
January Draconids	January 10-24	January 13-16
Rho Geminids	December 28-January 28	January 8/9
Alpha Hydrids	January 15-30	January 20/21
Alpha Leonids	January 13-February 13	January 24-31
Gamma Velids	January 1-17	January 5-8

### Daylight Activity

None

Source: <http://comets.amsmeteors.org/meteors>

## *Star Dust Is Now Available Electronically*

Any member wishing to receive *Star Dust*, the newsletter of the National Capital Astronomers, via e-mail as a PDF file attachment, instead of hardcopy via U.S. Mail, should contact Nancy Grace Roman, the NCA Secretary, at [ngroman@erols.com](mailto:ngroman@erols.com), or via telephone at 301-656-6092 (home).

## **Deadline for February *Star Dust*: January 15**

Please send submissions to Elliott Fein at [elliott.fein@erols.com](mailto:elliott.fein@erols.com). Text must be in ASCII, MS Word, or WordPerfect.

Thanks.

# Mid-Atlantic Occultations and Expeditions

by David Dunham

## Asteroidal Occultations

DATE	Day	EST	Star	Mag	Asteroid	dmag	s	in.	Location
Jan 11	Fri	21:49	HIP 1512	10.4	Galatea	2.9	4	6	Pennsylvania
Jan 13	Sun	19:18	SAO 60107	7.6	Amherstia	4.7	5	2	Florida
Jan 16	Wed	7:08	SAO 138364	8.2	Malabar	6.0	25	2	Cuba; DC Sun -4
Jan 18	Fri	1:26	TYC24801151	9.9	Sophrosyne	2.0	10	6	n. Florida
Jan 23	Wed	21:03	TYC48061589	10.3	Denise	2.7	6	7	South Carolina
Jan 29	Tue	20:54	TYC13271656	11.2	Thi sbe	1.3	25	8	s. Florida
Jan 30	Wed	20:38	TYC24950265	11.5	Bononi a	1.7	12	8	New York

## Lunar Grazing Occultations

DATE	Day	EST	Star	Mag	% alt	CA	Location
Jan 5	Sat	4:32	ZC 1783	7.3	59- 50	12S	Princeton, NJ
Jan 7	Mon	2:37	94 Vir	6.5	37- 10	8S	nw New Brunswick, NJ
Jan 16	Wed	19:07	SAO 165155	9.2	11+ 10	14S	Myersville, MD
Jan 18	Fri	19:09	SAO 147050	9.0	25+ 31	14S	Hollywood, MD
Jan 18	Fri	21:06	33 Pi sci um	4.6	25+ 10	8S	n Buffalo, NY
Jan 23	Wed	19:54	SAO 93663	8.3	72+ 67	12S	Myersville, MD
Jan 25	Fri	18:49	SAO 77532	8.2	89+ 52	14S	Hollywood, MD
Jan 25	Fri	21:01	SAO 77610	8.6	89+ 73	10S	California, MD
Jan 25	Fri	21:05	SAO 77613	8.4	89+ 72	10S	Myersville, MD
Jan 26	Sat	20:11	SAO 78789	8.3	95+ 56	13S	Hughesville, MD

## Total Lunar Occultations

DATE	Day	EST	Star	Mag	% alt	CA	Sp.	Notes
Jan 3	Thu	1:26	R 46 Leoni s	5.4	81- 50	89N	M2	ZC 1544
Jan 5	Sat	0:59	R 16 Vir	5.0	60- 20	68N	K1	ZC1773, 5.8, 5.8, 0.6", PA 76
Jan 6	Sun	2:12	R SW Vir	7.1	48- 20	77N	M7	var., 6.4-7.9, SAO 139236
Jan 7	Mon	4:10	R SAO 139753	8.2	36- 27	76N	M	var., 8.15-8.33, SAO 139753
Jan 10	Thu	7:13	R SAO 184782	8.0	9- 20	6N	B2	Sun alt. -3 deg.
Jan 15	Tue	17:18	D kappa Cap	4.7	5+ 17	81S	G8	ZC 3175; Sun alt. -2
Jan 17	Thu	18:37	D SAO 165603	8.1	17+ 25	23N	G5	
Jan 18	Fri	18:24	D 30 Pi sci um	4.4	24+ 36	71S	M3	ZC 3536 = YY Pi sci um
Jan 19	Sat	21:55	D ZC 106	6.6	34+ 12	56N	K0	
Jan 23	Wed	18:25	D ZC 577	6.0	72+ 62	72S	F4	
Jan 23	Wed	23:40	D ZC 593	5.9	73+ 37	75N	F4	spectroscopic binary
Jan 25	Fri	3:09	D iota Tau	4.6	83+ 10	59N	A7	ZC 752; close double?
Jan 25	Fri	3:40	D ZC 755	6.2	83+ 5	44S	K0	possible close double
Jan 26	Sat	3:49	D 1 Gem	4.2	91+ 14	81S	G7	ZC 916; mag. 5.1, 5.1, sep 0.2"
Jan 26	Sat	22:09	D ZC 1052	6.8	95+ 74	24N	F8	16" to terminator
Jan 28	Mon	1:56	D BL Cancr i	6.0	99+ 57	87N	M3	ZC 1221; 14" to terminator
Jan 30	Wed	21:02	R ZC 1598	6.5	93- 14	46N	F5	WA 306; maybe close double
Feb 2	Sat	0:43	R ZC 1856	6.6	75- 27	63N	F5	mags. 7.2, 7.6, sep 1.0", PA105
Feb 2	Sat	23:59	R ZC 1976	7.0	64- 7	89N	A3	
Feb 3	Sun	0:27	R ZC 1978	6.6	64- 12	88S	K0	close double star
Feb 3	Sun	4:40	R ZC 1994	6.2	63- 43	53S	F8	mags. 6.5, 7.7, sep 3.6", PA103

Total occultations are calculated for Greenbelt, MD, but in most cases, the times will be within 2 minutes for locations within 70 miles of there.

Phone the IOTA occultation line, 301-474-4945, for weather go/cancel decisions, and other updates and details, or check IOTA's Web site at <http://www.lunar-occultations.com/iota> which now has an asteroidal occultation section with finder charts and updated path maps.

David Dunham, e-mail [dunham@erols.com](mailto:dunham@erols.com), phone 301-474-4722

# Getting to the NCA Monthly Meeting

## Saturday, January 5

3:00 P.M. - NCA Meeting in the Bethesda-Chevy Chase Regional Services Center of Montgomery County, 4805 Edgemoor Lane (2nd Floor), Bethesda, MD.

Dr. Kirk Borne will present the featured talk for the January 5 meeting of National Capital Astronomers, "Cosmic Train Wrecks: Hot Galaxy Collisions".

Following the meeting, dinner with the speaker and NCA members dinner with the speaker and NCA members at a restaurant to be announced at the meeting.

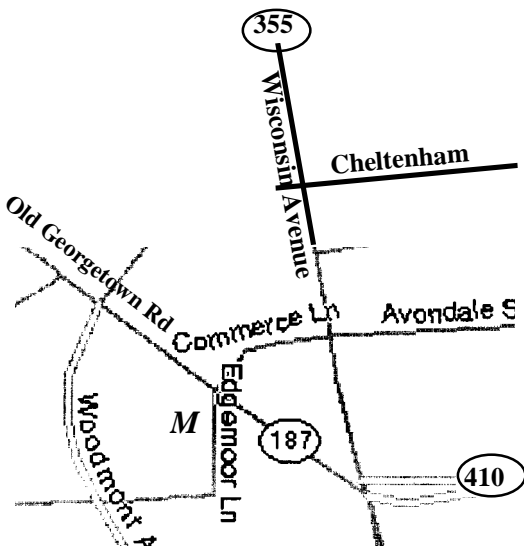
## Directions to the New Meeting Place From North of Bethesda

1. Take Rockville Pike/MD-355 South.
2. Rockville Pike/MD-355 S becomes MD-355/Wisconsin Ave.
3. Shortly after Cheltenham Dr. (and one block before reaching Rt. 410), turn right onto Commerce Lane.
4. Commerce Lane becomes Edgemoor Lane.
5. After crossing Old Georgetown Rd., 4805 is the second entrance on the right. (See **M** on map.)
6. To get to public parking, continue on Edgemoor Lane which will make a sharp right turn. The parking garage is then on your right. See note below.

## From South of Bethesda

1. Take MD-355/Wisconsin Ave. North.
2. Turn slight left onto MD-187/Old Georgetown Rd.
3. Turn next left onto Edgemoor Ln. 4805 is the second entrance on the right. (See **M** on map.)
4. To get to public parking, continue on Edgemoor Lane which will make a sharp right turn. The parking garage is then on your right.

Note: there are two parking lots. The one on Woodmont is for the apartments and may have a fee. The one on Edgemoor is marked "Public" and does not charge on weekends.





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### SERVING SCIENCE & SOCIETY SINCE 1937

NCA is a nonprofit, membership-supported, volunteer-run, public-service corporation dedicated to advancing astronomy, space technology, and related sciences through information, participation, and inspiration, via research, lectures, presentations, publications, expeditions, tours, public interpretation, and education. NCA is the astronomy affiliate of the Washington Academy of Sciences. All are welcome to join NCA.

#### SERVICES & ACTIVITIES:

**Monthly Meetings** feature presentations of current work by researchers at the horizons of their fields. All are welcome; there is no charge. See monthly *Star Dust* for time and location.

**NCA Volunteers** serve in a number of capacities. Many members serve as teachers, clinicians, and science fair judges. Some members observe total or graze occultations of stars occulted by the Moon or asteroids. Most of these NCA members are also members of the International Occultation Timing Association (IOTA).

**Publications** received by members include the

monthly newsletter of NCA, *Star Dust*, and an optional discount subscription to *Sky & Telescope* magazine.

**Consumer Clinics:** Some members serve as clinicians and provide advice for the selection, use, and care of binoculars and telescopes and their accessories. One such clinic is the semiannual event held at the Smithsonian Institution National Air and Space Museum.

**Fighting Light Pollution:** NCA is concerned about light pollution and is interested in the technology for reducing or eliminating it. To that purpose, NCA is an Organization Member of the International Dark Sky Association (IDA). Some NCA members are also individual members of IDA.

**Classes:** Some NCA members are available for educational programs for schools and other organizations. The instruction settings include star parties, classroom instruction, and schoolteacher training programs that provide techniques for teaching astronomy. NCA sponsors a telescope-making class, which is described in the *Star Dust*

"Calendar of Monthly Events".

**Tours:** On several occasions, NCA has sponsored tours of astronomical interest, mainly to observatories (such as the National Radio Astronomy Observatory) and to the solar eclipses of 1998 and 1999. Contact: Sue Bassett [wb3enm@amsat.org](mailto:wb3enm@amsat.org)

**Discounts** are available to members on many publications, products, and services, including *Sky & Telescope* magazine.

**Public Sky Viewing Programs** are offered jointly with the National Park Service, and others. Contact: Joe Morris. [joemorris@erols.com](mailto:joemorris@erols.com) or (703) 620-0996.

**Members-Only Viewing Programs** periodically, at a dark-sky site.

**NCA Juniors Program** fosters children's and young adults' interest in astronomy, space technology, and related sciences through discounted memberships, mentoring from dedicated members, and NCA's annual Science Fair Awards.

**Fine Quality Telescope**, 14-inch aperture, see "Calendar of Monthly Events".

**Yes! I'd like to join the NATIONAL CAPITAL ASTRONOMERS**

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\_\_\_ \$27 With *Star Dust* ONLY.

\_\_\_ \$45 Junior membership with *Star Dust* and a discount subscription to *Sky & Telescope*.

\_\_\_ \$15 Junior membership with *Star Dust* ONLY.

\_\_\_ \$100 Contributing member (with *Sky & Telescope*) (\$43 tax-deductible).

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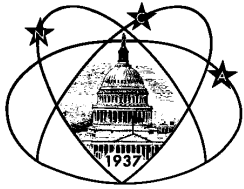
Junior members only: Date of Birth: \_\_\_\_\_ Only members under the age of 18 may join as juniors.

Tax deductible contribution: \_\_\_\_\_ Thank You.

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Please send this form, with your check payable to National Capital Astronomers, Inc., to:

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