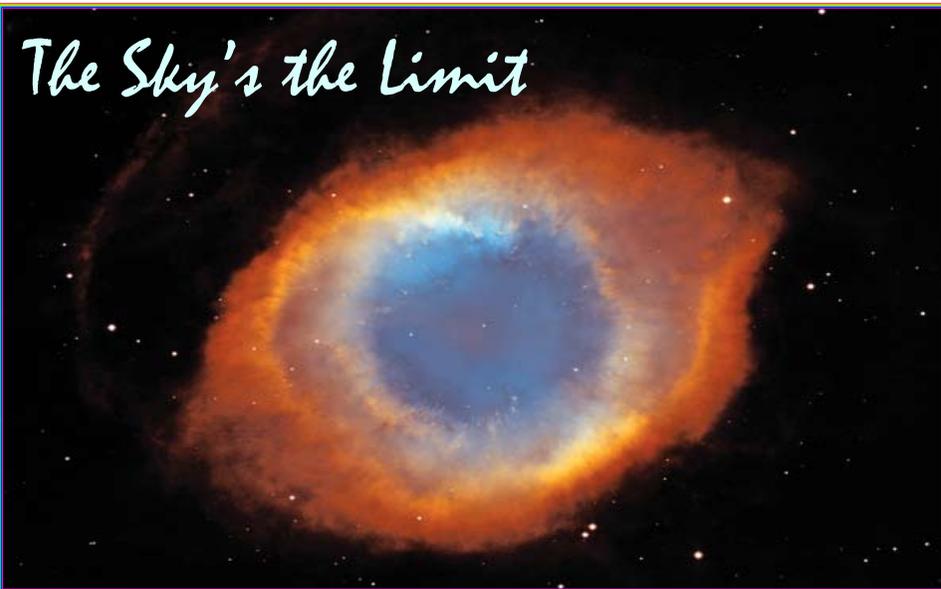


# Science

## The Sky's the Limit



HELIX NEBULA NGC 7293 HUBBLE SPACE TELESCOPE

## A Personal Journey of Wonder

by Walter Reil

On a clear, dark night, bundle up, step outside and look up at the vast blanket of sky overhead. What do you see? Only tiny, twinkling points of light? Ah! But you need to look “deeper” to learn and understand what truly is out there in the vast depths of the cosmos, hidden from the view of most of us living on Earth. For a very special group of people around the world, to which I belong, this is our Disneyland.

When professional and amateur astronomers study the night sky, we see far more than twinkling lights. What we see is unbelievably exciting and energizing, taking us on a journey into the spectacular unknown. We see mankind’s past and future. We begin to understand what our lives truly are all about. We are discovering ourselves.

Our incredibly tiny “Blue Marble” of Earth is nestled in an absolutely stunning, breathtaking and humbling neighborhood of hundreds of billions of stars, other suns (some smaller and some hundreds of times larger than our own Sun, with many having their own “extrasolar planets”), and other solar systems.

This gives rise to the two biggest, most intriguing and profound questions for all mankind; “Is there life elsewhere in the universe?” and “What is Earth’s and mankind’s future?”. NASA and its famous Jet Propulsion Laboratory

(JPL) in Pasadena, California (center of the world’s solar system exploration programs), the European Space Agency (ESA) in Germany, and science-based colleges and universities and other space agencies around the world, are very busy trying to answer these questions.

Two incredible rovers named Spirit and Opportunity are now in their unbelievable fifth year supporting this search, scurrying around the surface of Mars looking for evidence of past or present water, rolling on wheels made by Next Intent aerospace machining in San Luis Obispo. The exciting Phoenix Mars Lander just completed its five-month mission digging material in the northern polar region of Mars, finding an abundance of frozen water ice. The Cassini spacecraft is now in its fifth year orbiting Saturn, sending back stunning images of the “Lord of the Rings” and its many moons, while its Huygens lander landed on Saturn’s moon Titan to discover huge lakes of liquid hydrocarbons that rain from the sky. America’s Messenger spacecraft is on its way to Mercury and New Horizons is on its way to Pluto.

Over the next several years the Kepler Space Telescope and James Webb Space Telescope will enter Earth orbit to study the universe in far greater detail than the Hubble Space Telescope and search for Earth-like planets around other stars.

Our tiny solar system resides in the spectacular spiral Milky Way Galaxy, 100,000 light years in diameter, which itself is nestled among a hundred billion galaxies of all shapes and sizes in the vast universe, separated by incredible distances filled with “dark matter” and “dark energy”. There are more suns in our universe than there are grains of sand on Earth. If you like BIG things, you can’t get any bigger than this. Welcome to outer space!

It is not just the immense size that is amazing, but, more importantly, what is happening in our galaxy and universe that is absolutely mind-boggling. New stars and solar systems are forming before our eyes just a “short” distance away in constellation Orion and the famous Great Orion Nebula. Stars are ending their lives in slow, beautiful death throws called “planetary nebulae”, ejecting material into space at millions of miles per hour, traveling distances many hundreds of times greater than the diameter of our huge solar system. Other stars, many times more massive than our Sun, die in violent explosions, totally destroyed within seconds, called a supernova, that are the biggest and most powerful events known to mankind, sometimes ending up giving birth to dreaded black holes. It is now strongly believed that there are black holes at the center of most, if not all, galaxies. We now know for a fact that our Milky Way Galaxy hosts at least one huge black hole at its center.

Everyone and everything on Earth, Earth itself and our solar system, are all different forms of energy. We were created in the furnace of stellar explosions. As famous astronomer Carl Sagan used to say in the 1980’s, we are all made of “star stuff”. That is because some of the materials in our bodies came from only one place, from the depths of a supernova explosion. Beautiful and valuable gold, the iron in our blood and calcium in our bones were created in the intense pressure and heat of supernovae.

We know of such things from the famous Hubble Space Telescope, Chandra X-ray Space Observatory, Spitzer Infrared Space Observatory,

the Very Large Array of radio telescopes in New Mexico, and major observatories on Earth. Given tremendous advances in technology, amateur astronomers are now getting in on the action, discovering comets, extrasolar planets and supernovae. What our telescopes and powerful observatories reveal to us is an unbelievable view of a tumultuous universe undergoing spectacular and violent change, including the recently discovered fact that our universe is expanding at an accelerating rate.

### Sharing the Night Sky

I am a resident of Atascadero and a volunteer for NASA’s Jet Propulsion Laboratory as a “Solar System Ambassador”, one of 520 around the nation, taking space exploration to the public and schools for free in the form of digital multimedia presentations [http://www2.jpl.nasa.gov/ambassador/profiles/Walter\\_Reil.htm](http://www2.jpl.nasa.gov/ambassador/profiles/Walter_Reil.htm).

I am also a member of the Central Coast Astronomical Society (CCAS), located in San Luis Obispo, [www.ccastronomy.org](http://www.ccastronomy.org). In operation for over 25 years, the CCAS has approximately 60 members of all ages. Our sole purpose is to enjoy the night sky with fellow astronomers and the public, especially families, children and school students. Not only do we enjoy sharing the awe and grandeur of our universe and the fascinating points of light in the sky, commonly called “faint fuzzies”, we also relish the opportunity of having young minds experience the wonders and excitement of science, technology, engineering and mathematics (STEM).

Each month the CCAS holds a free public “star party” at the Santa Margarita Lake KOA campground, with astronomers and newcomers arriving about one hour prior to sunset. These events are not the typical celebration parties that people are familiar with, as they occur in the absolute darkness of night on a small hilltop we lovingly call “Star Hill”. Sometimes we have upwards of ten telescopes of all sizes, including some monster 18” and 20” diameter Dobsonian scopes, which everyone loves looking through.

# MATHCOUNTS®

Teams and individuals from eight area middle schools participated in the 26th annual chapter MATHCOUNTS competition held at Cal Poly on Saturday February 7<sup>th</sup>. MATHCOUNTS, a nationwide math competition open to 6<sup>th</sup>, 7<sup>th</sup> and 8<sup>th</sup> grade students competing individually and on teams, tests basic arithmetic skills, math logic, probability and statistics, linear algebra and polynomials.

This year's MATHCOUNTS winning team was Laguna Middle School (SLO). The team from Judkins Middle School (Pismo Beach) placed second, and Paulding Middle School (Arroyo Grande), Old Mission School (SLO), and Atascadero Jr. High finished third, fourth, and fifth, respectively. Los Osos Middle School came in sixth, and was followed by Mesa Middle School (Arroyo Grande) and McKenzie Jr. High (Guadalupe).



The Laguna Middle School team, consisting of Nico MacDougall, Alec Griffith, Jane Selna, and Kyle Sargent, and coached by Barbara Sulaitis, will next compete in the state MATHCOUNTS competition on March 21<sup>st</sup> at UC Irvine. Also scheduled to represent the Central Coast District at Irvine is the second-place team from Judkins M. S., consisting of Carolyn Davis, Emily Kaar, Joseph Simonian, and Scott Techau, who are coached by Carol Littlefield-Halfman. In addition, the top two individuals not on the winning teams, Alex Freeman of Old Mission School and Jerry Ouyang of Atascadero J. H. will be competing at the state level. The top four scorers at the state competition will represent California in the national MATHCOUNTS competition to be held in Orlando in May.

First place in the individual competition went to Nico MacDougall (Laguna), followed by Alex Freeman (Old Mission) in second, Jerry Ouyang (Atascadero) in third, Alec Griffith (Laguna) in fourth, and Jerome Andres (Los Osos M. S.) in fifth.

Other award winners include: Joseph McInerney (Paulding) in sixth, Michael White (Paulding) in seventh, Akash Salam (Paulding) in eighth, Jasen Wallace (Mesa M. S.) in ninth, and Jason Werner (Mesa) in tenth, Lena Riegelhuth (Los Osos) in eleventh, Simon Yu (Old Mission) in twelfth, Kyle Sargent (Laguna) in thirteenth, Jane Selna (Laguna) in fourteenth, Claire Vogel (Los Osos) in fifteenth, and Emily Kaar (Judkins) in sixteenth. In addition, Alex Freeman of Old Mission was the winner of the special oral "countdown" round, in which the top eight place winning "Mathletes" participated.

The Central Coast District chapter MATHCOUNTS competition was sponsored by the Science, Math and Engineering Departments of Cal Poly. MATHCOUNTS recently honored the 28 Chapter and State Coordinators who have served as volunteers for over a quarter of a century. Among these devoted volunteers is Cal Poly Physics Professor Dr. Leonard Wall, the Central Coast Chapter MATHCOUNTS Coordinator.

MATHCOUNTS is a national enrichment, coaching and competition program that promotes middle school mathematics achievement through grassroots involvement in every U.S. state and territory. Currently in its 26th year, MATHCOUNTS is one of the country's largest and most successful education partnerships involving volunteers, educators, industry sponsors and students. MATHCOUNTS offers two unique programs to middle school teachers and students: The Competition Program and the Club Program. For more information, visit <http://mathcounts.org/>

Hearing the squeals of delight, joy, and excitement from children and adults who see Saturn or Jupiter for the first time through a powerful telescope is the most rewarding and heartwarming of all experiences for astronomers. Astronomers man their scopes for the public's enjoyment.

**The next CCAS star party will be on Saturday March 21<sup>st</sup>, with sunset at 7:14 pm.** For other star party dates in the coming months, please see the CCAS Calendar web page. For star party driving directions, details, pointers and etiquette, see the CCAS Star Parties web page. To see what star parties are like, see the CCAS Photo Gallery / Monthly Star Parties. If you decide to attend a star party, first check the CCAS website home page for an event status report on that Saturday.

If you enjoy science, love mysteries and the call of the unknown, or if you have children in 3<sup>rd</sup> grade or older (bringing younger children is discouraged for safety reasons), then please consider visiting a CCAS star party to see what the fascinating world of astronomy is all about. Such an experience is vitally worthwhile for students, to energize and inspire their interest in science and engineering. Our nation critically depends on our children having a foundation based in STEM subjects.

Thank you for joining me on a brief trip into the cosmos and the fascinating world of astronomy and space exploration. **Visit the CCAS website at [www.ccastronomy.org](http://www.ccastronomy.org).** If you have questions, feel free to call me at home 466-0757 evenings and weekends.



Walter Reil is VP of Communications for the Central Coast Astronomical Society and Volunteer NASA JPL Solar System Ambassador. He can be reached at his home: 466-0757 or [ccas@ccastronomy.org](mailto:ccas@ccastronomy.org)

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