The Objective View

March 2000

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Meetings first Thursday of each month

Next Meeting: March 2 7:30 pm Discovery Center, Fort Collins
" Mount Evans Observatory " by Dr. Bob Stencel, University of Denver
** Club Business will precede the program, 7-7:30 pm **

March 2 NCAS Meeting Directions
Discovery Center, 703 E Prospect Rd, Fort Collins
From Loveland go North on US 287 to Prospect Rd in Fort Collins, go East about 0.5 miles. Look for the Discovery Center sign on the South side of the street.
From I-25, take Exit 268, head West into Fort Collins. Continue past Lemay Ave about 0.5 miles and see the Discovery Center on the left.

NCAS Star Parties, March 3, 4, 24, 25 Pawnee Grasslands Site The site is on undeveloped prairie about 8 miles west of Briggsdale. Take Colorado Highway 14 East from I-25. At 17 miles East of Ault, at milepost 170, take Road 65 (dirt) North one mile. At the curve West, stop. Go through the gate on the right (no road), close gate and set up. Beware of the cactus! Call Tom Teters with questions about the star party status, site or dates, 482-5702, 482-0807, or Email tom@ezlink.com. Site maps: http://ezlink.com/~tjteters/starparty.html

Future NCAS Meetings

April 6	Ray Martin, University of Wyoming
May 4	

Discovery Center Starwatching, First Quarter Moon
Bring a scope for free public starwatching behind Discovery Center. Dates to come:

March 17	7 pm
April 14	8 pm
May 12	8:30 pm

Other Area Events

Longmont Astronomical Society	March 16
at Longmont Christian School, 550 N Coffman St	
Chamberlain Observatory, Denver	March 1
Little Thompson Observatory	March 17
Rocky Mtn Star Stare, CSAS	June 29-July 2
Weekend Under the Stars, Foxpark WY	July 27-30

February 3 Program: String Theory: Think Small, by Andy Goris
Millions of Americans sit down to enjoy their home particle accelerators every day. Television and computer monitor picture tubes consist of an electron source, a positively charged screen, and an electromagnetic coil which directs an electron beam in a sweeping motion across the face of the tube, painting 2 interwoven pictures every 1/30 second for TV. Research accelerators for charged particles operate on similar principles, but on a much larger scale; they can occupy many acres. Magnetic fields confine the streams of particles, and electric fields are coordinated to accelerate particles. The particle stream is accelerated then diverted to a target, and a liquid hydrogen bubble chamber displays the traces made by shattered atoms. The properties of subatomic particles can be deduced by their paths in the bubble chamber. What is matter really made of? Ancient Greeks believed there were four elements: earth, air, fire, and water. By the 1900's physicists had identified nearly 100 atoms. The composition of atoms occupied researchers in the early 20th century, and most people today picture the Bohr model, an atomic nucleus surrounded by circling electrons. It is more descriptive to think of electrons in a probability field, pictured as a cloud around the nucleus. Several specific energy fields are permitted. Electrons are considered to exist as a point, less than 10e-18 meters. Protons and neutrons are about 10e-15 meters across. The nucleus of the atom contains protons and neutrons. Protons are composed of 2 up quarks and 1 down quark. An up quark has a charge of +2/3, and a down quark has a charge of - 1/3, this gives a proton a charge of +1. A neutron consists of 1 up quark and 2 down quarks, so - 1/3 - 1/3 + 2/3 equals zero charge for neutrons. The quarks are held by the strong force, and cannot be separated. Energy applied to separate quarks creates more quarks between those which are separating, nullifying the effort. The strong force also leaks out and binds the nucleus together. The strong force is one of four forces in the standard model. The model includes the weak force, electromagnetic force, and gravity. Gravity is mediated by a proposed particle, the graviton. It has infinite range but has only 10e-38 the strength of the strong force. Electromagnetic force is carried by photons,

has unlimited range, and its relative strength is 10e-2. Photons are not affected by charge. The weak force is tranmitted by the W+, W-, and Z zero particles. It is carried by particles with mass or spin. Its range is 10e-18 meters, and relative strength is 10e-13. It is necessary to propose 6 particles to explain forces we observe. Most of the mass in the Universe in in four particles. The electron and neutrino are leptons, the up and down quarks (forming protons and neutrons). Quark family 1 comprises the up and down quarks, and family 2 contains charm and strange quarks, family 3 contains top and bottom quarks. Each of the listed particles has an antimatter version. Particle properties are mass, electrical charge, spin, and strong charge. Quarks can also have color charge, and it is transmitted by gluons. Integration of the various forces has progressed from the 1800's. James Clerk Maxwell developed electromagnetic field theory. Addition of the weak nuclear force yielded the electroweak theory. Addtion of the strong force produced the grand unified theory, still considered a work in progress. Theoreticians are chasing the unified field theory, which would incorporate gravity as well. But beyond this is a model of all forces and all particles. This is estimated to be a 26 dimensional problem. A simplified approach is String Theory, which reduces the problem to 10 dimensions. A string is a 1 dimensional entity in 10 dimensional space. It can be pictured as a ring which has multiple oscillation modes. The type of oscillation, its frequency, amplitude, and mode, defines the type of particle it is. Electrons and neutrinos would be fundamentally distinguished only by their oscillation modes. The oscillation must be quantized, conforming to quantum mechanics. Strings can be wrapped to give additional dimensions. Bosons carry force, and a Higgs boson is a hypothetical particle which would explain where mass comes from. Mass would come from movement through the Higgs field. String theory predicts that not all wavelengths of light have the same speed. Particles and antiparticles are constantly forming, and they have a tiny chance of being struck by photons. The delay of red photons differs from blue, and over the scale of the visible universe, about 15 billion light-years, the delay would constitute a few microseconds. A satellite due for launch in 2004 will address this question. For further reading, Andy recommends "The Elegant Universe" by Brian Greene, and a web site: www.particleadventure.com/

NCAS Business, February 3

President Dave Chamness announced that the Mountain Area Research Section (MARS) of the Astronomical League is soliciting research proposals for a project to be carried out in our area. Star party dates were announced. Vice President Gerry Reynolds invites volunteers for NCAS programs for this year. Dave Chamness made available the Astronomical League list of Binocular Messier objects, and gave a reminder of the Sky and Telescope March 2000 Messier Marathon guide. Dave has the club scope. Dan Laszlo recruited volunteers for elementary school Super Science Nights, Discovery Center starwatching, and Ken VanLew invited members to assist with observing nights for Front Range Community College students. Visitor Ted Cline brought a 1985 Sky & Telescope article on a stereo meteor trail image. Several members had lunar eclipse images.

Best Looks

Moon	Near Venus 3/3, Mercury 3/15
	Mars 3/8, Jupiter 3/9, Saturn 3/10
Mercury	In WSW eves, max elongation 2/14
Venus	Low in SE, mornings. By Uranus 3/3
Mars	In W eves, closing on Jupiter
Ceres	Magnitude 7 in Virgo, Realm of Galaxies
3/18 by NGC 4571	3/20 by M91 4/11 by NGC 4237
Jupiter	In W eves, closing on Saturn
Saturn	In W eves

AstroAlerts from Sky & Telescope

To subscribe to rapid E mail notification of events such as supernovae in neighboring galaxies, comets or good chances for viewing an aurora, see www.skypub.com/news/astroalert.html

Resource for Lunar Observers

The Lunar Orbiter Atlas online is useful for closeups of familiar features, and giving your visual sightings some perspective. See:
http://cass.jsc.nasa.gov/research/lunar_orbiter/

A Few Iridium Satellite Flares. IMPORTANT!

The intensity of these flares is very sensitive to your position, so please try to know your coordinates as accurately as possible. A position error of 10km on the ground can change the flare intensity by several visual magnitudes. Accurate time is also critical. Observer's Location: Near Lemay and Trilby in Fort Collins CO (40.50°N, 105.05°W). Local Time: Mountain Standard Time (GMT - 7:00)
Current Mir, ISS and Iridium predictions are available on the Web at:
http://www.heavensabove.com/
Site now gives directions for maximum Iridium flare magnitude.

Date	Time	Magnitude	Elev. Azimuth
01 Mar	18:40:25	-8 52°	13°(NNE
07 Mar	20:10:17	-7 18°	8°(N)
11 Mar	05:27:55	-8 47°	178°(S)
12 Mar	05:23:28	-6 47°	181°(S)

A Few Mir and ISS Passes. Times are estimates as of late September. Times are MST, Fort Collins/Loveland. Az is compass direction, N=0, E=90, S=180, W=270. Elevation above horizon, 10 degrees, about a hand-width at arm's length. Passes were determined with the Heavens Above website. Mir times in particular may change, so confirmation of times is recommended.

TO:

From:
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