The Objective View

Newsletter of the Northern Colorado Astronomical Society
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Meetings first Thursday of each Month
Next Meeting: May 1, 1997 7:30 pm Discovery Center, Fort Collins

“Sundials,” by John Lamprey

** Club Business will precede the program, 7-7:30 pm **

May 1 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.

Note club business is to be discussed from 7 to 7:30 before the program. A vote on the bylaws changes (announced last month) is planned for this month’s meeting.

Next NCAS Starparty
May 3 and/or 10: Pawnee Grasslands
Take Colorado Hwy 14 East from I-25. At 17 miles East of Ault, just after 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 on the prairie. There are no facilities, and beware of the cactus!
Call Gerry Reynolds with questions about the star party status, site or dates, 226-0705, or Email gerry@fc.hp.com.

NCAS Events, from Randy Moench, Vice President
June 5 Tom Teters

Recent Events
April 3 Meeting: The Universe’ Missing Mass, by Ken VanLew
There is much more to the Universe than meets the eye. Ken noted that an enormous fraction, about 90-95%, of the mass in the Universe is invisible to us. The invisible mass makes its presence known by its impact on the motions of stars and galaxies. In 1933, Fritz Zwicky noted that the galaxies in the Coma Berenices cluster are moving too fast to be accounted for by the visible matter. Stars in the outer reaches of typical galaxies also are moving faster than expected. A spiral galaxy’s central bulge rotates as if it were a solid disk, suggesting there is additional invisible mass surrounding it. Ken noted that the missing mass problem is not manifested in the solar system. The Sun accounts for over 99.9% of the solar system’s mass, and it clearly dominates the motions of the planets. He then reviewed the candidates proposed to account for the invisible mass. First were the MACHOS, the Massive Compact Halo Objects. These are proposed to be up to a billion solar masses, and could be relatively few in number. No signs of them have been detected. WIMPS, the Weakly Interactive Massive Particles, are at the other end of the scale, exotic subatomic particles. Billed as “massive,” they nonetheless are less massive than protons. In this category are neutrinos, axions, zinos, winos, photinos, and squarks. They would need to be present in enormous numbers, and so far, there is insufficient evidence to suggest they are the answer. In between, several categories of objects are possible contributors. Among massive objects, normal black holes range from 3 to 8 solar masses. Smaller black holes are not thought to form from stars, but could be remnants from formation of the Universe. Larger stars self-destruct as supernovae and do not directly form black holes. However, it is possible for mass accretion to add to black holes, and many galaxy centers are thought to hold supermassive black holes, up to a thousand solar masses. Quasar emissions may be powered by black holes. Light cannot escape black holes, but an accretion disk around the black hole can be a source for light and X-rays. The central mass manifests infinite density and zero volume. Ken pointed out that black holes do not possess a sinister ability to vacuum up distant matter. If the sun were to suddenly become a black hole of one solar mass, the planets could continue to follow their current orbits. The Sun would have to collapse to a radius of 3 km to form a black hole. The Earth would have to collapse below a mass of 1 cm. The critical dimension, the Schwarzschild radius, is \( R = \frac{2GM}{c^2} \). Collapse of a star of 1.4 to 3 solar masses yields a neutron star. They are about 20 miles in diameter, and have a density of 100 million tons per cubic cm. The star collapses, its spin rate increases, to achieve 1 to 1000 rpm. If the magnetic pole swings earthward, the neutron star is detectable as a pulsar. A star smaller than 1.4 solar masses collapses to a white dwarf. They are about Earth-sized, and have a density of about 1 ton per cubic centimeter. They have an inert carbon and oxygen core in a crystal lattice. Stellar gas shed by the white dwarf can appear to form rings, helices, and more complex shapes as planetary nebulae. Planets are not very good candidates for the missing mass.
In our solar system, they comprise only 0.1% of the mass, and 60% of this belongs to Jupiter. As of March 1997, only 18 extrasolar planets are suspected, and the largest is estimated at only 9 times Jupiter's mass. Comets and asteroids may number in the hundreds of billions, but their mass contribution to the solar system is tiny. Finally, Ken noted that the amount of mass in the Universe governs our long term future. The Universe is expanding, but the expansion could be reversed if there is sufficient mass. Clearly, better instruments are needed to resolve this conundrum. This will be addressed by the Hobby-Eberly telescope in Texas, and the recently launched Japanese satellite for the Very Long Baseline Space Observatory Program. Expect to see more detectors for WIMPs, and work in subatomic particle physics. The hunt goes on for gravitational lensing by MACHOS. We can forsee a continuing saga on the hunt for the missing mass.

Club Public Star Parties, March 23

Fort Collins High School drew about 200 guests on a night of mostly cloudy skies. Volunteers included Doug and Randy Moencher, Tom Fay, Dave Chamness, Tom Teters, Mike McCarthy, Brad Jarvis, Angie Austin, Ken VanLew, Andy Goris, Erin Handgen, Jim Haneburg, Emily Thurston, Jerry and Mary Dunn, Bill Greenlee, Phil McCollum, Gene Schmidt, Dorothy Pillmore, and Dan Laszlo. There were views of Comet Hale-Bopp for much of the evening, and Mars and the partially eclipsed Moon peeked through gaps in the clouds from time to time. Unfortunately, mideclipse was pretty socked in.

Lee Youngblood submitted his notes on the Loveland Seven Lakes site:

NCAS members & others: Jamey MacArthur (20" Telekit); JD Murphy (20" Truss-tube dob); Bob Cline (13" reflector + binocs w/parallelogram mount); Bob Carlson (8" reflector plus small 2-3" refractor); Bob Gunnerson (4-6" refractor); Marty Tippmann (90mm Meade refractor); Mike Prochoda (3" RFT refractor plus binocs); Lee Youngblood (11x80 binocs on my new tripod /parallelogram!); Thom Peck (binocs); John Lamprey (binocs); Art Berglin. Bill Snow (Reporter-Herald photographer) was there in the early evening taking 'people/event' and comet photos. Weather temperatures were very mild, with no wind. Clouds however were another story! Early on (645 to ~8pm) we had good to declining views of Comet Hale-Bopp. The pre-eclipse moon was in and out of visibility due to broken clouds. Between about 8 and 930PM, both Hale-Bopp and the eclipsing moon were mostly clouded out! We did get some views of Orion's nebula and miscellaneous stars, and a few brief but poor, low altitude views of Hale-Bopp. After about 930PM, a 'sucker hole' cleared enough to allow some good views of the eclipse - thru high thin clouds. We had a good public turnout for this 'double header'! From about 645 to 9PM we had a very steady stream of people coming out to view. I believe we reached 'steady state' in public viewers : I was handing out flyers (1 per family/group) as new observers were arriving, and as many new people were arriving as others were leaving. People who were there early (before 8PM) and/or late (after ~930PM) got some good views of Hale-Bopp and/or the moon in eclipse. People there only during the middle hours (about 8-930PM) got at best a poor view of Hale-Bopp, a good view of Orion Nebula, but no moon/eclipse!

3-24-97: The Loveland Reporter-Herald did a nice front page follow up article in Monday (3-24-97) nights paper. It included a couple photos of Jamey MacArthur setting up and aligning his 20" Telekit. They estimated 60 to 70 people attended the star party. But I handed out over 80 flyers to families or groups of > 1 to 5+ people! Therefore my estimate is more like 150 to 200 people attended this event! All in all it was a fun event. Most people attending were able to at least get a glimpse of comet Hale- Bopp, the Moon/eclipse, Mars and/or the Orion Nebula!

Best Looks

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<tr>
<td>Moon</td>
<td>Daylight occultation of Saturn May 4</td>
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<td>Mercury</td>
<td>Very low in SE, dawn, end of month</td>
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<td>Venus</td>
<td>Low in W late May</td>
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<td>Mars</td>
<td>Bright in S, Eves</td>
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<td>Saturn</td>
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<td>Neptune</td>
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<td>Pluto</td>
<td>Opposition on May 25</td>
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Comet Hale-Bopp’s display draws to a close in May. It will be about a fist-width above the horizon at the end of twilight on May 1, but sets at the end of twilight by the middle of the month. It will cross the horns of Taurus over these dates. Find a dark Western sky for the best comet views through May 15. The slender crescent Moon swings by the comet on May 8 and 9. Enjoy dramatic views of the comet over the mountains whenever it’s clear the first half of the month.

From:
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TO: