

Skywatchers

Newsletter of the China Lake Astronomical Society

Volume 46 No. 9

September 1, 2009

NEXT MEETING 7:30 p.m., Monday, September 14, 2009

Maturango Museum, 100 East Las Flores Avenue, Ridgecrest, California

PROGRAM FOR THE SEPTEMBER 14 MEETING: DARK ENERGY

Clint Spindler will discuss "Dark Energy, The Cosmological Constant and Our Ever Expanding Universe." What is dark energy, how was it discovered, how do we test for its presence and how does it influence the cosmos? This is a leading topic of discussion in cosmology today. Cosmology is the field of astronomy that aims at a comprehensive theory of the structure and evolution of the entire physical universe.

DATES TO KEEP IN MIND

Monday, September 14, 2009: Regular CLAS Meeting at the Maturango Museum, 7:30 p.m.

Thursday, September 17, 2009: Museum Observatory public viewing session, 8:00 p.m. (Cancelled)

Thursday, September 17, 2009: Astronomy for Students at Gateway Elementary School

Friday, September 18, 2009: Next public star party, see details below.

Wednesday, September 23, 2009: Deadline for next Skywatchers Newsletter.

Monday, October 5, 2009: Regular CLAS Meeting at the Maturango Museum in Ridgecrest, 7:30 p.m.

STAR PARTY SCHEDULE FOR THE 2009 SEASON

Star Parties will be held on the dates listed below. Star Parties are an activity where members and guests come together to view the skies. If you have a telescope, bring it; if not, come and look through someone else's. They are held at a site in the open desert south of Ridgecrest. To reach the site from Ridgecrest, go south on China Lake Boulevard 6.2 miles from its intersection with Ridgecrest Boulevard. Continue straight across Highway 395 and you will be on Brown Road (Old Highway 395). Follow Brown Road as it curves to the right and goes west. After 2.3 miles, there will be a 30-inch orange cone on the left. Turn left and follow the dirt road marked by 12-inch cones. The CLAS star party is 0.5 miles along this road. Signs and cones will be put out about a half hour before viewing starts. Call Carroll Evans 760-375-5681, or Bruce Churchill 760-375-7247, for more information.

Friday, September 18: Signs out at 7:30 p.m., Star viewing 8:00 p.m.

Friday, October 16: Signs out at 7:00 p.m., Star viewing at 7:30 p.m.

Friday, November 13: Signs out at 5:30 p.m., Star viewing at 6:00 p.m.

PERSEID METEOR SHOWER OBSERVATIONS FROM THE OWENS VALLEY – Earl Wilson

Times given are PDT. Perseids began appearing on the night of Aug 5th and through the morning of the 11th sporadic fireballs were observed mostly in the hours after midnight and averaging about 13 events per night. As predicted the night of 11-12th was the best night, with 57 events starting at 9:30 p.m. averaging 6-8 fireballs per hr. but with a peak of 20 between 4-5 a.m. Not predicted were events that occurred on the night of 12-13th from 10 P.M. to 2 a.m., when there were 30 events recorded, with the count tapering off until dawn. The total for this night was 44. On the night of 13-14th there was still quite a bit of additional activity.

THE SKY IN SEPTEMBER by Roger Brower

1. Venus remains in the morning sky but moves into Cancer this month. It rises in the east-northeast about 3 hours before the sun.
2. Saturn moves to the morning sky this month. Look for it low in the east shortly before sunrise at the end of the month. The rings are closing (getting more edge-on) so they will become less brilliant throughout the summer.
3. Mercury returns to the morning sky this month. Look for it in the east before sunrise.
4. Jupiter remains a fine evening object. Look for it low in the southeast soon after sunset.
5. Mars rises about midnight. Look for it rising ever higher in the east after that.

FUTURE OUTREACH PROGRAMS

The China Lake Astronomical Society will be doing outreach work with two local educational organizations. Please assist with them if possible. First, on Thursday evening, September 17, we will again take part in the "Star Gazing Extravaganza" for Fifth Grade students at Gateway Elementary School. The students and their parents will be divided into three groups. By turns, each group will view the sky through telescopes, visit the computer lab for astronomy online, or watch a slide show about the fundamentals of our solar system and beyond. It will be a big help if you can bring a telescope. Roger Brower is coordinating this event; contact him at 760-375-1181

Then, on Friday evening October 9, Cerro Coso Community College is hosting its annual astronomical star party and barbeque. Details are not yet available, but please set aside time for this event. Our help will be primarily at the college observatory, assisting the public at the telescopes.

A TREATISE ON COSMOLOGY, AS EXCERPTED FROM THE ONLINE FREE DICTIONARY

Present models of the universe hold two fundamental premises: the cosmological principle and the dominant role of gravitation. Derived by Hubble, the cosmological principle holds that if a large enough sample of galaxies is considered, the universe looks the same from all positions and in all directions in space. The second point of agreement is that gravitation (or an antigravitation force, called dark energy) is the most important force in shaping the universe. According to Einstein's general theory of relativity, which is a geometric interpretation of gravitation, matter produces gravitational effects by actually distorting the space about it; the curvature of space is described by a form of non-Euclidean geometry. The widely accepted big bang model satisfies both the cosmological principle and general relativity.

According to big-bang models, at the beginning of time, all of the matter and energy in the universe was concentrated in a very dense state, from which it "exploded," with the resulting expansion continuing until the present. This event is dated about 13.7 billion years ago. In this initial state, the universe was very hot and contained a thermal soup of quarks, electrons, photons, and other elementary particles. The temperature rapidly decreased, falling from 10^{13} degrees Kelvin after the first microsecond to about one billion degrees after three minutes. As the universe cooled, the quarks condensed into protons and neutrons, the building blocks of atomic nuclei. Some of these were converted into helium nuclei by fusion; the relative abundance of hydrogen and helium is used as a test of the theory. After many millions of years the expanding universe, at first a very hot gas, thinned and cooled enough to condense into individual galaxies and then stars. Several spectacular discoveries since 1950 have shed new light on the problem. Optical and radio astronomy complemented each other in the discovery of the quasars and the radio galaxies. It is believed that the energy reaching us now from some of these objects was emitted not long after the beginning of the universe. Further evidence for the big-

bang theory was the discovery in 1965 that a cosmic background noise is received from every part of the sky. This background radiation has the same intensity and distribution of frequencies in all directions and is not associated with any individual celestial object. It has a black body temperature of 2.7 deg K; (−270 deg C) and is interpreted as the electromagnetic remnant of the primordial fireball, stretched to long wavelengths by the cosmic expansion. More recently, the analysis of radiation from distant celestial objects detected by artificial satellites has given additional support to the big-bang theory.

The earliest conceptions assumed that the earth was the center of the universe. With the acceptance of the heliocentric theory (or Copernican system), the nature and extent of the solar system began to be understood. The Milky Way, a vast collection of stars separated by enormous distances, came to be called a galaxy and was thought to constitute the entire universe with the sun at or near its center. By studying the distribution of globular star clusters, the American astronomer Harlow Shapley was able to give the first reliable indication of the size of the galaxy and the position of the sun within it. Modern estimates show it to have a diameter of about 100,000 light-years with the sun toward the edge of the disk, about 28,000 light-years from the center.

During the first two decades of the 20th century, astronomers came to realize that some of the faint hazy patches in the sky, called nebulae, are not within our own galaxy, but are separate galaxies at great distances from the Milky Way. Willem de Sitter of Leyden suggested that the universe began as a single point and expands without end. After studying the red shift in the spectral lines of the distant galaxies, the American astronomers Edwin Hubble and M. L. Humason concluded that the universe is expanding, with the galaxies appearing to fly away from each other at great speeds. According to Hubble's law, the expansion of the universe is approximately uniform. The greater the distance between any two galaxies, the greater their relative speed of separation.

At the end of the 20th century, the study of very distant supernovas led to the belief that the cosmic expansion was accelerating. To explain this cosmologists postulated a repulsive force, dark energy that counteracts gravity and pushes galaxies apart. It also appears that the universe has been expanding at different rates over its cosmic history. This led to a variation of the big-bang theory in which, under the influence of gravity, the expansion slowed initially and then, under the influence of dark energy, suddenly accelerated. It is estimated that this "cosmic jerk" occurred about five billion years ago. This theory postulates a flat, expanding universe with a composition of about 74% dark energy, 22% dark matter, and 4% luminous bodies.

A number of questions must be answered, however, before cosmologists can establish a single, comprehensive theory. The expansion rate and age of the universe must be established. The nature and density of the missing mass, the dark matter and dark energy that is far more abundant than ordinary, visible matter must be identified. The total mass of the universe must be determined to establish whether it is sufficient to support an equilibrium condition—a state in which the universe will neither collapse under its own gravity nor expand into diminishing infinity. Such an equilibrium is called "omega equals one," where omega is the ratio between the actual density of the universe and the critical density required to support equilibrium. If omega is greater than one, the universe would have too much mass and its gravity would cause a cosmic collapse. If omega were less than one, the low-density universe would expand forever. Today the most generally accepted picture of the universe is an omega-equals-one system of hundreds of billions of galaxies, many of them clustered in groups of hundreds or thousands, spread over a volume with a diameter of at least 10 billion light-years and all receding from each other, with the speeds of the most widely separated galaxies approaching the speed of light. On a more detailed level, there is great diversity of opinion, and cosmology remains a highly speculative and controversial science.

A URL TO GIVE YOU THE SCALE OF THINGS IN THE UNIVERSE

<http://www.atlasoftheuniverse.com/index.html>

MEMBERSHIP INFORMATION

Basic CLAS dues are \$20.00 per year, which includes the Skywatchers Newsletter. As a benefit of membership, you may also receive Astronomy Magazine and/or Sky and Telescope Magazine. The fee schedule is as follows:

Basic membership	\$20.00 per year
Membership with Astronomy magazine	\$54.00 per year
Membership with Sky and Telescope magazine	\$53.00 per year
Membership with both S & T and Astronomy	\$87.00 per year

Send your check to: Roger Brower, Treasurer, China Lake Astronomical Society, P.O. Box 1783, Ridgecrest, CA 93556.

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WESTERN AMATEUR ASTRONOMERS WEB SITE <http://www.waa.av.org/>

Meetings of the China Lake Astronomical Society are held at the Maturango Museum at 7:30 p.m. on the first Monday evening of each month, except when the first Monday is a holiday.

**SKYWATCHERS, Newsletter of the
CHINA LAKE ASTRONOMICAL SOCIETY
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FIRST CLASS

NEXT MEETING: 7:30 p.m., MONDAY SEPTEMBER 14, 2009: “DARK ENERGY” AT THE MATURANGO MUSEUM, 100 EAST LAS FLORES AVE., RIDGECREST, CALIFORNIA

CLAS WEB PAGE <http://www.chinalakeastrosoc.org>

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