



June 2008

Volume XXXVIII, Issue 4

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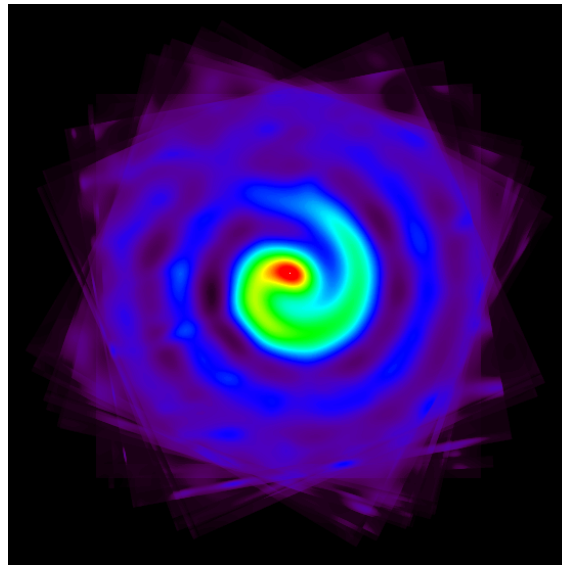
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Possible Supernova Candidates and GRB 2.5 Kpc Towards Galactic Center



Image, courtesy Keck Observatory

Imagine, if you will, a star system containing a massive, intensely hot, luminous star that is emitting a fierce and prodigious stellar wind in binary orbit around a massive, O Type star with the former Wolf-Rayet star at the very end of its productive life. Add to the "mix" the fact that the material spewing off the former is producing a continuous spiral 200 AU in width. If you have imagined this, then you have a clear idea of what WR-104, an enigmatic and potentially lethal stellar system about 8,000 Ly (2.5 Kpc) distant in the constellation of Sagittarius, looks like. Additional details and commentary inside.

Highlights for June 2008

Saturday, June 7th Annual Meeting, Election and BBQ. Election slate and additional details inside.

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Editor's Column

Tom Madigan, Editor

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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>

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"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

Regrettably, I was unable to publish a Custer Comment for last month. Please accept my sincere apologies for that. Between my graduate studies, research activities and teaching responsibilities, I simply didn't have the time or energy to produce an issue up to the standards and quality that you deserve.

This month Custer will host its annual membership meeting, election and BBQ. Please see the details further on in this issue.

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 Music Project Mission Statement

The Custer Institute and Observatory was established in 1927 and is a NYS 501(c)(3) not-for-profit, chartered educational organization that operates on public support and is staffed by volunteers. The Institute has a distinguished history and a long-standing commitment to education and research in the science of astronomy. It also has a tradition of supporting the arts through exhibitions and concerts. Each year, Custer hosts number of musical and artistic performances that range from classical to rock and jazz, music indigenous to other cultures (including Andean flute, Spanish flamenco and Celtic ballads), as well as cabaret and theatrical acts.

The Music Project at Custer Observatory was created to encourage musical expression and education, to provide a venue for local artists to showcase their talent, as well as to offer the community a wide range of musical experiences. While there are many other musical and artistic events on Long Island, there are few that extend as far east as Southold or that offer such a varied repertoire with educational objectives.

Long Island is undergoing a musical renaissance. The Custer Institute has always been dedicated to supporting great ideas and talent, and to avail the community of the same through lectures, classes, seminars, and performances. In order to formalize its support for music and the arts, as well as to expand its offerings, the Institute has created The Music Project which has as its goal the integration of music and art with science and discovery.

What could be better than enjoying an evening of live music and gazing at the stars through the telescopes at the Custer Institute and Observatory? It's literally a universal experience that can be appreciated by people of all ages, backgrounds, and cultures.

We hope you will join us in the development of The Music Project by showing your support as a Sponsor, and by attending upcoming concerts and other events. Please don't hesitate to contact us if you have any questions.

Anne Verticchio, Director of Music
Donna L. McCormick, President
Custer Institute and Observatory
www.CusterObservatory.org

Heavenly Events To Watch For June 2008

“... And would happen to the land,
And how would look the sea,
If in the bearded devil’s path
Our earth should chance to be?
Full hot and high the sea would boil,
Full red the forests gleam;
Methought I saw and heard it all
In a dyspeptic dream ! “

- Oliver Wendell Holmes

By the last weekend of June MERCURY could be found with binoculars low over the east-northeast horizon around 4:45 AM, about 1½ hours before sunrise. VENUS is at superior conjunction on the night of the 8th, so chances of spotting it at month’s end, shortly after sunset, would be slim. As June begins 1.5 magnitude MARS is about 20° west of 0.8 magnitude SATURN, but the gap between them is closing fast. At month’s end Mars will be within 1° of the star Regulus in Leo (and nearly the same brightness), and about 5° west of Saturn. By this time the two planets will be low in the west at nightfall, setting not long after 11

PM. JUPITER rises in the southeast around 10 PM in mid-June, in dark twilight, and is low in the south among the stars of Sagittarius around 3 AM. This -2.7 magnitude gas planet will arrive at opposition on July 9.

- 3 New Moon is within a few hours of perigee; extreme tides are possible in event of a storm.
- 7 The waxing crescent Moon slips beneath Mars this evening. Tomorrow evening it will squeeze past Regulus as it approaches Saturn.
- 8 Tonight Venus passes behind the Sun at superior conjunction. In the 4 years since the celebrated transit of Venus at inferior conjunction on June 8, 2004, Venus has rounded the Sun 6½ times, lapping the Earth 2½ times. Four years from now, when Venus completes its 13th trip (lapping us 5 times,) Venus will again make a transit across the Sun’s face - on June 6, 2012 ! Last night Venus crossed the ecliptic (ascending node), the positioning which makes this doubled phenomenon possible.
- 13 Earliest sunrise around this date, around 5:20 AM.
- 18 Full Strawberry Moon sets before sunrise, and rises again after sunset.
- 18 On June 18, 1983, 25 years ago, astronaut Sally Ride became the first American woman in space.
- 19 The fat waning gibbous Moon rises to the left of Jupiter at twilight’s end this evening, then drifts beneath the planet in the early morning hours.
- 20 Pluto is at opposition today. The 14th magnitude “dwarf-planet” is about 40 arcminutes west of the 6.2 magnitude star 6 Sagittarii. On June 22, 1978 - 30 years ago - U.S. Naval Observatory astronomer James Christy discovered the existence of Charon, the large satellite (or perhaps co-dwarf) of Pluto by noting “bulges” on Pluto’s images on observatory photos.
- 20 Summer begins at 8 PM, as the Sun crosses the 6-hour meridian of the sky.
- 26 Latest sunset around this date, around 8:30 PM.
- 30 The slim waning crescent Moon rises among the stars of the Pleiades cluster before dawn. Look for these two reappearances along the Moon’s earthlit right limb: Maia (20 Tauri) around 3:10 AM (if the Moon has risen where you are) and Alcyone (η Tauri) around 3:31 AM. Look for other dimmer ones to reappear.
- 30 On June 30, 1908 - 100 years ago today - a great fireball streaked down through Earth’s atmosphere, blowing apart miles above a sparsely settled area near the Stony Tunguska River in Siberia. The blast leveled or scorched about 800 square miles of forest. The lack of cratering or cosmic remains suggests that a large aerolitic (stony) meteoroid entered our atmosphere that day, not a comet as once thought.

Prepared by Robert Chapin

Annual Membership Meeting and BBQ

Saturday, June 7th, 5:00 PM

The time for the Annual Meeting and elections is again at hand: Saturday, June 7, 2008, beginning promptly at 5:00 PM. Following the meeting, Custer's Board would like to thank you for your support of our fine organization by inviting you and your family as its guests to the annual BBQ dinner (feel free to bring your favorite dish/dessert to add to the table). We'll enjoy the usual favorites as we dine outside, surrounded by the Town's beautiful arboretum, and listen to a live performance of Baroque music by the Celan String Quartet. After dinner, there will be a star party with members of all the area astronomy clubs: AAA, AOS, ASLI and Montauk Observatory.

2008 Election Of Officers And Directors

As in any election of a governing body, every vote matters. We hope that you will exercise your most important right as a Custer Member by casting your vote. If you think you will be unable to attend the meeting, you can still have a voice by sending in a proxy form (copy below). The proxy form must be received by June 4; please mail it to: Custer Institute, P.O. Box 1204, Southold, NY 11971 or email it to McCormick@Scientific-Consultants.com. If you have a Family Membership, then the two adults of the family are entitled to vote so each of you should fill out a separate form. If you send in your proxy and then decide to attend the meeting, your proxy will be returned to you so you may vote in-person.

2008 Slate

Below is the slate of 7 candidates recommended by the Nominating Committee (David Cohn, Ruth Makofske, Anna Verticchio):

| | |
|--------------------------|--------------------------|
| President | Donna L. McCormick |
| Vice President | Kurt Massey |
| Treasurer | Barbara Lebkuecher |
| Secretary | Peter Guastella |
| Finance Chairman | John Mastromarino, CPA |
| Director-At-Large | Brian Andrews, Esq. |
| Director-At-Large | Chiaki Yanagisawa, Ph.D. |

The other two Directors-at-Large are currently Jeffrey Owen Katz, Ph.D., and Alarico Verticchio; their terms expire in 2009.

Revocable Proxy 2008
The Custer Institute Inc.

The undersigned, _____, a Member of The Custer Institute Inc., a New York Not-for-Profit Corporation ("Custer"), hereby appoints _____, such individual himself/herself being a Member of Custer, or in default of so designating a specific individual, then any member of the 2008 Nominating Committee (David Cohn, Ruth Makofske, Anna Verticchio), as the undersigned's true and lawful agent and proxy ("Proxy"), to vote the undersigned's membership interest in Custer ("Membership Interest") in the undersigned's place and stead, with respect to:

The election of members of the Board of Directors of Custer at the Annual Meeting of the Members of Custer to be held on Saturday, June 7, 2008 at 5:00 P.M., New York time, and at any and all postponements or adjournments thereof (the "Annual Meeting");

Check (yes) below if you wish your Proxy to represent you on all other matters in which you are entitled to vote besides the election of Directors. Otherwise, check (no).

Yes ___ No ___ Any and all other matters upon which the undersigned may be entitled to vote or otherwise act in his or her capacity as a Member of Custer at the 2008 Annual Meeting.

This proxy supersedes and renders null and void any proxy heretofore granted by the undersigned to any person with respect to the undersigned's Membership Interest. The undersigned hereby authorizes the Proxy to substitute, in writing, another Member of Custer (as "Substitute Proxy") to act in his or her place and any Substitute Proxy may make further substitutions to other Members of Custer, in writing, without limitation.

The proxy shall be revocable at the pleasure of the undersigned.

This proxy shall only be valid with regard to votes or other actions taken at the Annual Meeting if it is received by the Secretary of Custer three business days before the Annual Meeting, which begins at 5:00 P.M., June 7, 2008. This proxy may be delivered either in person, by mail (send to: Custer Institute, P.O. Box 1204, Southold, NY 11971), or by email (to: McCormick@Scientific-Consultants.com).

Unless revoked by the undersigned prior to the Termination Date (as hereinafter defined), this proxy shall be effective as of the date signed (as set forth below), or if no such date is supplied then on the date of the Annual Meeting (the "Effective Date"), and shall terminate at the conclusion of the 2008 Annual Meeting (the "Termination Date").

IN WITNESS WHEREOF, the undersigned has set forth his/her hand as of the date set forth below. A facsimile signature or electronically transmitted signature on this Proxy shall be deemed the same as an original signature.

SIGNATURE _____ DATE _____
Print Name _____

News and Highlights June 2008

George Vrattos, RIP

It is with a heavy heart that I report the passing of life-time amateur astronomer, Custer Member and friend, George Vrattos. Additional details to follow next month.

Patchogue Village Enacts Local Lighting Law

Lead by Patchogue Village Mayor Paul Pontieri and spearheaded by Village Trustee Lori B. Devlin, the Patchogue Village Board unanimously enacted the first local lighting law for the village. The law is effective immediately and is substantially modeled after the recently enacted and amended lighting law for Brookhaven Township, the largest township on Long Island and the 3rd largest in the state. With an eye towards energy conservation, Patchogue Village joins the ever-growing list of municipalities who are enacting legislation designed to protect and preserve the nighttime sky and environment from light pollution and to preserve the quality of life for its residents. With brilliant testimony provided by world-renowned expert Susan Harder and assisted by this editor, the village acted with vision and foresight and is to be congratulated.

And Phoenix Makes Three

On May 25th, NASA's Phoenix lander successfully touched down on the red planet and joins 2 other *active missions* on Mars. Unlike Spirit and Opportunity, Phoenix is stationary and will use a sophisticated robotic arm to sample the Martian surface searching for water, life or evidence of biological activity. The northern polar region of the planet was chosen because of the lower average temperature and the possibility that water ice may be locked up in the soil below the surface. Phoenix is equipped with a color stereo imager, a meteorological station built by the Canadian Space Agency, a fully-equipped microscopy and electrochemistry lab and a conductivity analyzer, these last 3 being built by NASA's Jet Propulsion Laboratory (JPL). Telemetry and experimental results from the lander are relayed to earth via uplink to the Mars Odyssey orbiter or the Mars Reconnaissance orbiter and received via DSN downlink with the possibility that the lander's UHF signal could be directly received by the Green Belt Radio Telescope in West Virginia.

The Mars Phoenix lander was manufactured by Lockheed Martin Space Systems. The mission is led by Principal Investigator Peter H. Smith, Ph.D of The University of Arizona and is a cooperative effort between the University of Arizona, NASA, the Jet Propulsion Laboratory, the Canadian Space Agency and a consortium of European universities and institutes. Daily updates and images can be found at the University of Arizona's Phoenix homepage (<http://phoenix.lpl.arizona.edu>), the university's Mars homepage (<http://mars.arizona.edu>), NASA's official website for the mission (http://www.nasa.gov/mission_pages/phoenix/main) and the various pages subordinate to these principal sites.

WorldWide Telescope Brings Space Exploration to Earth

A service free of charge from Microsoft lets students and lifelong learners tour the night sky using high-resolution images from the world's best land- and space-based telescopes.

REDMOND, Wash. — May 12, 2008 — The final frontier got a bit closer today as Microsoft Corp. officially launched the public beta of its WorldWide Telescope, which is now available at <http://www.worldwidetelescope.org>. WorldWide Telescope is a rich Web application that brings together imagery from the best ground- and space-based observatories across the world to allow people to easily explore the night sky through their computers. WorldWide Telescope has been eagerly anticipated by the astronomical and educational communities as a compelling astronomical resource for students and lifelong learners, and as a way to make science fun for children.

“The WorldWide Telescope is a powerful tool for science and education that makes it possible for everyone to explore the universe,” said Bill Gates, chairman of Microsoft. “By combining terabytes of incredible imagery and data with easy-to-use software for viewing and moving through all that information, the WorldWide Telescope opens the door to new ways to see and experience the wonders of space. Our hope is that it will inspire young people to explore astronomy and science, and help researchers in their quest to better understand the universe.”

The application itself is a blend of software and Web 2.0 services created with the Microsoft high-performance Visual Experience Engine, which allows seamless panning and zooming around the heavens with rich image environments. WorldWide Telescope stitches together terabytes of high-resolution images of celestial bodies and displays them in a way that relates to their actual position in the sky. People can freely browse through the solar system, galaxy and beyond, or take advantage of a growing number of guided tours of the sky hosted by astronomers and educators at major universities and planetariums.

“WorldWide Telescope brings to life a dream that many of us in Microsoft Research have pursued for years, and we are proud to release this as a free service to anyone who wants to explore the universe,” said Curtis Wong, manager of Microsoft’s Next Media Research Group. “Where is Saturn in the sky, in relation to the moon? Does the Milky Way really have a supermassive black hole in the center of the galaxy? With the universe at your fingertips, you can discover the answers for yourself.”

The service goes well beyond the simple browsing of images. Users can choose which telescope they want to look through, including the Hubble Space Telescope, the Chandra X-Ray Observatory Center, the Spitzer Space Telescope or others. They can view the locations of planets in the night sky — in the past, present or future. They can view the universe through different wavelengths of light to reveal hidden structures in other parts of the galaxy. Taken as a whole, the application provides a top-to-bottom view of the science of astronomy.

“Users can see the X-ray view of the sky, zoom into bright radiation clouds, and then cross-fade into the visible light view and discover the cloud remnants of a supernova explosion from a thousand years ago,” said Roy Gould, a researcher at the Harvard-Smithsonian Center for Astrophysics. “I believe this new creation from Microsoft will have a profound impact on the way we view the universe.”

Microsoft Research has formed close ties with members of the academic, education and scientific communities to make WorldWide Telescope a reality. NASA along with other organizations coordinated with Microsoft Research to provide the imagery, provide feedback on the application from a scientific point of view, and help turn WorldWide Telescope into a rich learning application.

Microsoft's mission to make the universe accessible to everyone was begun years ago by renowned Microsoft Senior Researcher Jim Gray. WorldWide Telescope is built on top of Gray's pioneering development of large-scale, high-performance online databases including SkyServer and his contributions to the Sloan Digital Sky Survey, a project to map a large part of the Northern sky outside of the galaxy. Microsoft Research is releasing WorldWide Telescope as a service free of charge to the astronomy and education communities as a tribute to Gray with the hope that it will inspire and empower kids of all ages to explore and understand the universe in an unprecedented way.

About Microsoft Research

Founded in 1991, Microsoft Research is dedicated to conducting both basic and applied research in computer science and software engineering. Its goals are to enhance the user experience on computing devices, reduce the cost of writing and maintaining software, and invent novel computing technologies. Researchers focus on more than 55 areas of computing and collaborate with leading academic, government and industry researchers to advance the state of the art in such areas as graphics, speech recognition, user-interface research, natural language processing, programming tools and methodologies, operating systems and networking, and the mathematical sciences. Microsoft Research currently employs more than 800 people in six labs located in Redmond, Wash.; Cambridge, Mass.; Silicon Valley, Calif.; Cambridge, England; Beijing, China; and Bangalore, India. Microsoft Research collaborates openly with colleges and universities worldwide to enhance the teaching and learning experience, inspire technological innovation, and broadly advance the field of computer science. More information can be found at <http://www.research.microsoft.com>.

About Microsoft

Founded in 1975, Microsoft (Nasdaq "MSFT") is the worldwide leader in software, services and solutions that help people and businesses realize their full potential.

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For more information, WorldWide Telescope Virtual Pressroom:

<http://www.microsoft.com/presspass/presskits/worldwidetelescope/default.mspx>

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If the radiance of a thousand suns were to burst at once into the sky, that would be like the splendor of the mighty one...

Hindu holy book, the Bhagavad-Gita

These were the words recalled by J. Robert Oppenheimer as he witnessed the first nuclear test at Alamogordo, New Mexico. Perhaps, within the context of this month's cover story, another quote from the Bhagavad-Gita would be more appropriate: "***Now I am become Death, the destroyer of worlds***". These words were spoken by Oppenheimer during a 1965 television interview when discussing that first nuclear blast at the site that would later become known as ***Trinity***. J. Robert Oppenheimer was a brilliant theoretical physicist who is widely known for many things not the least of which was his collaboration in the discovery of the upper mass limit for a Neutron star, a mass limit above which the degenerate neutron core can no longer provide a barrier to collapse. Known as the TOV limit, short for Tolman-Oppenheimer-Volkoff limit, this upper limit is 3 solar masses and is the analogous limit for a Neutron Star as the Chandrasekhar Limit is for White Dwarfs (1.44 Solar masses).

First discovered in 1999 by Peter Tuthill of the School of Physics, University of Sydney, NSW, Australia, WR-104 could be aptly referred to as the destroyer of worlds, most significantly, ***this*** world. Both stars in this binary system are candidates for core collapse supernovae, the Wolf-Rayet component a Type Ib or Ic supernova and the luminous O-Type star a Type II supernova. Exemplified by broad, strong ***emission*** lines of Helium, Oxygen, Nitrogen and Carbon, Wolf-Rayet stars are stars in the last productive phase of their lives for highly evolved, massive stars (> 20 M(s)). Most stellar spectra exhibit ***absorption*** lines (dark lines representing elements or compounds at specific "colors" or wavelengths). Wolf-Rayet stars are known for their extremely intense stellar wind and prodigious mass loss. Although Type II supernovae aren't thought to be GRB progenitors, the Wolf-Rayet component of WR-104 could be. Even though the system is located at 2.5 Kpc, a reasonably safe distance for a Type II supernova, the polar axis of the system, exemplified by the Archimedes spiral produced as the WR component loses mass, is aligned ***within*** 16° of earth's line of site ***and could pose a threat***. Research is ongoing but GRBs are thought to be tightly focused beams of Gamma rays produced by certain types of supernovae. The typical angular spread of those beams is in the range of 2 – 20°. The given timeline for the demise of the Wolf-Rayet component of WR-104 is 0 – a few hundred thousand years. According to current evolutionary models for evolved, high-mass stars, the Wolf-Rayet component of WR-104 is towards the end of its Helium burning phase (core temperatures in excess of 100,000,000 K). When the Helium burning phase concludes, the Carbon that has been building in the stellar core will become the new nuclear fuel and will require temperatures in excess of 600,000,000 K to burn. Neon burning follows Carbon and requires core temperatures in excess of 1.2 Giga (billion) Kelvin. Each productive phase is shorter and shorter and yields less and less energy as the binding energy of each successive and more massive nucleus increases. The last productive phase of a high-mass star is Silicon burning, a phase that lasts ***one day***. This phase ensues when the Oxygen fuel from the previous phase is depleted and the core temperature, achieved by gravitational collapse, exceeds 2.5 Giga Kelvin.

Taken in the near IR by the twin Keck 10-meter reflectors and featured on the cover of this month's issue, WR-104 is known as "The Pinwheel Nebula". Please see the last issue of the Custer Comment for another article on GRB's with the cover story of that issue entitled "The Most Luminous Object Ever Observed".

TJM

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|---|---|
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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.