



April 2008

Volume XXXVIII, Issue 3

Executive Board

PRESIDENT

Donna L. McCormick '08
 Programs & Publicity Chair
 (631) 696-3333
mccormick@scientific-consultants.com

VICE PRESIDENT

Kurt Massey '08
 (631) 325-2123
kamassey@verizon.net

TREASURER

Barbara Lebkuecher '08
 (631)722-3850
barbaraleb@aol.com

SECRETARY

Charles Cardona III '08
 (631) 727-6769
cc@owlnet.com

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Alarico Verticchio '09
 (631) 477-2717
akam10@optonline.net

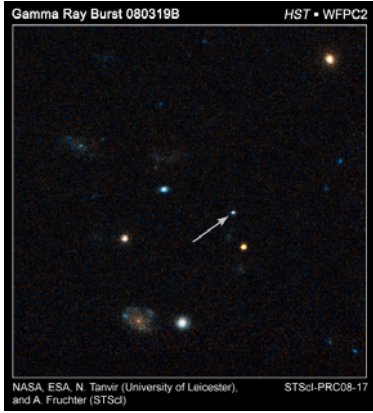
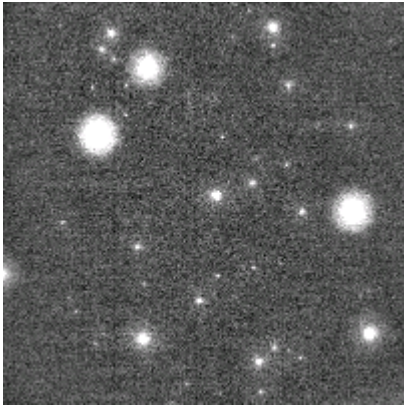
Jeffrey Katz, PhD '09
 (631) 696-3333
katz@scientific-consultants.com

Brian Andrews, Esq '08
 (631) 725-1515
bandrewsesq@optonline.net

Chiaki Yanagisawa, PhD '08

Most Luminous Object Ever Observed

GRB080319B, the brightest GRB Recorded To Date



Visual light detection image of GRB080319B on the left recorded by Pi-of-the-Sky (<http://grb.fuw.edu.pl/pi/ot/grb080319b/normal.html>) equipment at Las Campanas Observatory. Right hand image obtained by WFPC2 aboard HST on 10th April, 22 days after maximum light. Please see accompanying article inside for additional details and commentary.

Upcoming Highlights

- **Fri, April 25th** Monthly Member's night for April
- **Sat, April 26th** Cabaret Concert: Cole Porter And Irving Berlin
- **Sat, April 26th** Starlab Portable Planetarium Shows
- **Sat, May 10th** Probing The Night Sky With The World's Most Powerful Microscope
- **Fri, May 30th** Monthly Member's night for May
- **Sat, May 31st** Seminar: How to do an Astronomy Project
- **Sat, June 7th** Annual Meeting and BBQ

Please see inside for full details on these and other exciting events at Custer Institute, Long Island's Oldest Public Observatory

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Announcements & General Interest

Nominating Committee Appointed

Please note the appointment of this year's Nominating Committee: David Cohn, Ruth Makofske, and Anna Verticchio.

If you would like to contact them to propose candidates for the 2008 elections (to be held at the June 7th Annual Meeting and BBQ) or if you have any questions, please e-mail Anna: akam10@optonline.net. The deadline is May 1, 2008 to notify the nominating committee about being considered as a candidate for a position on the Executive Board.

Annual Meeting And BBQ (and maybe a Star Party, too!)

Sat, June 7

30th Annual Astronomy Jamboree and Astronomy Science Fair (grades 9-11)

Sat, Oct. 4

On-Going

Every Sat. evening, from dusk until midnight, Custer is open to the general public. Staff provide guided tours of the sky (weather permitting) via laser pointers and powerful telescopes, and are more than happy to answer questions. Group visits by classes, scouts, and others are welcome (contact CusterDonna@yahoo.com to arrange). The facilities are also available for private functions.

Editor's Column

Tom Madigan, Editor

Tom Madigan
99 North Summit Ave.
Patchogue, NY 11772-2226
tmadigan@optonline.net

Cutoff for submissions is the 15th of the month preceding publication

Visit the new Custer Website at
<http://www.custerobservatory.org>
Custer Comment Archive:
<http://www.tommadigan.net/custer>

The Custer Comment is published monthly by

Custer Institute
P.O. Box 1204
Main Bayview Road
Southold, NY 11971
(631) 765-2626

"I have loved the stars too fondly to be fearful of the night."

Sarah Williams

"The brilliant ones among us see things but darkly; they catch a notion, a fleeting glimpse, a brief insight, a hint that fades and flickers as a candle set atop a desert mountain"

T. Madigan

I hope all are well. Spring is finally here and with it the attendant stars and constellations of this change of season. Look for the Summer Triangle to be making its way up in the east-northeast after midnight. If you're fortunate enough to live under dark skies with a dark eastern horizon, you'll be able to see the Milky Way spanning the horizon from the northeast to the southwest, passing through Scorpio and then Sagittarius later on at night.

Please excuse the late publication of this month's issue. A number of personal crises, not the least of which was the passing of my brother-in-law, have conspired to delay publication. Please take note of the Announcements and General Interest column on the inside front page. The nominating committee has been selected and the deadline for nominations to the executive board is May 1st. As required by Custer's Constitution, the general election is to be held at the annual meeting. The date for this year's meeting is Saturday, June 7th.

Cheers,

Tom

Tom Madigan, Editor and Producer

Fellow, RAS

Associate Member, AAS

"If the Stars should appear one night in a thousand years, how would men believe and adore; and preserve for many generations the remembrance of the city of God which had been shown! But every night come out these envoys of beauty, and light the universe with their admonishing smile"

~Ralph Waldo Emerson

The Sun Lecture
Apr 11th, 2008 6:00PM Montauk Public Library
By Patria Baradi Pacis



Image credit Patria Baradi Pacis

Astronomer Tom Madigan

Last Friday evening, Astronomer Tom Madigan from the Montauk Observatory Group gave an interesting lecture on "The Sun: Our Home Star. Professor Mike Inglis, from Suffolk Community College, a frequent guest of the Library, introduced his fellow astronomer to the audience. Unfortunately, the weather did not cooperate for the star party that was to be held at the Roosevelt County Park after the lecture so the party was canceled.

Mr. Madigan started the lecture by stating that most people do not think of the sun as a star. It is a yellow dwarf star as opposed to a common star, call red dwarf which is usually cool, with a low mass. The sun is a giant, spinning ball of very hot gas fueled by nuclear reactions. It is the closest star to Earth and is the center of our Solar System. Most people know the sun as a source of heat and energy. Of all the sun's energy that reaches the Earth's surface, only a small amount is used by living things. The sun sustains all life on earth. The sun was even worshipped as a god. It has been the subjects of poems, paintings and books forever.

Mr. Madigan showed us cross sections of the sun and what it would look like if we saw it directly with our own eyes. The sun would look red. If we had ultraviolet eyes it would look purple. Mr. Madigan informed us that the Spacecrafts Voyager 1 and 2 are still returning data to Earth about the Sun for the last 30 years. It takes 25 hours or 12 and half hours each way, at the speed of light, for the data to go back and forth. Mr. Madigan showed us the red giant star called Betelgeuse: red giants are stars that have exhausted their hydrogen fuel and are burning helium and heavier elements. My ears perked up when I heard the name mentioned since it reminded me of "Beatlejuice" the movie.

What I didn't know is that our Sun's life span is about 10 billion years. The Sun is about 4.5 billion years old already. We were told that the hydrogen in the center of the Sun will eventually run out. The helium will get squeezed out which will then speed up the hydrogen to burn much hotter. In 1 and 1/2 billion years the sun will output 20 percent more heat. Earth will then be too hot to live unless we find some other way to adapt. It was good to know that Mr. Madigan was optimistic in mankind figuring out a way to survive the heat. This reporter asked if the global warming was due to the sun's heat and was told no, the global warming was due to human actions.

We were also shown several solar eclipses taken from different camera angles then put together to form one picture. It was great to look at them without hurting our eyes.. Prof. Madigan fell in love with astronomy as a young boy 49 years ago as his father would frequently take him for walks along the sidewalks of New York, pointing out the constellations and the night sky. We also discussed parts of the sun: the Photosphere, the Chromosphere and the Corona. We discussed what Solar Winds and Sunspots were. At the end of the lecture there was a question and answer section to the point that we had to be reminded of the time. Anyone interested in future lectures can check the website www.montaukobservatory.com.

Heavenly Events To Watch For April 2008

“Darkness is everywhere.
I peer through the long
Fingers of the night
Into that shadowless land
Of tomorrow.

Wood

And pasture sleep
Side by side. Far
In the distance a dog
Has treed the silence. Hills
Are wholly dissolved except
In memory.

I scan

The sky: a star
Is riveted against
The emptiness ... one bolt
Holding the world in place.

- John Robert

Quinn

Fanciers of the mercurial planet MERCURY are about to enjoy its best evening appearance (for the northern hemisphere) of 2008. The last few days of April will find the -1 magnitude Mercury edging higher each evening over the west-northwest horizon, toward its “peak” around May 12. The normally showy VENUS is being coy; our only good chance of spotting her is when she’s visited by the thin crescent Moon along the eastern horizon on the morning of April 4 shortly before sunrise. MARS criss-crosses through Gemini in April, well up in the west after dark and setting around 2 AM at midmonth. Rising along the southeast horizon by 3 AM to the left of the already-flashy Teapot of Sagittarius, JUPITER adds its -2.2 magnitude spark to the Archer. Still retrograding westward toward the star Regulus in Leo, SATURN is due south by 10 PM at midmonth and it sets around 4:30 AM.

4 Binoculars may be needed to find the thin waning crescent Moon rising over the eastern horizon just above Venus in the minutes before sunrise this morning. Venus will be at the solar farside (superior conjunction) on June 8/9, and won’t be easier to find (low in the west after sunset) until mid-July.

8 By nightfall this evening you’ll see the waxing thin crescent Moon low in the west close beneath M45, the Pleiades Cluster in Taurus. The horns of the crescent point up toward the cluster, drawing near as if some of the Pleiads may fall into the Moon’s grasp. Sure enough, around 9:57 PM the 4.4 magnitude star

Taygeta (19 Tauri) will disappear behind the earthlit upper-left edge, followed by Maia (20 Tauri) around 10:15 PM. You might also keep an eye on the dimmer Pleiads Celaeno (16 Tauri, beneath Taygeta,) and 21 and 22 Tauri (“the twinned Asterope”, above Taygeta.)

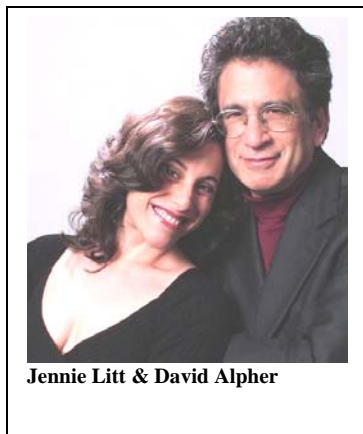
- 11 The Moon, approaching 1st quarter phase, is also creeping up on Mars. It will brush just north of Mars. Observers on the Labrador coast (if any) could see an occultation of Mars.
 - 14 Tonight the waxing gibbous Moon nears Regulus and Saturn as the trio heads toward the west.
 - 17 Today Jupiter crosses the plane of the ecliptic, heading south (descending node) in its 12-year trip around the Sun. (If this had taken place within a few days of Jupiter’s opposition, imagine an observer on one of the Galilean moons watching a transit of Earth and Moon across the Sun’s face.)
 - 20 Full Pink Moon in Virgo sets shortly before sunrise. (The coming Lyrid meteor display - mooned out.)
 - 23 On April 23, 1858, 150 years ago, Max Planck was born. In his studies of black-body radiation, he concluded in 1900 that a body does not radiate continuously, but emits energy in discrete “quanta”. This theory generated the field of quantum physics.
 - 26 Mars has drifted to within 5° of the star Pollux, β Geminorum. Which is brighter? (Compare by naked eye, then by telescope.) Which is more orange?
 - 27 The waning gibbous Moon is beneath Jupiter in the predawn sky.
- May 3 Retrograde ends for Saturn, stopping just 2.2° east of Regulus. Saturn is twice as bright as Regulus right now - a difference of 0.8 magnitude.

Prepared by Robert Chapin

Upcoming Events and Highlights

Cabaret Concert: Cole Porter And Irving Berlin

Sat, April 26, 8:00 PM



Jennie Litt & David Alpher

Acclaimed cabaret duo, Jennie Litt (vocals) and David Alpher (piano), have appeared at numerous venues throughout the northeast. They have been hailed: "Among the premier cabaret acts"; "A perfect musical ensemble"; "Litt's lovely voice is perfectly suited for her repertoire. She can really sell a song!" Alpher was co-founder and director of the Rockport Chamber Music Festival; he is currently Artistic Director of the Chamber Arts Festival in Marbletown and is acclaimed for both his playing and compositions. The duo will perform their Broadway-caliber show, "The Elegant & The Immigrant: Cole Porter and Irving Berlin Together." This is a program of songs in matched pairs, exploring the similarities and differences between these two master songwriters from Tin Pan Alley's "Golden Age." Cole Porter is known for such classics as "Anything Goes," "I've Got You Under My Skin," "Night and Day"; Irving Berlin's masterpieces include "Puttin' on the Ritz," "White Christmas," "There's No Business Like Show Business," "God Bless America." Timeless melodies, naughty lyrics, Broadway history, and charming anecdotes.

Join us for an incomparable evening! Suggested donation: \$15 Members; \$20 Non-Members; \$10 Students. Reservations suggested: email CusterDonna@yahoo.com or call 631-765-2626.

Members' Night

Fri, April 25, 7:00 PM

A Members-Only (and their guests) evening for mingling, enjoying the observatory and its resources, discussing Custer's present and planning its future together. Coordinator: David Van Popering. Admission: FREE.

Starlab Portable Planetarium Shows

Sat, April 26, 2:30 and 3:30 PM

A planetarium is one of the best ways to quickly become familiar with the night sky. StarLab presenter and storyteller, Andi Pisacano, will introduce you to the constellations and other celestial bodies, and tell you the myths associated with them. Two shows each day; call or check website to confirm times. Suggested donation: \$5 Child (under 14), \$8 Adult, \$20 Family (2 adults and children) per show.

Probing The Night Sky With The World's Most Powerful Microscope

Sat, May 10, 8:00 PM

Can the forces of nature be unified? What is the nature of dark matter? These are the questions that physicists from around the world will explore when the world's largest and most powerful microscope – the Large Hadron Collider (LHC) at the European particle physics laboratory CERN in Switzerland – begins colliding protons later this year. It will provide an unprecedented look at the universe under conditions where our current understanding breaks down and new phenomena might be observed, and the exciting connections between physics at microscopic and astronomical scales will be explored at the LHC in the coming years. Speaker: Dr. George Redlinger is a staff physicist at Brookhaven National Laboratory, where he is a member of the ATLAS experiment at the CERN Large Hadron Collider. When he is not thinking about supersymmetry and dark matter, he works on making the paradigm shift from classical to jazz piano. Suggested Donation: \$10 Members; \$13 Non-Members; \$5 Students.

Branding, Marketing & Advertising Your Nonprofit

Wed, May 21, 7:00-9:00 PM

In this troubled economy, funding is difficult to obtain. Effectively positioning your organization, enhancing its image and promoting its efforts are essential. This seminar will cover issues that should be of active concern to every nonprofit: branding, marketing and advertising. Make sure that your cause is known and that your nonprofit will attract public and foundation dollars. Whether you're just starting out or have been around for years, you will undoubtedly learn something that will enhance your organization and be of benefit to its survival. The instructors (Dr. Raymond Knab, Liz Irwin, and Audrey Watson Wigley) have over 90 years of collective experience in

nonprofit management, fundraising, marketing and graphic art design. Suggested donation: \$25 Members; \$35 Non-Members. If you would like to purchase the CD containing materials covered in the seminar and more, the cost is \$7.50 additional. Refreshments provided. Pre-registration by May 16th required: please email CusterDonna@yahoo.com.

Members' Night Fri, May 30, 7:00 PM

A Members-Only (and their guests) evening for mingling, enjoying the observatory and its resources, discussing Custer's present and planning its future together. Coordinator: David Van Popering. Admission: FREE.

Seminar: How To Do An Astronomy Project Sat, May 31, 3:00-6:30 PM

Participating in science fairs is important for a number of reasons. The process of selecting and conducting a project increases appreciation for and understanding of scientific methodology and provides greater insight into the discipline under study. Participation can also enhance a student's resume and lead to scholarships: winning local fairs leads to regional ones, then national and international competitions such as the Intel ISEF (which will distribute \$4 million in awards and scholarships in 2008). The potential rewards are great so it's important for all involved to prepare for the competition. This seminar is intended for teachers and students (and helpful parents). A team of presenters will cover all aspects of doing an astronomy project: from selecting a topic and finding resources to carrying out the research and writing up the presentation. Feel free to bring your ideas for discussion and development. Participants are welcome to remain (no additional charge) for Dr. Helio Takai's presentation, "Demonstrations in Physics (or Life Outside the Box)" at 8PM (see below). Afterward, there will be a tour of the observatory's facilities and observing through powerful telescopes (weather permitting). Presenters include members of Custer's Research Committee (Peter Guastella, Science Research Teacher at Manhasset High School and Vice President of the Long Island Science and Engineering Fair; Dr. Jeffrey Owen Katz, Custer Observatory Director; Steve Orlando, Chemistry Teacher at BOCES; schedule permitting: Dr. Chiaki Yanagisawa, Dept. of Physics and Astronomy, SUNY Stony Brook) and David Cohn, Director of the Educational Projects Network. Refreshments provided. Participants will include winners of 2008 LISEF awards. Suggested donation: \$20 Adults, \$10 Students, and free to all students (grades 9-11) who register to present their projects at Custer's Astronomy Science Fair on October 4, 2008. Reservations suggested. To register for Custer's fair or reserve seats at the seminar, contact CusterDonna@yahoo.com or call 631-765-2626.

Custer Institute's 2008 Astronomy Science Fair

If you are a *student* who is interested in participating in our astronomy science fair and/or internship program and/or upcoming seminar on May 31, 2008 or if you are a *teacher* who would like to help encourage students to participate in our programs and/or learn more about educational opportunities such as our upcoming seminar for teachers (in June 2008), "Astronomy for Teachers," please email Donna at CusterDonna@yahoo.com. If you would like to attend the Astro Fair and Jamboree, please join our notification list at <http://www.custerobservatory.org/List/Signup.htm>. Please visit Custer's website at <http://www.custerobservatory.org> for additional details and the full brochure.

Demonstrations In Physics (Or Life Outside The Box)

Sat, May 31, 8:00-9:00 PM

Physics is a basic science that is the foundation for many other areas of knowledge. It is simple and elegant, yet it is often considered one of the most difficult subjects in high school. Through a series of live demonstrations, Dr. Helio Takai will make it easier to understand physics from classical to modern, a span of over five centuries of knowledge. Demonstrations will involve light, sound, gravity, electricity, magnetism, semiconductors, Brownian motion and particle physics; each demo will describe a phenomenon and how it is of relevance to daily life. This presentation is for all ages. Presenter: Dr. Helio Takai is a physicist at Brookhaven National Laboratory and is a member of Custer's Research Committee. Suggested donation: \$10 Members; \$13 Non-Members; \$5 Students.

Patchogue Village to Enact Local Lighting Law

Leading by example, Patchogue Village will be enacting a local lighting law modeled after Brookhaven Township's recently enacted and amended lighting regulations. Amid a warm reception from Patchogue's Mayor Paul Pontieri and Village Trustee, Lori Devlin, world renowned expert and Dark Sky Champion, Susan Harder, addressed the Village board and agreed to work with this editor and the village to bring to fruition Patchogue's desire to be counted among those municipalities who are "Dark Sky" friendly.

Custer Institute Awards Stellar Students

By Donna McCormick

March 17, 2008

The Custer Institute (est. 1927), a publicly supported nonprofit organization and home of Long Island's oldest public observatory, presented two awards to high school students for their outstanding work in astronomy.

The Vail Scholastic Achievement Awards were created by the Institute to encourage students to actively pursue the study of astronomy. Students were selected on the basis of the projects they had entered in the Long Island Science and Engineering Fair, a regional fair established in 1986 for grades 9-12; LISEF winners go on to the Intel International Science and Engineering Fair, as well as other major competitions. Members of Custer's Research Committee attended the February 5, 2008 round of LISEF, met with all the students who entered projects in the Space Science category and later interviewed the finalists by phone. "It was difficult to decide among so many bright students" said Dr. Jeffrey Owen Katz, Custer's Research Chair. "We selected on the basis of expertise, originality, and commitment to the study of science." At LISEF's final round on March 17, 2008, Custer Research Committee Member (a science teacher at Manhasset High School and Vice President of LISEF), Peter Guastella, presented the winners with certificates of achievement; each Vail award includes \$100, a position in the Institute's Internship Program, and a complimentary family membership in the organization. The winners are:

Katherine Bedkowski, a senior at Plainview Old Bethpage JFK High School, for her project: "Stellar Encounters in the Solar Neighborhood." Katherine's internship at Custer will focus on the development of software for the analysis of astronomical image data.

Pragya Kakani and Yvette Leung, 11th graders from Jericho High School, teamed up for the "Creation of a Metropolitan Cosmic Ray Detector." Over the summer, these new Custer interns will be at the observatory installing equipment to detect and study sub-atomic particles.

"We are truly pleased to be able to encourage the students this way and, through the Internship Program, to give them hands-on research experience," said Dr. Jeffrey Owen Katz.

All the students who entered astronomy projects at LISEF were invited to present at the Custer Institute's first Space Science Fair, to be held concurrent with its 30th annual astronomy conference on October 4, 2008. For the first place winner, Custer will pay the 2009 LISEF (or comparable fair) registration fee, provide a \$200 cash award, as well as a position in the Institute's Internship Program and a complimentary family membership. According to Donna L. McCormick, Custer's President and a Research Committee member, "We created the Space Science Fair to motivate students to study astronomy. Although all Long Island students in grades 9-11 are eligible to enter, we particularly hope to see participation by those from schools east of Riverhead. We were rather dismayed when we noticed that, out of approximately 500 presenters at LISEF, none were from the North Fork which is where our observatory is located. All of us at Custer are determined to do something about that." To further help students, the Custer Institute will be holding a seminar on May 31 to teach them how to select and prepare a space science project. The Research Committee (which consists of professional scientists and educators) is also making itself available to the students throughout the process to assist them with their work. Ms. McCormick said, "Custer has always been about education, but now we're determined to play an active role in motivating students to pursue science--particularly astronomy--in their studies and their careers. We cannot sit back and allow the decline in interest, or in the number of educational programs available to encourage that interest, to continue."

For further information about Custer's research and educational programs, or to help support Custer's programs, please visit www.CusterObservatory.org or email CusterDonna@yahoo.com.

CONTACT: Donna L. McCormick, President, **voice:** 631-765-2626, **email:** CusterDonna@yahoo.com

The Award Winners!



Peter Guastella and Katherine Bedkowski

All images, credit: Donna McCormick



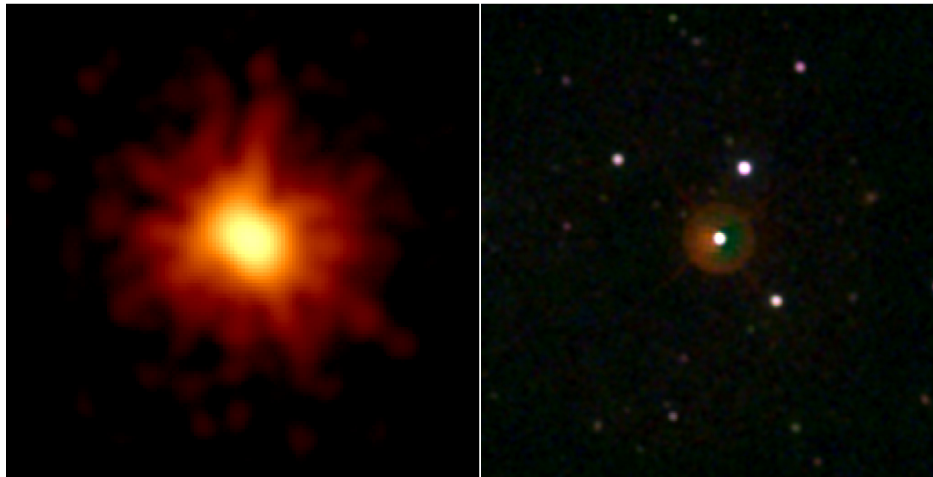
(L to R): Peter Guastella, Pragma Kakani, Yvette Leung, Chris Hoppner (Science Research Advisor, Jericho High School)

GRB080319B, The Most Luminous Object Ever Observed

By Tom Madigan

7.5 billion years ago, 3 billion years before the solar system formed and the sun shone bright in space, 2.5 billion years before the supernova that enriched the interstellar medium with the heavy elements from which our bodies are made exploded, an event involving a star thought to have been in excess of 50 solar masses occurred that would someday, eons in the future, be recorded as the most luminous object ever recorded by the eye and instruments of man.

Shining with the brilliance of 2.5 million supernovae and outshining its host galaxy 22 days after peak light, GRB080319B was visible as a +5.8 magnitude, naked-eye object in Bootes at a distance, quite literally, halfway across the universe. First detected by the SWIFT orbiting Gamma Ray detector, this Gamma Ray Burst faded quickly but not before the suite of instruments and telescopes on board SWIFT were brought to bear on the object. Using the ultraviolet spectrum of GRB080319B, obtained by UVOT aboard SWIFT, a redshift of 0.937 was computed, indicating a recessional velocity in excess of 57% the speed of light!



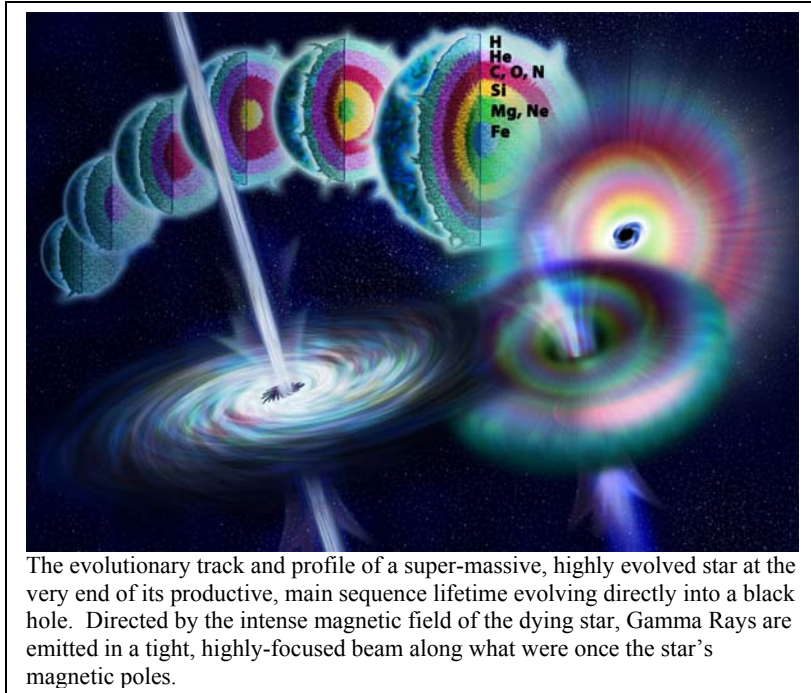
Using the X-Ray telescope aboard SWIFT, the image on the left shows the X-Ray afterglow of GRB080319B. The image on the right shows the corresponding bright optical afterglow.

Image credit
NASA/SWIFT/Stefan Immler

Thought to lie along the line-of-sight of the poles of a massive star during what some have characterized as a “Hypernova”, a Gamma Ray Burst or GRB, is the tightly-focused beam of ultra-high-energy radiation from the event. GRB080319B emitted Gamma Rays with photon energies in excess of 7 MeV. Other models suggest that instead of a Type II supernova, a GRB is the result of a highly evolved super-massive star that evolves directly to a black hole (see illustration below) and, in doing so, emits Gamma Rays as a tightly-focused beam of ultra-high-energy radiation.

Some Sobering Facts about the March 19th GRB

On March 19th we were witness to a Gamma Ray Burst so luminous and powerful that it was visible as a naked-eye object at a distance of, literally, half-way across the known universe. This object was the single, most luminous, most energetic event ever recorded; it was 2.5 million times more luminous than the most luminous supernova ever recorded. Was it reported in the news media? No. All we heard were unending reports about the inappropriate escapades of NY's former governor, the insipid activities of certain Hollywood personalities and other meaningless and forgettable stories. If this event occurred in our half of our own galaxy, it would have meant the extinction of all life on earth. If this event occurred at the same distance (6,000 light years) of the supernova that is believed to have caused the greatest mass extinction in earth's geologic history, it would rival the mid-day sun in brightness and would have




The evolutionary track and profile of a super-massive, highly evolved star at the very end of its productive, main sequence lifetime evolving directly into a black hole. Directed by the intense magnetic field of the dying star, Gamma Rays are emitted in a tight, highly-focused beam along what were once the star's magnetic poles.

incinerated the earth! Do you think we heard about it? No. Ironically, we could be wiped out in less time than it takes to read this sentence and, not only never see it coming, but never know why. In the words of the famous Steven Weinberg, "The effort to understand the universe is one of the very few things that lift human life a little above the level of farce and give it some of the grace of tragedy".

For further reading, additional data and images, please navigate

to <http://grad40.as.utexas.edu/grblog.php?view=burst&GRB=20080319B> and <http://swift.gsfc.nasa.gov> .

TJM

<p style="text-align: center;">ROBERT A. VANSON</p>  <p style="text-align: center;">VANSON FINANCIAL REGISTERED INVESTMENT ADVISOR <i>"Your Life Planner"</i></p> <p>37 Valley Forge Dr., Bohemia, NY 11716 631-218-2350 Homepage http://www.vansonfinancial.com E-mail bvanson@aol.com</p>	<p style="text-align: center;"><u>RADIO ASTRONOMY SUPPLIES</u></p> <p style="text-align: center;"><i>Your International Supplier of Quality Radio Astronomy Products Since 1994</i></p> <p style="text-align: center;">Radio Telescopes, LNA's, Noise Calibration Sources, Books, Videos, and All Associated Items for Radio Astronomy Researchers and Government Applications. Appraisal Services</p> <p style="text-align: center;">Contact: Jeffrey M. Lichtman Phone: 954-965-4471 Skype: Jeffrey M. Lichtman or jeff_c130h jmlras@mindspring.com http://www.radioastronomysupplies.com http://www.nitehawk.com/rasmit/ras.html P.O. Box 450546, Sunrise, FL 33345</p>
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EXHIBITS NOW ON VIEW IN CUSTER'S STOKES GALLERY

The Eclectic Eye: The Photographs of Jeffrey Owen Katz
Visions of the Cosmos: The Astrophotographs of David Barnett

After the exhibit closes, Mr. Barnett's beautifully framed photos will be Custer's thank you gift, one photo for each donation of \$50 or more (while supplies last). All proceeds will benefit Custer's research and educational programs.