The Objective View

August 2005

Newsletter of the Northern Colorado Astronomical Society

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Next Meeting: August 4, 7:30 PM

Population Growth and the Settlement of Space

Brad Jarvis

NCAS Business at 7 PM
Meeting directions Discovery Science Center
703 East Prospect Rd, Fort Collins
http://www.dcsm.org/index.html
In Fort Collins, from the intersection of College Ave and Prospect Rd, head East about 1/2 mile. See the Discovery Center sign to the South. Enter the West Wing at the NE corner. From I-25, take Exit 268, West to Lemay Ave, continue West 1/2 mile, see Discovery Center on the left.

NCAS Programs

Sep 1	NCAS Picnic	Observatory Village, Fort Collins
Oct 6	John Spencer	Cassini Report

Dates for Rocky Mountain National Park 2005
Aug 12, 26
Contact Dan Laszlo if you wish to volunteer at the Upper Beaver Meadows site this summer. Djlaszlo at aol.com

Other Events

Little Thompson Observatory Star Night, Berthoud
August 19 7 pm Star Night
http://www.starkids.org

Cheyenne Astronomical Society
Aug 4-7 Weekend Under The Stars, Foxpark WY
Aug 19 9 pm Cheyenne Botanical Garden
http://home.bresnan.net/~curranm/

Open House, Chamberlain Observatory, dusk to 10 pm
Aug 13, Sep 10, Oct 8, Nov 5, Dec 10 303 871 5172
http://www.du.edu/~rstencel/Chamberlin/

Longmont Astronomical Society
Aug 18 7 pm FRCC, 2121 Miller Rd
http://longmontastro.org/

About Our August 4 Speaker
Brad Jarvis is a physicist, engineer, and writer. He is a former president and vice president of NCAS, and former president of the Rocky Mountain Mars Society.

Brad will discuss various options for the settlement of space and their impact on the growth rate of the human population. The speed of light and availability of resources will ultimately limit population growth to a small fraction of a percent in the settlement of the Galaxy.

July 7 Program
Binary Stars as Keys to Stellar Characteristics
Dr. Dirk Terrell
Binary stars are the source for much basic information on stars. We can measure stellar masses and radii. We can learn the distance to clusters and external galaxies. Binaries are very common; most stars belong to a binary system. They may be important in the search for extrasolar planets. Binaries are traditionally observed directly, and more recently interferometry was applied. Spectroscopic binaries can show single or double lines. If the pair has less than a 20 fold difference in luminosity, double lines are seen. If single lines shift with time, presence of an unseen companion can be inferred. If a neutron star orbits a normal star, its X-ray pulses arrive alternately early or late due to Doppler shift. Only a few of these are known. Eclipsing binaries have their orbital plane oriented so the stars alternately pass in front of each other. A wide variety of curves is seen. BR Cygni has a well known curve with evenly spaced major and minor eclipses. If the orbit is eccentric, like Beta Lyrae, a minor and major eclipse are close, then a longer interval ensues. A discussion list can be found via: **http://binaries.boulder.swri.edu** and more info at the AAVSO variable star of the season at: **www.aavso.org/vstar/vsots** Observers can do science with less than $10K equipment. Dirk runs a 10 inch SCT with a CCD camera, filter wheel, and uses an Optec SSP-4 IR photometer. He ofter collaborates with Jon Gross, Walt Looney and Arne Hendron with robotic observing with a C 14 in Sonoita, Arizona. It has an SBIG 1024 square chip, and VBRI filters. Aside from monsoon season, they can operate nearly 98% of nights. One project is followup of the Robotic Optical Transit Search Experiment. Dirk is interested in a color survey of W U Majoris systems. These are Sun-like stars in contact binary systems. Photometry and spectroscopy are performed simultaneously. The Roche model of contact binaries assumes that stars are point masses, that they have a circular orbit, they orbit synchronously, there are no radiation pressure effects, and that the stars' gas is in hydrostatic equilibrium. The model was extended for eccentric orbits and non-synchronous rotation. There is an inner LaGrange point between the stars. When a member swells to near giant radius, gas at the LaGrange point is squirted out like from a nozzle, and feeds the smaller companion. It is possible to achieve 2 stellar cores orbiting within a gas envelope. An overcontact binary has gas overfilling the Roche surfaces. There is mass exchange. This leads to period and light-curve variability. A

classical nova is a red giant feeding a white dwarf, with episodic detonation and brightening. Matter transfer can spin up rotation of the binary. Dirk then discussed the binary parameters which can be determined by visual and spectroscopic methods. The light curve gives no information on the absolute dimensions of the stars. The width of eclipse gives a clue to the relationship of the star's size to the orbit. Magnetic fields are not a factor in non-degenerate stars, but have a role in cataclysmic variables. The Wilson-Divinney computer model was initially published in the Astrophysical Journal 165:229 (1971). It uses a modified Roche model to compute figures of stars. It can model standard and eccentric orbits. In Fortran, it can be found at:
ftp://astro.ufl.edu/pub/wilson/lcdc.2003
He then told the story of HD23642 in the Pleiades. Hipparcos placed it at 118 pc, markedly at variance with ground-based measures. Newer backyard data put it at 132 pc, and added to the consensus that the Hipparcos methods were flawed. DK Canum Venaticorum is worth following for changes year to year. Russell Genet is monitoring W U Maj nightly to detect light curve changes year to year. V 523 Cas also has a changing light curve. Bob Nelson evaluated TU Musci, two O stars, measuring their mass to high precision. OW Gem is topic of a 2003 Astrophysical Journal article. It is now a pair of supergiants with very different masses, a ratio of 0.6. The more massive should have progressed by now. The best resolution appears to be development from a triple system. Measurement of lithium in the larger component would help confirm this scenario.

NCAS Business, July 7 2005
President Greg Halac called the meeting to order. He announced the CSAS Star Stare in July and Weekend Under The Stars at Foxpark Wyoming August 4 to 7. He announced the RMNP Starwatching for the summer. The treasurer's report showed that current income closely matches expenditures to support newsletter mailings, AL dues and IDA support. Members are encouraged to keep their $15 annual dues current. Dues may be requested in January of each year to simplify the process. Dave Chamness asked for volunteers for the Crow Valley Campground Star Party, in October 2005. James Holland will start a Mars Society Chapter in Fort Collins, he may be contacted at **jamesho81@aol.com** . The Mars Society convention in Boulder is in August 2005, see www.marssociety.org. MIT is offering free astronomy classes online, see: **http://www.ocw.mit.edu/ocwweb .** Nate Perkins will schedule a fall picnic for NCAS in September.

Lowell Observatory Star Party
New dates - Thursday, September 29, 2005 through Sunday, October 2, 2005
* Mars viewing with Percival Lowell's 24-inch Clark refractor.
* A new dark observing site at 7,500 feet with unobstructed horizons
* Tours of the research telescopes
* Presentations from our astronomers
Details are available at
http://kraken.lowell.edu/lsp3/index.html
Questions can be directed to russell.tweed@lowell.edu or at the phone number below. Thanks for your help.
Russell Tweed, Lowell Observatory 928-774-3358
www.lowell.edu

J.G Baker Passes Away
http://www.nytimes.com/2005/07/13/national/13baker.html
The New York Times July 13, 2005
J. G. Baker, Designer of High-Altitude Camera Lenses, Dies at 90, by JEREMY PEARCE

. . . In the late 1950's, with the launchings of the first satellites, Dr. Baker, in collaboration with Joseph Nunn, developed the Baker-Nunn satellite tracking camera, which allowed observers to follow the course and trajectory of the Soviet satellite Sputnik in 1957. The camera uses an expansive field of view to photograph large swaths of sky and record the progress of satellites and other objects. Robert S. Hilbert, an optical designer and president of Optical Research Associates, a design firm in Pasadena, Calif., said that the Baker-Nunn camera provided "an unprecedented combination of speed, wide field of view and image quality" and that, 45 years later, "for the same purpose, no better camera or design exists than the Baker-Nunn today."

From Andrea Schweitzer
Dolores Beasley July 8, 2005
Headquarters, Washington
DC Agle
Jet Propulsion Laboratory, Pasadena, Calif
Lee Tune
University of Maryland, College Park, Md.

RELEASE: 05-177: NASA'S DEEP IMPACT TELLS A TALE OF THE COMET
Data from Deep Impact's instruments indicate an immense cloud of fine powdery material was released when the probe slammed into the nucleus of comet Tempel 1 at 6.3 miles per second. The cloud indicated the comet is covered in the powdery stuff. The Deep Impact science team continues to wade through gigabytes of data collected during the July 4 encounter with the 3-mile-wide by 7-mile-long comet. "The major surprise was the opacity of the plume the impactor created and the light it gave off," said Deep Impact Principal Investigator Dr. Michael A'Hearn of the University of Maryland, College Park. "That suggests the dust excavated from the comet's surface was extremely fine, more like talcum powder than beach sand. And the surface is definitely not what most people think of when they think of comets -- an ice cube."

How can a comet hurtling through our solar system be made of a substance with less strength than snow or even talcum powder? "You have to think of it in the context of its environment," said Pete Schultz, Deep Impact scientist from Brown University, Providence, R.I. "This city-sized object is floating around in a vacuum. The only time it gets bothered is

when the sun cooks it a little or someone slams an 820-pound wakeup call at it at 23,000 miles per hour."

The data review process is not overlooking a single frame of approximately 4,500 images from the spacecraft's three imaging cameras taken during the encounter. "We are looking at everything from the last moments of the impactor to the final look-back images taken hours later, and everything in between," added A'Hearn. "Watching the last moments of the impactor's life is remarkable. We can pick up such fine surface detail that objects that are only four meters in diameter can be made out. That is nearly a factor of 10 better than any previous comet mission."

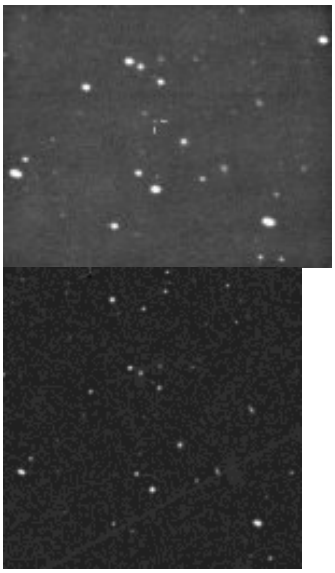
The final moments of the impactor's life are important, because they set the stage for all subsequent scientific findings. Knowing the location and angle the impactor slammed into the comet's surface is the best place to start. Engineers have established the impactor took two not unexpected coma particle hits prior to impact. The impacts slewed the spacecraft's camera for a few moments before the attitude control system could get it back on track. The penetrator hit at an approximately 25 degree oblique angle relative to the comet's surface. That's when the fireworks began.

The fireball of vaporized impactor and comet material shot skyward. It expanded rapidly above the impact site at approximately 3.1 miles per second, and the crater was just beginning to form. Scientists are still analyzing the data to determine the exact size of the crater. Scientists say the crater was at the large end of original expectations, which was from 50 to 250 meters.

For information about Deep Impact on the Internet, visit:
http://www.nasa.gov/deepimpact

"Large" Kuiper Belt Objects Announced
From Lee Gregory:
By the way, the coordinates given in the S&T article are not as accurate as those given in the Astronomy magazine article:
http://www.astronomy.com/asy/default.aspx?c=a&id=3401
which includes a link to:
http://cfa-www.harvard.edu/mpec/K05/K05O41.html

If you download an 8' x 8' DSS image centered at
2005 07 29 01 39.38 -05 19.3
this star field matches the CCD photo in the S&T article, without the planet, of course.



Left is the photo from the S&T article; right is the DSS1 image:

Orbit of 2003 UB313

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Eccentricity (e):        0.4416129
Semi-major axis (a):    67.7091 AU
Perihelion (q):          37.808 AU
Aphelion (Q):            97.610 AU
Orbital period (P):      557 years
Inclination (i):         44.177°
Ascending node (Ω):      35.8750°
Argument of perihelion (ω):151.3115°
Mean anomaly (M): 197.5379°
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Best Looks

Moon	By Venus 8/8; Near Jupiter 8/9; by Mars 8/24; Near Saturn 8/31
Mercury	Low in E last half of month
Venus	W at dusk; by Jupiter 8/31
Mars	High in SE predawn
Jupiter	In SW evenings
Saturn	Low in E predawn end of month

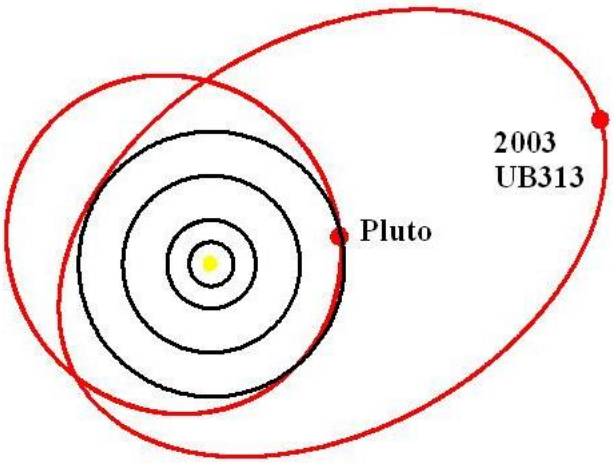
Perseid Maximum August 12-13
We can expect over 60 shower members per hour on the mornings of Aug 12 and 13. Expect in the week preceding this year's peak. The Moon sets by 2330 on Aug 12 so will not interfere with predawn meteor watching.

Ninth Mag Asteroid Occults 7.5 mag Star By M33 Aug 13
Asteroid 89 Julia is forecast to occult the 7.5 magnitude star SAO 74880 (Hip 7948) at 9h UT on the morning of Aug 13. A magnitude drop is expected for 11 seconds. Sources for updates on the narrow shadow path in Colorado:
www.lunar-occultations.com/iota and Steve Preston's site:
www.asteroidoccultation.com

From: Dan Laszlo
2001 S Shields St Building H

Fort Collins CO 80526

TO:



Extracted from:
http://www.gps.caltech.edu/~mbrown/planetlila/index.html

What else is out there?

The last week of July 2005 was an exciting one for the outer solar system. In the course of two days the existence of three new objects was announced, and each object was brighter than all of the previously known objects in the Kuiper belt (with the exception of Pluto). The first object, 2003 EL61, was announced by a team from Spain. The second two, this planet and another new object named 2005 FY9, were announced from our survey the next day. With so many bright objects coming out at once it is hard to keep them all straight. Here is the quick score card:

Object	**2003 UB313**	**2003 EL61**	**2005 FY9**
Found by	Brown, Trujillo, Rabinowitz	Ortiz et al.	B, T, R
Size	bigger than Pluto!	~1/2 Pluto	~1/2 Pluto
Brightness	4th brightest KBO Mag 18.8 (Pluto is the brightest Kuiper Belt Object)	3rd	2nd
Current distance	97 AU	52 AU	52 AU
Orbital period	560 years	285 years	307 years
Closest app to Sun	38 AU	35 AU	39 AU
Furthest from Sun	97 AU	52 AU	52 AU
Orbit inclination	44 degrees	28 degrees	29 degrees
Satellite?	Unknown	yes!	no
Surface composition	Pluto-like	water ice	Pluto-like
When visible 2005	late summer, fall, early winter later winter, spring, early summer		

Here is where these extremely bright Kuiper belt objects are in the solar system these days:

Why the hasty announcement? What about the hacking? What is going on here?

As has been widely reported in the press, the announcement of the new planet was made in a rather hasty manner because of fears that our discovery was going to be made public by someone who had hacked a web site and gained access to information about where the object is. The details are a little more complicated than this, the terminology can be debated ("hacked?" "sleuthed?" "stole?" "stumbled across?") and not all are 100% clear to me, but here is a reconstruction of the events that lead to the announcement as best I can discern them. Some aspects remain mysterious.

In mid-July short abstracts of scientific talks to be given at a meeting in September became available on the web (for example, here). We intended to talk about the object now known as 2003 EL61, which we had discovered around Christmas of 2004, and the abstracts were designed to whet the appetite of the scientists who were attending the meeting. In these abstracts we call the object a name that our software automatically assigned is, K40506A (the first Kuiper belt object we discovered in data from 2004/05/06, May 6th). Using this name was a very very bad idea on our part! Unbeknownst to us, some of the telescopes that we had been using to study this object keep open logs of who has been observing, where they have been observing, and what they have been observing. A two-second Google search of "K40506A" immediately reveals these observing logs. Ouch. Bad news for us. From the moment the abstracts became public anyone on the planet with a web connection and a little curiosity about this "K40506A" object could have found out where it was. Anyone on the planet with even a modest-sized telescope could then go find the object and claim a discovery as their own.

Interestingly, this is not what we then happened. The Spanish group headed by J.-L. Ortiz legitimately discovered the object on their own in data from 2 and 3 years ago. The fact that this discovery happened days after the data were potentially available on the web is, I believe, a coincidence. At the time, however, some in the community privately expressed their concerns to me that this coincidence was too good to be true and wanted to know if there was any possible way that anyone could have found out the location of our object. I insisted it was impossible. I was wrong. I myself went to Google late on the night after the Spanish announcement, typed K40506A into Google, and let out a gasp. Even though I don't believe the Spanish group did this, I realized anyone *could* have found our object with very little effort. To be very clear, from the first day I have very publicly stated that the official discovery credit goes to Ortiz et al. and no one else.

By Friday morning it occurred to me that once someone knew about the web site where the information on where the telescopes we had been using had been pointing it would take only a little more effort to carefully peruse this web site to see if we had been looking at anything else moving in the sky. At this point I contacted Brian Marsden at the International Astronomical Union's Minor Planet Center (MPC) by email, told him confidentially about the two objects that we had not yet announced (now known as 2003 UB313 and 2005

FY9), expressed my concerns that someone may be able to nefariously find our data and attempt to claim credit for discovering these objects, and sought his advice. His chilling response came less than an hour later: someone had already used a web service of the MPC to use past observations of an object to predict locations for tonight. The past observations were precisely the logs from the telescope we had used! The culprit and not even bothered to change the names that we used (K31021C for 2003 UB313 and K50331A for 2005 FY9). At this point we had no choice but to hastily pull together a press conference which was held at 4pm on the last Friday in July, perhaps the single best time to announce news that you want no one to hear.

All of this came about because of the perfect confluence of three factors: we used our actual code name in publicly available abstracts (dumb on our part), we assumed that no one would piece together information from the internet and figure things out (naive on our part), someone with astronomical knowledge was willing to go to some effort to obtain our data (unethical on their part). It's true that the information was available without breaking into any sites. It's also true that sometimes I don't lock the door to my house. I hope that people don't think it's therefore OK to come in and take my stuff.

We have been greatly saddened by this experience but have learned many lessons. It seems likely, however, that determined people with no ethics will continue to find ways to cause problems in all fields.
M. Brown