The Meridian

Newsletter of the Quad Cities Astronomical Society • November 2014

Upcoming QCAS Meetings

We're back on schedule with Bettendorf Library! All meetings start at 6:30pm.

December 1st, Astronomy (non-business) meeting.

December 15th, monthly business meeting.

Meeting Notes

From November 17th. Meeting called to order by Dale Hendricks at 6:35pm. The meeting was attended by 10 members. Members included: Karl Adlon, Dale Hendricks, John Robbins, Bruce Brooker, Robert Mitchell, Jeff Struve, John Baker, Dana Taylor, Craig Cox and Ken Boquist.

Treasurer's Report: Balance in account is $1909.49, this is before most of the 2015 membership dues were collected.

Elections for 2015: Block slate was moved by Dana Taylor and unanimously passed. Officers for 2015 are: President: Dale Hendricks; Vice President: Bruce Brooker; Treasurer: John Baker; Secretary: John Robbins.

Old & New Business: Bruce Brooker reported on the installation of a flourescent light inside the dome of the 16" scope.

Dale opened discussion about the style, format and content of the non-business meeting (first Mondays of the month). The group raised no objection to keeping things the same way.

This led to a question raised about better adherence to business meeting procdure and process (e.g., treasurer's report, reading of minutes, along with motions, seconds and group approvals). As a non-profit group, the question was asked: *What are the Society's obligations to run the meeting following a codified format, such as Robert's Rules of Order?*

Ken Boquist inquired about pass codes for QCAS facilities. Pass codes have not been changed in over two years and can be found upon logging into the the QCAS web site. Beware that keypads can be tricky to operate. Dana indicated that he'd check their operating condition and lube as needed.

Presentation: After sharing some nice food together and a few buzzes by Dana's quadcopters, Karl Adlon gave a short presentation on Messier 77 (NGS1068), an interesting galaxy some 45 million light years away, near δ Ceti. Karl indicated that M77 will prove to be a tough target when trying to complete the Messier Marathon in March, 2015. The meeting adjourned at 8:40pm.

Here is M77 seen in a Hubble view.

Past Event Reports

By Dale Hendricks

November 19: Karl Adlon was asked to make a presentation to the students at Lydia Home in Davenport at 4:00pm after their tutoring session. There were 14 students and five adults for the event.

I introduced the session and shared some of the ancient and more modern history of astronomy with the kids – and adults – and discussed what the ancients and moderns found and, for us "moderns", what we were still looking for.

Karl brought a telescope and since it was during the day we focused on a crack and hole in a window and let the kids see just how much magnification there was when lenses and things all worked. Even though it was not a "heavenly" body, there were lots of "Wows" and "Can I look at that again.

Karl presented some grade appropriate information on how telescopes work, the different kinds of telescopes, Galileo and his "little" telescope and Sir Isaac Newton and the Newtonian telescope.

What really captured their attention was the trip through the solar system (including sun and moon and planets) and then into deep space.

We had an hour and for those who remember how short attentions spans can be for any age group at that time of day that they were still engaged was quite remarkable. Karl then had a contest that centered on voting for the photo the kids thought was the most "pretty". We asked that they only vote once but many of them voted many times and the winning photo was of the North American nebula and Karl left that with them. Good job all the way around. We were sorry to have lost out when the spaghetti dinner was being prepared.

November 20: We went to the Saulsbury Recreational Area north of Muscatine. If you want to define "remote" this would qualify. Even with lights for the parking lot, the Milky Way was visible as were most of the common late fall/early winter sky constellations.

The "guests" were sixty 2nd grade students from Washington School in Muscatine, their chaperones/teachers and some folks from the recreational area for a total of about 75 people.

Dana brought the club's 11" scope and Bruce had his instrument set up in the parking lot. The sky conditions were nearly perfect and the kids saw some really good star "stuff", except for those few who couldn't seem to puzzle out how to look into the eyepieces.

I think that 'Smores were more important to them because they could be next to wood fire.

The adults/teachers took away as much from the event as did the kids and it was a great PR success sponsored by the Muscatine County Conservation Board/Committee. The program placed our activity in between looking at two owls, many bathroom calls and warm-ups in the lodge (it was a cold night). Thanks to both Bruce and Dana for staying outside and sharing some of the heavens with this great group of people and kids.

I have to say, that after attending both of these events, what kids this age know is kind of remarkable. One young lad at Lydia Home answered every question we posed to the group. Many of the 2nd grade students also showed how much they knew, as well. Thanks to Karl, Bruce and Dana for making these events special for so many people – young and old.

Philae Lands! And Bounces!

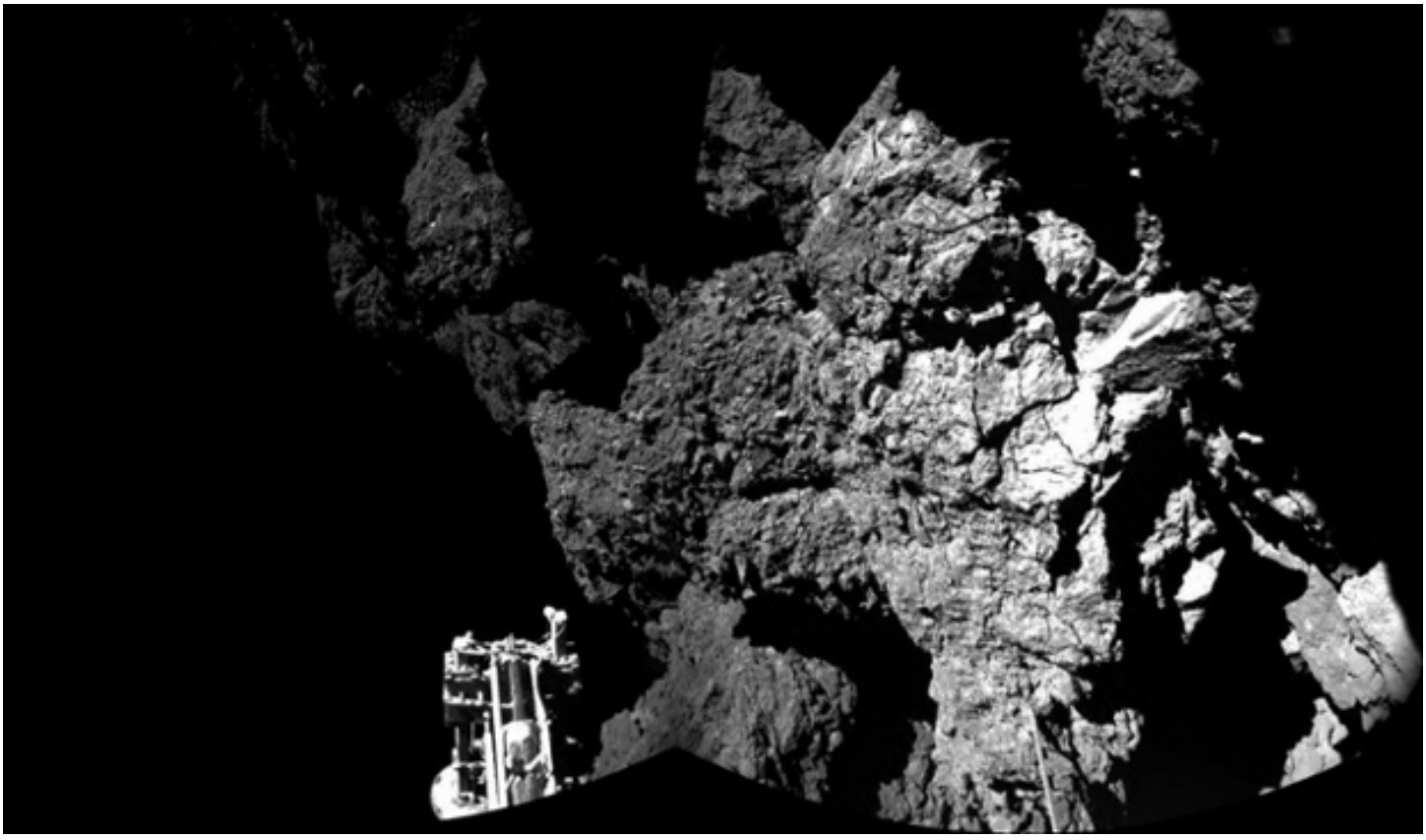


Photo taken by Philae of it's location on comet 67P/Churyumov-Gerasimenko.

ESA's Rosetta mission has soft-landed its Philae probe on a comet, the first time in history that such an extraordinary feat has been achieved.

After a tense wait during the seven-hour descent to the surface of Comet 67P/Churyumov-Gerasimenko, the signal confirming the successful touchdown arrived on Earth at 16:03 GMT (17:03 CET).

The confirmation was relayed via the Rosetta orbiter to Earth and picked up simultaneously by ESA's ground station in Malargüe, Argentina and NASA's station in Madrid, Spain. The signal was immediately confirmed at ESA's Space Operations Centre, ESOC, in Darmstadt, and DLR's Lander Control Centre in Cologne, both in Germany.

The first data from the lander's instruments were transmitted to the Philae Science, Operations and Navigation Centre at France's CNES space agency in Toulouse.

"Our ambitious Rosetta mission has secured a place in the history books: not only is it the first to rendezvous with and orbit a comet, but it is now also the first to deliver a lander to a comet's surface," noted Jean-Jacques Dordain, ESA's Director General.

"With Rosetta we are opening a door to the origin of planet Earth and fostering a better understanding of our future. ESA and its Rosetta mission partners have achieved something extraordinary today."

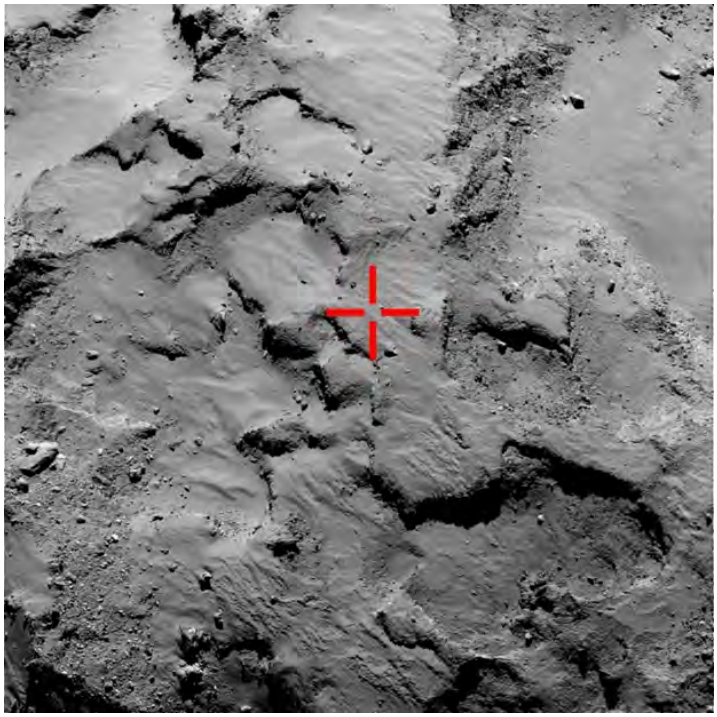
"After more than 10 years travelling through space, we're now making the best ever scientific analysis of one of the oldest remnants of our Solar System," said Alvaro Giménez, ESA's Director of Science and Robotic Exploration.

"Decades of preparation have paved the way for today's success, ensuring that Rosetta continues to be a game-changer in cometary science and space exploration."

"We are extremely relieved to be safely on the surface of the comet, especially given the extra challenges that we faced with the health of the lander," said Stephan Ulamec, Philae Lander Manager at the DLR German Aerospace Center.

"In the next hours we'll learn exactly where and how we've landed, and we'll start getting as much science as we can from the surface of this fascinating world."

Rosetta was launched on 2 March 2004 and travelled 6.4 billion kilometres through the Solar System before



Location on the comet where Philae landed.

arriving at the comet on 6 August 2014.

"Rosetta's journey has been a continuous operational challenge, requiring an innovative approach, precision and long experience," said Thomas Reiter, ESA Director of Human Spaceflight and Operations.

"This success is testimony to the outstanding teamwork and the unique knowhow in operating spacecraft acquired at the European Space Agency over the decades."

The landing site, named Agilkia and located on the head of the bizarre double-lobed object, was chosen just six weeks after arrival based on images and data collected at distances of 30-100 km from the comet. Those first images soon revealed the comet as a world littered with boulders, towering cliffs and daunting precipices and pits, with jets of gas and dust streaming from the surface.

Following a period spent at 10 km to allow further close-up study of the chosen landing site, Rosetta moved onto a more distant trajectory to prepare for Philae's deployment.

Five critical go/no-go decisions were made last night and early this morning, confirming different stages of readiness ahead of separation, along with a final preseparation manoeuvre by the orbiter.

Deployment was confirmed at 09:03 GMT (10:03 CET) at a distance of 22.5km from the centre of the comet. During the seven-hour descent, which was made without propulsion or guidance, Philae took images and recorded information about the comet's environment.

"One of the greatest uncertainties associated with the delivery of the lander was the position of Rosetta at the time of deployment, which was influenced by the activity of the comet at that specific moment, and which in turn could also have affected the lander's descent trajectory," said Sylvain Lodiot, ESA Rosetta Spacecraft Operations Manager.

"Furthermore, we're performing these operations in an environment that we've only just started learning about, 510 million kilometres from Earth."

Touchdown was planned to take place at a speed of around 1 m/s, with the three-legged landing gear absorbing the impact to prevent rebound, and an ice screw in each foot driving into the surface.

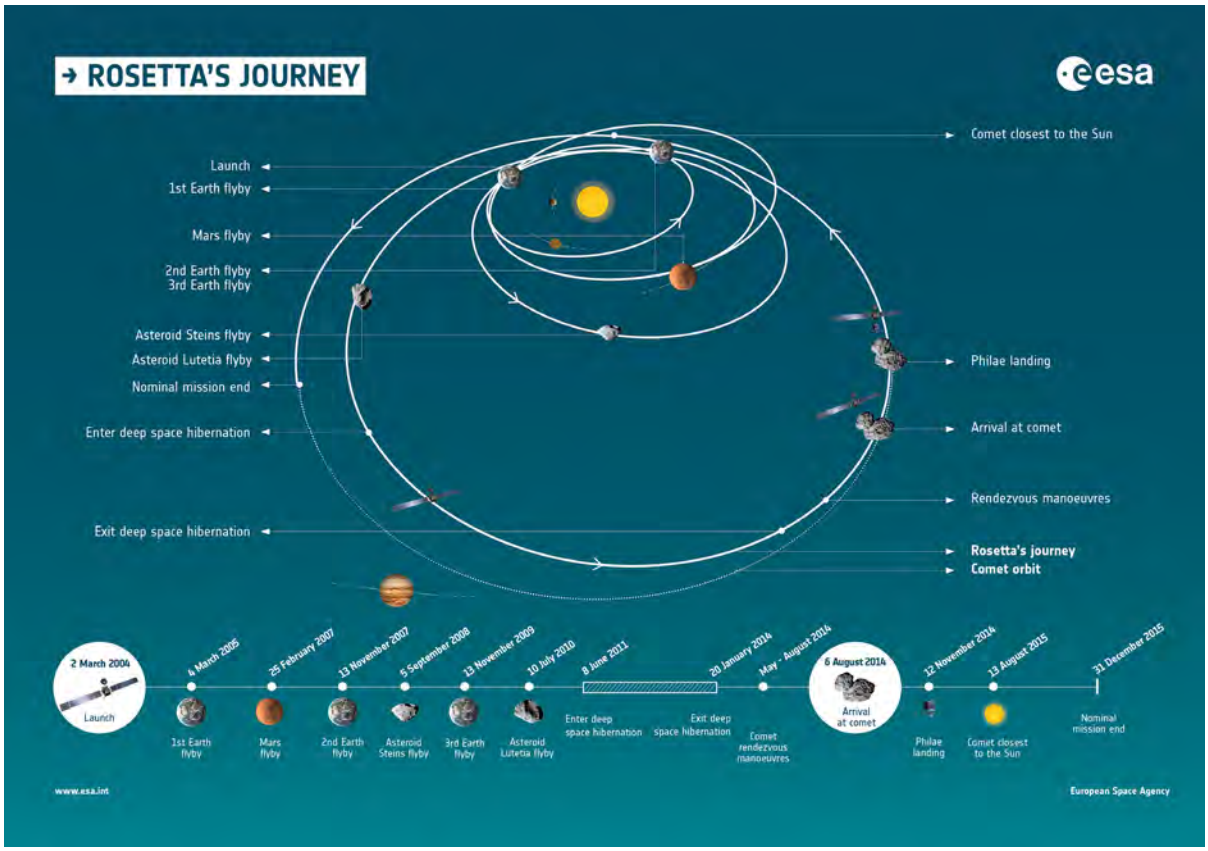
At the same time, two harpoons fired and locked the probe onto the surface.

But during the final health checks of the lander before separation, a problem was detected with the small thruster on top that was designed to counteract the recoil of the harpoons to push the lander down onto the surface. The conditions of landing -- including whether or not the thruster performed -- along with the exact location of Philae on the comet are being analysed.

The first images from the surface are being downlinked to Earth and should be available within a few hours of touchdown.

Over the next 2.5 days, the lander will conduct its primary science mission, assuming that its main battery remains in good health. An extended science phase using the rechargeable secondary battery may be possible, assuming Sun illumination conditions allow and dust settling on the solar panels does not prevent it. This extended phase could last until March 2015, after which conditions inside the lander are expected to be too hot for it to continue operating.

Science highlights from the primary phase will include a full panoramic view of the landing site, including a section in 3D, high-resolution images of the surface immediately underneath the lander, on-the-spot analysis of the composition of the comet's surface materials, and a drill that will take samples from a depth of 23 cm and feed them to an onboard laboratory for



analysis.

The lander will also measure the electrical and mechanical characteristics of the surface. In addition, low-frequency radio signals will be beamed between Philae and the orbiter through the nucleus to probe the internal structure.

The detailed surface measurements that Philae makes at its landing site will complement and calibrate the extensive remote observations made by the orbiter covering the whole comet.

"Rosetta is trying to answer the very big questions about the history of our Solar System. What were the conditions like at its infancy and how did it evolve? What role did comets play in this evolution? How do comets work?" said Matt Taylor, ESA Rosetta project scientist.

"Today's successful landing is undoubtedly the cherry on the icing of a 4 km-wide cake, but we're also looking further ahead and onto the next stage of this ground-breaking mission, as we continue to follow the comet around the Sun for 13 months, watching as its activity changes and its surface evolves."

While Philae begins its close-up study of the comet, Rosetta must manoeuvre from its post-separation path back into an orbit around the comet, eventually returning to a 20 km orbit on 6 December.

Next year, as the comet grows more active, Rosetta will need to step further back and fly unbound 'orbits', but dipping in briefly with daring flybys, some of which will bring it within just 8 km of the comet centre.

The comet will reach its closest distance to the Sun on 13 August 2015 at about 185 million km, roughly between the orbits of Earth and Mars. Rosetta will follow it throughout the remainder of 2015, as they head away from the Sun and activity begins to subside.

"It's been an extremely long and hard journey to reach today's once-in-a-lifetime event, but it was absolutely worthwhile. We look forward to the continued success of the great scientific endeavour that is the Rosetta mission as it promises to revolutionise our understanding of comets," said Fred Jansen, ESA Rosetta mission manager.

More about Rosetta

Rosetta is an ESA mission with contributions from its Member States and NASA. Rosetta's Philae lander is provided by a consortium led by DLR, MPS, CNES and ASI. Rosetta is the first mission in history to rendezvous with a comet. It is escorting the comet as they orbit the Sun together, and has deployed a lander to its surface. Comets are time capsules containing primitive material left over from the epoch when the Sun and its planets formed. By studying the gas, dust and structure of the nucleus and organic materials associated with the comet, via both remote and in situ observations, the Rosetta mission should become the key to unlocking the history and evolution of our Solar System.

Jets, Bubbles, and Bursts of Light in Taurus

November 6, 2014 - Hubble-ESA The NASA/ESA Hubble Space Telescope has snapped a striking view of a multiple star system called XZ Tauri, its neighbour HL Tauri, and several nearby young stellar objects. XZ Tauri is blowing a hot bubble of gas into the surrounding space, which is filled with bright and beautiful clumps that are emitting strong winds and jets. These objects illuminate the region, creating a truly dramatic scene.

This dark and ominous landscape is located some 450 light-years away in the constellation of Taurus (The Bull). It lies in the north-eastern part of a large, dark cloud known as LDN 1551.

Just to the left of centre in this image, embedded within a rust-coloured cloud, lies XZ Tauri. While it appears to be a single star, this bright spot actually consists of several stars. It has long been known to be a binary, but one of these two stars is thought also to be a binary, making a total of three stars within a single system.

This is not the first time that Hubble has observed XZ Tauri – between the years of 1995 and 2000, a hot bubble of gas was spotted expanding outwards from the system. This bubble can be seen as the small orange lobe very close to the top left of XZ Tauri. This gas is speeding out from the star system, leaving a trail spanning tens of billions of kilometres. As the bubble travels it hits slower moving material, triggering pulses of light and rippling shockwaves.

Above and to the right of XZ Tauri, an equally epic scene is unfolding. Wisps of deep red seem to be streaking away from the blue-tinged clumps on the right. This bright blue patch contains a star known as HL Tauri [1], which is associated with Herbig-Haro object HH 150. Herbig-Haro objects are streaks of hot gas blasted into space by newborn and newly forming stars and LDN 1551 is particularly rich in these dramatic objects.

In the bottom right of this Hubble image is another Herbig-Haro object known as HH 30 (opo9905), associated with the variable star V1213 Tauri. The star itself is hidden within a flat, bright disc of dust that is split in half by a dark lane. This dust blocks direct light from V1213 Tauri, but the star is visible via its reflected light and the prominent, knotty jets it is blasting out into space.

Hubble previously viewed HH 30, alongside XZ Tauri, with its Wide Field Planetary Camera 2 between the years of 1995 and 2000. The observations were used to image and study the changes in disc brightness and jet strength over the five-year period. V1213 Tauri,Äôs strong magnetic field forms the jets by funnelling and shepherding gas from the disc, accelerating it along the star's magnetic poles to form two narrow beams.

A version of this image was entered into the Hubble's Hidden Treasures image processing competition

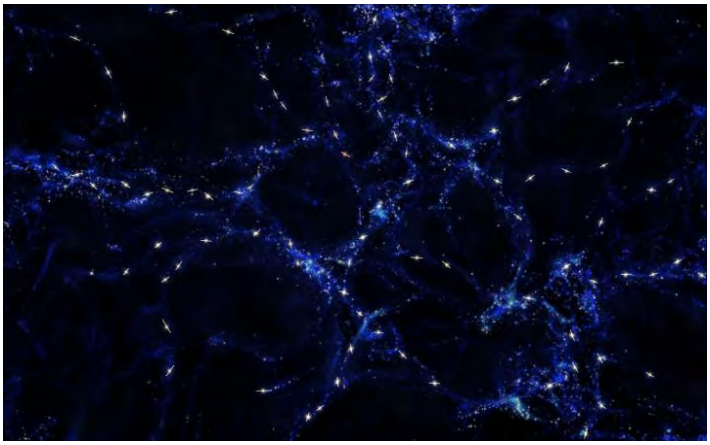
by contestant Judy Schmidt, and won third prize.

In a press release issued by the European Southern Observatory, observations from the Atacama Large Millimeter/submillimeter Array (ALMA) reveal extraordinarily fine and never-before-seen detail in the planet-forming disc around HL Tauri. The new observations are an enormous step forward in the observation of how protoplanetary discs develop and how planets form.

Notes

[1] XZ Tauri and HL Tauri are textbook examples of a class of stars known as T Tauris – young and rapidly rotating, with strong magnetic fields and powerful winds. They have yet to reach the temperatures necessary for hydrogen fusion deep in their cores. It will take around 100 million years for these stars to trigger these reactions and evolve into fully-fledged stars like the Sun.

Spooky alignment of quasars across billions of light-years

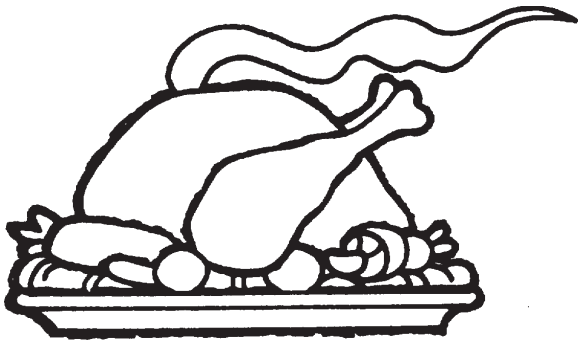


This artist's impression shows schematically the mysterious alignments between the spin axes of quasars and the large-scale structures that they inhabit that observations with ESO's Very Large Telescope have revealed. These alignments are over billions of light-years and are the largest known in the universe. The large-scale structure is shown in blue and quasars are marked in white with the rotation axes of their black holes indicated with a line. This picture is for illustration only and does not depict the real distribution of galaxies and quasars.

Celestial Calendar

Nov 27 17:11 Moon at Perigee: 369825 km
29 04:06 FIRST QUARTER MOON

Dec 02 02:32 Moon at Descending Node
05 22:35 Aldebaran 1.5°S of Moon
06 06:27 FULL MOON
08 04 Mercury at Superior Conjunction
08 13:29 Jupiter 2.7°N of Regulus
11 21:36 Jupiter 5.1°N of Moon
12 06 Mars at Perihelion
12 12:06 Regulus 4.4°N of Moon
12 17:02 Moon at Apogee: 404584 km
14 06 Geminid Meteor Shower
14 06:51 LAST QUARTER MOON
16 07:27 Moon at Ascending Node
16 19:05 Spica 2.8°S of Moon
19 14:55 Saturn 1.6°S of Moon
21 17:03 Winter Solstice
21 19:36 NEW MOON
22 14 Ursid Meteor Shower
24 10:43 Moon at Perigee: 364791 km
List from www.astropixels.com



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Vice-Pres: Bruce Brooker
Secretary: John Robbins
Treasurer: John Baker
Director: Dana Taylor
Facilities: John Baker
Web Master: Dana Taylor
Outreach: Tom Bullock
Programming: Jim Rutenbeck

QCAS Meetings: First Monday (workshop) at 6:30pm, and third Monday, (business), at 6:30pm, Bettendorf Library, 2950 Learning Campus Dr., off of 18th Street, Bettendorf.

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Members are welcome and encouraged to submit articles for The Meridian. Submit Any and all interesting items (via e-mail) to: John Robbins or Dale Hendricks.