ASTRONOMICAL SOCIETY OF SOUTHERN AFRICA

'NDABA

Monthly Newsletter of the Durban Centre - December 2017

Table of Contents

Member Submissions Disclaimer:

The views expressed in 'nDaba are solely those of the writer and are not necessarily the views of the Durban Centre, nor the Editor.

Chairman's Chatter

By Mike Hadlow

Dear Members,

It's the first week of December and this will be the last nDaba this year.

As I've previously done at the end of the year, I would like to thank John Gill again for his tireless work in having successfully produced the nDaba each month for the past year and to all of you who have contributed to the publication. I personally believe that we have an interesting and informative monthly publication that appeals to all of our different interests in astronomy.

It's been either cloudy or raining on probably 90% of the evenings over the last month and the society has not had any successful viewing evenings. Once again, our public viewing on 17th November was cancelled due to cloud and rain. Also our presentation and viewing evening at St Theresa's School on the 10th November had to be cancelled due to rain.

We have however been involved in a number of other activities, including our attendance, in the afternoon of 9 November, at the Durban Natural Science Museum in partnership with the Durban US Consulate, at the presentation by Dr Thomas, a former astronaut, titled 'Living and Working in Space'. As a group, we also attended the talk by Dr Thomas, titled Space Tour 2017, at Durban Girls College on 10 November. See "Members Moments" page 28/29.

In addition, we held a Media Liaison Workshop, presented by Logan Govender, attended by 9 members. Hopefully, this will lighten Logan's load and he will have some assistance in all the liaison he does for the society.

On the same afternoon I held a telescope workshop for those members who had their own telescopes but weren't sure how to operate them, or those who would like to loan scopes belonging to the society. The workshop went well but unfortunately it clouded over and we couldn't have any viewing after the sun set.

Our last formal general meeting of the year held on 8 November, was a panel discussion. It was very well attended by both members and guests. Personally, I believe it was hugely successful and we will definitely have more next year. Thanks must go to the members of the panel and those of you who submitted the questions.

What's to come?

We have a 'super moon' on the 3rd. It looks as if it will be cloudy, but as Peter Dormehl mailed me, *" maybe it will be so bright we will see it through the clouds, pollution and light pollution."*

Our next and final gathering of the year will be held on 13 December which will be our end of year annual dinner. Remember, this will be the night of our raffle draw and you may come away from the evening with a Prime X Relay Action Camera. Please everyone get those ticket sales in.

The painting of the dome has been completed! So, to commemorate the 30th Anniversary of the erection of the dome in 1987, will be placing a plaque at the dome, before we commence with our end of year dinner.

… Chairman's Chatter

Also remember the ASSA National symposium to be held in Cape Town in March 2018. The theme of the symposium is 'Amateur Astronomy in the Digital Data Age - how Amateurs can do real Science.' (How do we?). We know a number of you are interested. Those interested please could you let the secretary know so we can start making arrangements to attend as a group.

The next public viewing will be on the 15 December and I remember it always seems to rain at this time of year. However, if it's clear, please contact your facilitator whose details you will find on the web site, to confirm if there will be a viewing. As indicated over the past few months, despite our wanting clear skies, the drought has not yet been broken and we still need abundant rain to fill the dams. Albert falls dam on the upper Umgeni river is only 30% full. We must therefore still be praying for rain.

Looking forward to seeing you all at our dinner on 13 December and for those who I won't see at the dinner, have a fantastic festive season and holiday, with family and friends and we will meet again on the second Wednesday in January 2018.

Wishing you clear skies and great viewing.

Mike

THE BIG 5 OF THE AFRICAN SKY

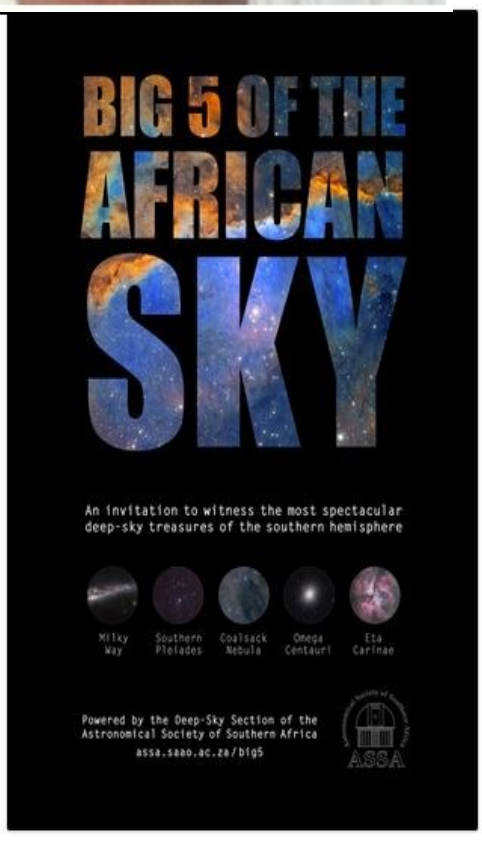
The magnificent southern sky is a starry realm richly sown with a treasury of deep-sky objects: star clusters, bright and dark gas clouds, and galaxies.

From this (sometimes bewildering) array five specimens of each class of object have been selected by a special Deep-Sky Task Force and are presented here as the celestial Big Five.

The representative of open star clusters is the **Southern Pleiades**. First amongst the globular star clusters is the overwhelming **Omega Centauri**. Bright nebulae are represented by the majestic **Eta Carinae Nebula**. The mysterious dark nebulae are represented by the **Coal Sack**. And the most splendid galaxy of them all is our own **Milky Way Galaxy**.

Your mission is to observe each of these beautiful objects and report back on what you have witnessed.

All submitted observations will be carefully evaluated and feedback will be given. The names of all participants will be acknowledged on the ASSA website. Observing certificates will be awarded only on merit and are issued by the Deep-Sky Section of the Astronomical Society. Have fun, and keep looking up!



The Science of the Christmas Star

by Brian Ventrudo

"O star of wonder, star of night,
Star with royal beauty bright,
Westward leading, still proceeding,
Guide us to thy perfect light."

"

It may be the most famous star in history. But was it real? Mentioned just once in the gospel of Matthew, the "Star of Bethlehem", or the "Christmas Star", may have guided three wise men from the East in search of a newborn king. A few words written on a scroll two thousand years ago isn't much to go on, but astronomers have a few ideas that may explain the apparition of a star near the time of the birth of Jesus.

The words below from the gospel of Matthew were written by an unknown author in about 90 A.D. It's not exactly a detailed observational report, at least by modern standards. There is no estimate of the star's brightness, motion, color, duration, and so forth. But it's all the astronomy we've got:

"Now, when Jesus was born in Bethlehem of Judea, in the days of Herod the king, behold, there came wise men from the east to Jerusalem, saying, Where is he that is born King of the Jews? For we have seen his star in the east, and are come to worship him. And lo, the star, which they had seen in the east, went before them, till it came and stood over where the young child was. When they saw the star, they rejoiced with exceeding great joy."

We also know that– religion aside– Jesus was an historical figure, a Jewish teacher who lived and travelled in and around Galilee until his death around 33-36 A.D. In 523 A.D., the Roman abbot Dionysius Exiguus placed the birth of Jesus at what we call 0 A.D., but he erred in determining the year in which Augustus Caesar began his rule, and he did not consider the year between 1 B.C. and 1 A.D. because "zero" was not regarded as a number in those days. Scholars now widely agree Jesus was born sometime between the years 7 B.C. and 2 B.C.

So there may have been a bright "star", something unusual, between the years 7 B.C. and 2 B.C. These are the clues.

Leaving aside divine occurrences, there are four explanations for a transient bright "star" around the time of the birth of Jesus:

A meteor. A bright meteor would capture the attention of wise men. But it would be too transient to guide them on a long journey to the Roman province of Judea. And it would not be visible from a wide area on Earth since meteors occur just 60-80 km above the Earth's surface. This is the least likely explanation.

… The Science of the Christmas Star

What astronomical event could explain the “Star of Bethlehem”?

A comet. A bright comet might be interpreted as a star, and it could be widely visible over the Earth for many weeks. Comet Halley appeared a few years too early in 12 B.C. And comets were beheld by the ancients as bad omens, not something to announce the birth of a new king. Nor did Chinese and Korean stargazers, who kept records in those days, note an exceedingly bright comet.

A nova or supernova. A flaring or exploding star would fit the bill. There is some record made by Chinese astronomers of a nova in 5 B.C. in Aquarius or Capricornus, but it was not particularly bright or noteworthy.

A planetary conjunction. A conjunction, the apparent close approach of two bright planets, is perhaps the most promising explanation for the Star of Bethlehem. By running the celestial clockworks back in time, astronomers know a rare “triple alignment” of Jupiter and Saturn occurred in 7 B.C. when the planets approached each other closely three times between April and December. The first approach may have alerted the wise men, and by the time they traveled to Judea to pay respects, the planets would have approached each other again to appear nearly as a single “star”.

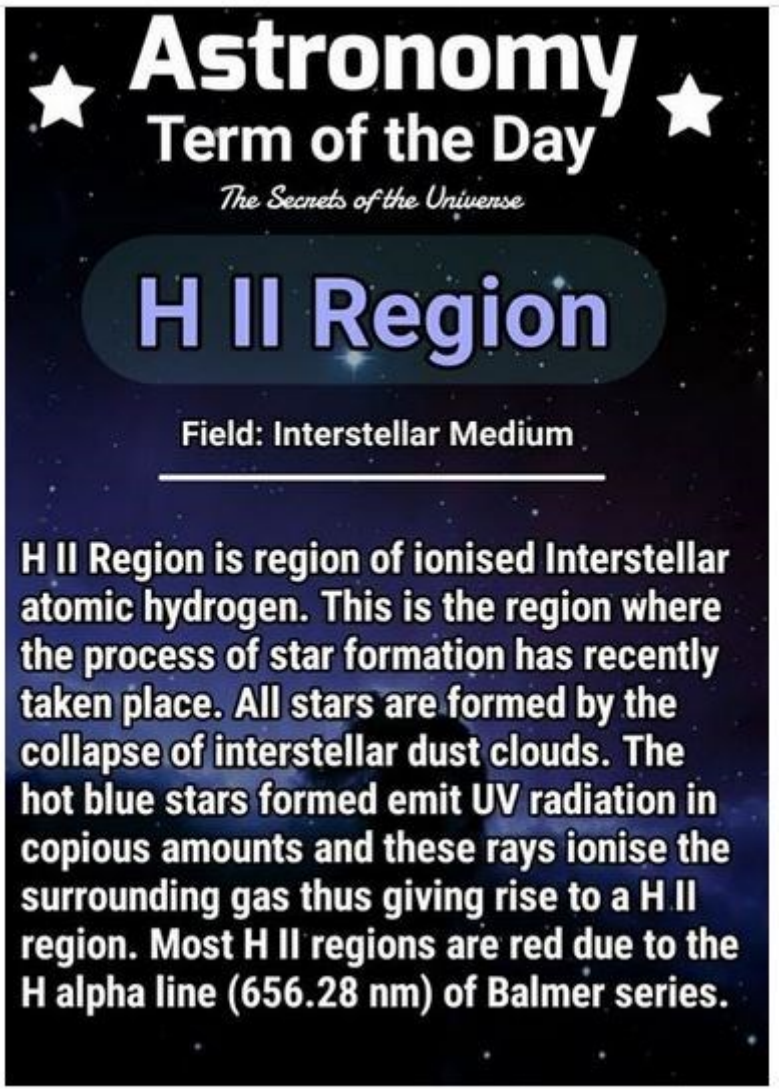
Even more striking conjunctions occurred in 3 B.C. and 2 B.C., this time between the two brightest planets Jupiter and Venus in the constellation Leo. The planets came as close as 12 arc-minutes of each other during these conjunctions, close enough to appear as a single very bright star. The first conjunction would have been visible in August of 3 B.C. in the eastern sky before dawn, which corresponds to the location described by the wise men in the gospel of Matthew. Jupiter and Leo were associated by the ancients with kings, and Venus was associated with fertility. So to three ancient Babylonian astrologers—the “wise men”—this event may have heralded the birth of a new king and got them packed and headed west. When they arrived in Judea months later, in June, Venus and Jupiter would have returned together for a second close approach in the western sky.

… The Science of the Christmas Star

Does that means Jesus was born in June? That would help explain the words in the gospel of Luke, “And there were in the same country shepherds abiding in the field, keeping watch over their flock by night”. Shepherds in Judea would tend newborn lambs in the spring not in December. Many historians suspect the date of remembrance of the birth of Jesus was chosen by early Christians to coincide with the ancient Roman winter festival of Saturnalia, possibly as a way to disguise their celebration and avoid persecution in the centuries before their religion was sanctioned in the Roman Empire.

So does a Jupiter-Venus conjunction explain the Star of Bethlehem? Perhaps. Many astronomers and historians suggest the star is apocryphal, an element added to the gospel of Matthew decades after the birth of Jesus to add drama and mystery. Unless an archeologist uncovers more astronomical or historical records, it’s unlikely we’ll ever know for certain the identity of the Star.

But life can be more interesting with a little mystery, don’t you think?



At the Eyepiece

December 2017 by Ray Field

THE SUN reaches the summer solstice for the southern hemisphere on the 21st.

THE MOON is FULL on the 3rd, Last Quarter on the 10th, NEW on the 18th, and First Quarter on the 26th. The Moon is near Aldebaran on the 3rd, the Beehive (M44) on the 7th, Regulus on the 9th, Mars on the 13th, Jupiter on the 14th, Mercury and Venus on the 17th, Saturn on the 18th, Neptune on the 24th, Uranus on the 27th and Aldebaran again on the 30th and 31st. Diagrams on page 59 of SKY GUIDE 2017 show the path of the Moon across the sky during December.

MERCURY may be seen with difficulty for a few days at the beginning of the month after sunset and a few days before sunrise at the end of the month. A diagram on page 59 shows Mercury and Saturn close together after sunset at the beginning of the month. Mercury will be near the Moon and Venus on the 17th.

VENUS is visible low in the morning sky this month but will be too close to the Sun by the month end to be seen. The Moon will be near Venus and Mercury on the 17th.

MARS, in Virgo for most of the month, passes into Libra by the month end. A diagram on page 76 of SKY GUIDE shows this. To the naked eye Mars appears as an orange-red star. It rises about 2 hours after midnight.

JUPITER is still the very bright object near the Spica in Libra and rises about 2 hours before the Sun. Its position in the sky is shown on the bottom map on page 59 and the map on page 77 of SKY GUIDE. Its 4 brightest moons can be seen in large binoculars or a small telescope and details of their movement around Jupiter are given on page 61 of the ASSA SKY GUIDE.
e beginning of the month it is near mercury after sunset but very low above the horizon.

… At the Eyepiece

SATURN, in Sagittarius, is too close to the Sun this month to be easily seen as it reaches conjunction with the Sun on the 21st. At the beginning of the month it is near mercury after sunset but very low above the horizon.

URANUS, in Pisces, is close to the Moon on the 27th. It is a very faint object and you will need binoculars and detailed maps to find it. The middle map on page 59 of SKY GUIDE will show you its approximate position in the sky.

NEPTUNE, in Aquarius, is even fainter than Uranus, and needs a telescope and detailed instructions to find it. It will be very near the edge of the Moon on the 24th and from some places around the world, an occultation of Neptune by the Moon will be visible.

COMETS, A list of comets and their perihelion dates for this year is shown on page 85 of SKY GUIDE.

METEORS. Three showers are visible this month per SKY GUIDE, page 86 as follows:-
1)DECEMBER PHOENICIDS. Max. Dec. 06, period Dec 03 to Dec. 09, Watch from 20hr 30m to 02hr 00m, ZHR 05, Unfavorable observing prospects.

2)GEMINIDS. Max. Dec. 14, period Dec. 04 to Dec. 16, Watch from 23hr 30m to 03h 00m, ZHR 50, Good observing Prospects.

3)PUPPID-VELIDS. Max. Dec 29, period Dec. 05 to Jan. 07, Watch from 22hr 30m to 03hr 30m, ZHR 05, Good observing prospects.

THE STARRY SKY

ORION has risen and by midnight it is very prominent over the northern horizon.. M42, the Orion Nebula in the "sword", makes a good binocular object and is visible to the naked eye as a fuzzy, luminous patch on a moonless night. Canes Major, the Big Dog, lies to the right of Orion's Belt, whilst the bright,red, star, Aldebaran, in the large, open cluster called the Hyades, lies to the left of his belt. The Southern Cross is very low on the southern horizon and the very long string of mainly, faint stars making up the celestial river ERIDANUS, starts at the foot of Orion, Rigel, and ends up at the bright star ACHERNAR, the "last of the river". Achernar is now well up over the southern horizon and above and slightly to its left, is a beautiful, bright double, ACAMAR (or Theta one and Theta two Eridani), which is easily seen in binoculars. Halfway between the South Celestial POLE and Achernar is the bright globular cluster 47 Tucanae, which is on the edge of, but not part of the Small Magellanic Cloud.

References:- ASSA SKY GUIDE 2017, Norton's Star Atlas, Phillips' Planisphere for 35 Degrees South and Sir Patrick Moore's Stars of the Southern Skies.

The Cover Image - Sculptor Galaxy

Imaged by John Gill, text from Sky Portal

NGC 253 is the brightest member of the Sculptor Group of galaxies. NGC 253 is often referred to as the Sculptor Galaxy, but the RASC Observer's Handbook gives the common name Silver Coin Galaxy.

NGC 253 was one of the major discoveries of Caroline Herschel, the sister of William Herschel. She discovered this object on September 23, 1783 with "an excellent small Newtonian Sweeper of 27 inches focal length and a power of 30" (William Herschel's description), and added it to her list as No. 10. William Herschel later included it in his catalog as No. V.1.

As one of the brightest galaxies in the sky (visual magnitude 8.0), the Sculptor Galaxy is viewable through binoculars. It is a good target for observation with a telescope with a 300 mm diameter or larger. As seen through such telescopes, it appears as a galaxy with a long, oval bulge and a mottled disk.

Visually, NGC 253 is an impressive sight in larger instruments. Its huge envelope is an elongated 25' x 7', and its disk shows complex dust lanes north of the core. In 1961, Allan Sandage wrote in the Hubble Atlas of Galaxies that the Sculptor Galaxy is "the prototype example of a special subgroup of Sc systems... galaxies of the group are dominated by the dust pattern. Dust lanes and patches of great complexity..."

The Sculptor group is perhaps the nearest to our Local Group of galaxies. It is grouped around the South galactic pole (and, therefore, also sometimes named "South Polar Group"). The companion galaxies NGC 247, PGC 2881, PGC 2933, Sculptor-dE1, and UGCA 15 form a gravitationally bound core near the center of the group. NGC 253 itself lies some 10 million light years distant.

NGC 253's true size is estimated to be 70,000 light years, comparable to the diameter of the Milky Way. But NGC 253 has a luminosity considerably less than the Milky Way's. The Sculptor Galaxy is a starburst galaxy, which means that it is currently undergoing a period of intense star formation. One supernova has been discovered in NGC 253 to date: SN 1940E, which was discovered by Fritz Zwicky, and became as bright as magnitude 14.0.

Tech Specs:
Celestron 8” EdgeHD on CGX mount and Canon 600D camera
ZWO Optics for Auto-Guiding
14 x Lights @ ISO 100 for 600 seconds
60 x Bias & Flats and 14 Darks
Processed with PixInsight

Edwin Powell Hubble

The man who discovered the cosmos

"I knew that even if I were second or third rate, it was astronomy that mattered."

This sentence, written by Edwin Hubble recalling his youth, tells us a lot about the man. A man who eventually broke the promise made to his father and followed the path dictated by his passion.

As a result of Hubble's work, our perception of mankind's place in the Universe has changed forever: humans have once again been set aside from the centre of the Universe. When scientists decided to name the Space Telescope after the founder of modern cosmology the choice could not have been more appropriate.

Edwin Powell Hubble

A promising student

Edwin Hubble was born in Missouri in 1889, the son of an insurance executive, and moved to Chicago nine years later. At his high school graduation in 1906, the principal said: *"Edwin Hubble, I have watched you for four years and I have never seen you study for ten minutes."* He paused, leaving young Edwin on tenterhooks a moment longer, before continuing: *"Here is a scholarship for the University of Chicago."*

This high school scholarship was also awarded to another student by mistake, so the money had to be halved and Edwin had to supply the rest. He paid his expenses by tutoring, working in the summer and, in his junior year, by obtaining a scholarship in physics and working as a laboratory assistant. He finally obtained a degree in Mathematics and Astronomy in 1910.

… Edwin Powell Hubble

The Rhodes scholar

A tall, powerfully built young man, Hubble loved basketball and boxing, and the combination of athletic prowess and academic ability earned him a Rhodes scholarship to Oxford. There, a promise made to his dying father, who never accepted Edwin's infatuation for astronomy, led him to study law rather than science, although he also took up Literature and Spanish.

He studied Roman and English Law at Oxford and returned to the United States only in 1913. Here he passed the bar examination and practised law half-heartedly for a year in Kentucky, where his family was then living.

The beloved high school teacher and coach

He was also hired by New Albany High School (New Albany, Indiana) in the autumn of 1913 to teach Spanish, Physics and Mathematics, and to coach basketball. His popularity as a teacher is recorded in the school yearbook dedicated to him: *"To our beloved teacher of Spanish and Physics, who has been a loyal friend to us in our senior year, ever willing to cheer and help us both in school and on the field, we, the class of 1914, lovingly dedicate this book."*

When the school term ended in May 1914, Hubble decided to pursue his first passion and so returned to university as a graduate student to study more astronomy.

A new era for astronomy begins

The famous British astrophysicist Stephen Hawking wrote in his book A Brief History of Time that Hubble's *"discovery that the Universe is expanding was one of the great intellectual revolutions of the 20th century."* Who could have guessed such a future for Edwin when he began his PhD in Astronomy at Chicago University in 1914?

War postpones Hubble's astronomical debut

Early in 1917, while still finishing the work for his doctorate, Hubble was invited by George Ellery Hale, founder of the Mount Wilson Observatory, in Pasadena, California, to join the staff there. This was a great opportunity, but it came in April of a dreadful year. After sitting up all night to finish his PhD thesis and taking the oral examination the next morning, Hubble enlisted in the infantry and telegraphed Hale:*"Regret cannot accept your invitation. Am off to the war."*

He served in France and next returned to the United States in 1919. He went immediately to the Mount Wilson Observatory, where the newly discharged Major Hubble, as he invariably introduced himself, arrived, still in uniform, but ready to start observing.

Hubble was lucky enough to be in the right place at the right time. Mount Wilson was the centre of observational work underpinning the new astrophysics, later called cosmology, and the 100-inch Hooker Telescope, then the most powerful on Earth, had just been completed and installed after nearly a decade of work.

On the mountain Hubble encountered his greatest scientific rival, Harlow Shapley, who had already made his reputation by measuring the size of the Milky Way, our own Galaxy. Shapley had used a method pioneered by Henrietta Leavitt at the Harvard College Observatory that relied on the behaviour of standardised light variations from bright stars called Cepheid variables to establish the distance of an object.

… Edwin Powell Hubble

His result of 300 000 light-years for the width of the galaxy was roughly 10 times the previously accepted value. However Shapley, like most astronomers of the time, still thought that the Milky Way was all there was to the Universe. Despite a suggestion first made by William Herschel in the 18th century, he shared the accepted view that all nebulae were relatively nearby objects and merely patches of dust and gas in the sky.

The turning point

Hubble had to spend many bitterly cold nights sitting at the powerful Hooker telescope before he could prove Shapley wrong. In October 1923 he spotted what he first thought was a nova star flaring up dramatically in the M31 "nebula" in the constellation of Andromeda. After careful examination of photographic plates of the same area taken previously by other astronomers, including Shapley, he realised that it was a Cepheid star. Hubble used Shapley's method to measure the distance to the new Cepheid. He could then place M31 a million light-years away - far outside the Milky Way and thus itself a galaxy containing millions of stars. The known Universe had expanded dramatically that day and - in a sense - the Cosmos itself had been discovered!

Even The New York Times of the day realised the importance of the discovery: *"Finds spiral nebulae are stellar systems. Doctor Hubble confirms view that they are 'island universes' similar to our own."*

Just the beginning

This discovery was of great importance to the astronomical world, but Hubble's greatest moment was yet to come. He began to classify all the known nebulae and to measure their velocities from the spectra of their emitted light. In 1929 he made another startling find - all galaxies seemed to be receding from us with velocities that increased in proportion to their distance from us - a relationship now known as Hubble's Law.

This discovery was a tremendous breakthrough for the astronomy of that time as it overturned the conventional view of a static Universe and showed that the Universe itself was expanding. More than a decade earlier, Einstein himself had bowed to the observational wisdom of the day and corrected his equations, which had originally predicted an expanding Universe. Now Hubble had demonstrated that Einstein was right in the first place.

The now elderly, world-famous physicist went specially to visit Hubble at Mount Wilson to express his gratitude. He called the original change of his beloved equations *"the greatest blunder of my life."*

Another war stops Hubble again

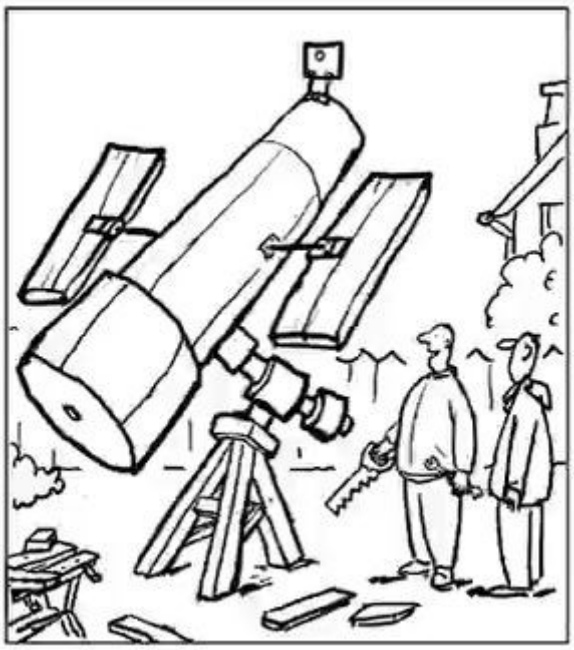
Hubble worked on indefatigably at Mount Wilson until the summer of 1942, when he left to serve in World War II. He was awarded the Medal of Merit in 1946. Finally, he went back to his Observatory. His last great contribution to astronomy was a central role in the design and construction of the Hale 200-inch Telescope on Palomar Mountain. Four times as powerful as the Hooker, the Hale would be the largest telescope on Earth for decades. In 1949, he was honoured by being allowed the first use of the telescope.

… Edwin Powell Hubble

No Nobel Prize for an astronomer

During his life, Hubble had tried to obtain the Nobel Prize, even hiring a publicity agent to promote his cause in the late 1940s, but all the effort was in vain as there was no category for astronomy. Hubble died in 1953 while preparing for several nights of observations, his last great ambition unfulfilled.

He would have been thrilled had he known that the Space Telescope is named after him, so that astronomers can continue to *"hope to find something we had not expected"*, as he said in 1948 during a BBC broadcast in London.



'It's based on the Hubble Space Telescope.'

International Space Station:
Facts, History & Tracking

By Tim Sharp

The International Space Station, as photographed by crewmembers aboard the space shuttle Endeavour in 2010. *Credit: NASA*

The International Space Station (ISS) is the most complex international scientific and engineering project in history and the largest structure humans have ever put into space. This high-flying satellite is a laboratory for new technologies and an observation platform for astronomical, environmental and geological research. As a permanently occupied outpost in outer space, it serves as a stepping-stone for further space exploration. This includes Mars, which NASA is now stating is its goal for human space exploration.

The space station flies at an average altitude of 248 miles (400 kilometers) above Earth. It circles the globe every 90 minutes at a speed of about 17,500 mph (28,000 kph). In one day, the station travels about the distance it would take to go from Earth to the moon and back. The space station can rival the brilliant planet Venus in brightness and appears as a bright moving light across the night sky. It can be seen from Earth without the use of a telescope by night sky observers who know when and where to look. You can use our Satellite Tracker page powered by N2YO.com to find out when to see the space station.

Five different space agencies representing 15 countries built the $100-billion International Space Station and continue to operate it today. NASA, Russia's Roscosmos State Corporation for Space Activities (Roscosmos), the European Space Agency, the Canadian Space Agency and the Japan Aerospace Exploration Agency are the primary space agency partners on the project.

… International Space Station

Structure

The International Space Station was taken into space piece-by-piece and gradually built in orbit. It consists of modules and connecting nodes that contain living quarters and laboratories, as well as exterior trusses that provide structural support, and solar panels that provide power. The first module, Russia's Zarya module, launched in 1998. The station has been continuously occupied since Nov. 2, 2000.

Starting in 2015, changes to the ISS were performed to prepare the complex for crewed commercial spacecraft, which will begin arriving as early as 2017. Two international docking adapters will be added to the station. Additionally, an inflatable module from Bigelow Aerospace is scheduled to arrive in 2016.

Current plans call for the space station to be operated through at least 2020. NASA has requested an extension until 2024. Discussions to extend the space station's lifetime are ongoing among all international partners; several countries, such as Canada, Russia and Japan, have expressed their support for extending the station's operations.

During the space station's major construction phase, some Russian modules and docking ports were launched directly to the orbiting lab, while other NASA and international components (including Russian hardware) were delivered on U.S. space shuttles.

How big is the International Space Station?

The space station, including its large solar arrays, spans the area of a U.S. football field, including the end zones, and weighs 861,804 lbs. (391,000 kilograms), not including visiting vehicles. The complex now has more liveable room than a conventional five-bedroom house, and has two bathrooms, gym facilities and a 360-degree bay window. Astronauts have also compared the space station's living space to the cabin of a Boeing 747 jumbo jet.

Crew size

A six-person expedition crew typically stays four to six months aboard the ISS. The first space station crews were three-person teams, though after the tragic Columbia shuttle disaster the crew size temporarily dropped to two-person teams. The space station reached its full six-person crew size in 2009 as new modules, laboratories and facilities were brought online. Also in 2009, the record for the largest gathering in space was set during NASA's STS-127 shuttle mission aboard Endeavour. When Endeavour docked with the International Space Station, the shuttle's seven-person crew went aboard the orbiting lab, joining the six spaceflyers already there. The 13-person party was the largest-ever gathering of people in space at the same time. While subsequent NASA shuttle and station crews matched the 13-person record, it has never been topped.

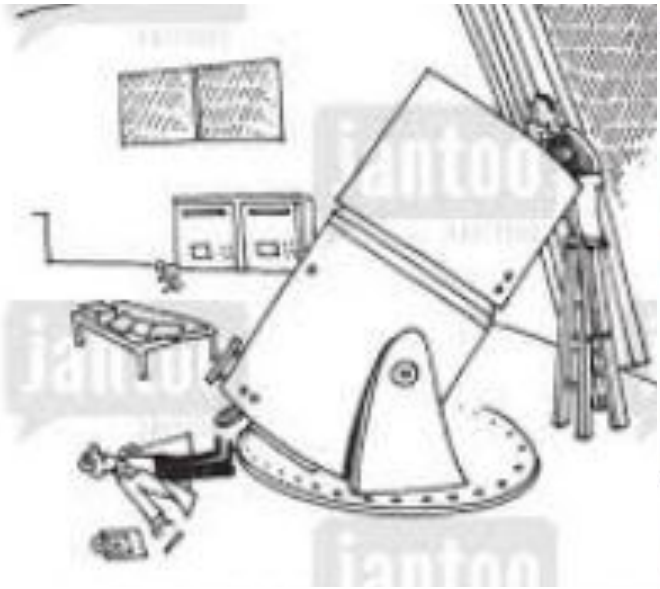
With a full complement of six crewmembers, the station operates as a full research facility. In recent years, technology such as 3-D printing, autonomous Earth imaging, laser communications and mini-satellite launchers have been added to the station; some are controlled by crewmembers, and some controlled by the ground. Additionally, there are dozens of ongoing investigations looking at the health of astronauts staying on the station for several months. Crews are not only responsible for science, but also for maintaining the station. Sometimes, this requires that they venture on spacewalks to perform repairs. From time to time, these repairs can be urgent — such as when a part of the ammonia system fails, which has happened a couple of times.

… International Space Station

Spacewalk safety procedures were changed after a potentially deadly 2013 incident when astronaut Luca Parmitano's helmet filled with water while he was working outside the station. NASA now responds quickly to “water incursion” incidents. It also has added pads to the spacesuits to soak up the liquid, and a tube to provide an alternate breathing location should the helmet fill with water. NASA is also testing technology that could supplement or replace astronaut spacewalks. One example is Robonaut. A prototype currently on board the station is able to flip switches and do other routine tasks under supervision, and may be modified at some point to work “outside” as well.

If the crew needs to evacuate the station, they can return to Earth aboard two Russian Soyuz vehicles docked to the ISS. Additional crewmembers are transported to the ISS by Soyuz. Prior to the retirement of NASA's space shuttle fleet in 2011, new space station crewmembers were also ferried to and from the station during shuttle missions. In 2017 or so, NASA expects to replace most Soyuz flights with SpaceX's crewed Dragon spacecraft and Boeing's CST-100. Crews aboard the ISS are assisted by mission control centers in Houston and Moscow and a payload control center in Huntsville, Alabama. Other international mission control centers support the space station from Japan, Canada and Europe. The ISS can also be controlled from mission control centers in Houston or Moscow.

The ISS hosted its first one-year crew in 2015-16, with NASA's Scott Kelly and Roscosmos' Mikhail Kornienko, which drew international attention and acclaim. The agencies have expressed interest in running more one-year missions in the future, but have not made a commitment to date.



Calm down, Professor,. It’s just a cricket!

Meteoroid

From Wikipedia, the free encyclopedia

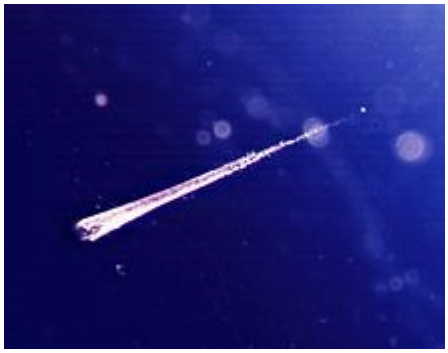
A **meteoroid** (/ˈmiːtiərɔɪd/) is a small rocky or metallic body in outer space.

Meteoroids are significantly smaller than asteroids, and range in size from small grains to 1 meter -wide objects. Objects smaller than this are classified as micrometeoroids or space dust. Most are fragments from comets or asteroids, whereas others are collision impact debris ejected from bodies such as the Moon or Mars.

When a meteoroid, comet, or asteroid enters Earth's atmosphere at a speed typically in excess of 20 km/s (72,000 km/h; 45,000 mph), aerodynamic heating of that object produces a streak of light, both from the glowing object and the trail of glowing particles that it leaves in its wake. This phenomenon is called a meteor or "shooting star". A series of many meteors appearing seconds or minutes apart and appearing to originate from the same fixed point in the sky is called a meteor shower. I f that object withstands ablation from its passage through the atmosphere as a meteor and impacts with the ground, it is then called a meteorite.

An estimated 15,000 tonnes of meteoroids, micrometeoroids and different forms of space dust enter Earth's atmosphere each year.

Meteoroids



Meteoroid embedded in aerogel. The meteoroid is 10 μm in diameter and its track is 1.5 mm long.

2008 TC3 meteorite fragments found on February 28, 2009, in the Nubian Desert, Sudan

In 1961, the International Astronomical Union defined a meteoroid as "a solid object moving in interplanetary space, of a size considerably smaller than an asteroid and considerably larger than an atom". In 1995, Beech and Steel, writing in the *Quarterly Journal of the Royal Astronomical Society*, proposed a new definition where a meteoroid would be between 100 μm and 10 meters across. In 2010, following the discovery of asteroids below 10 m in size, Rubin and Grossman revised the previous definition of meteoroid to objects between 10 μm and 1 m in diameter in order to maintain the distinction. According to Rubin and Grossman, the minimum size of an asteroid is given by what can be discovered from Earth-bound telescopes, so the distinction between meteoroid and asteroid is fuzzy. Some of the smallest asteroids discovered (based on absolute magnitude *H*) are 2008 TS_{26} with $H = 33.2$ and 2011 CQ1 with $H = 32.1$ both with an estimated size of 1 meter. Objects smaller than meteoroids are classified as micrometeoroids and cosmic dust. The Minor Planet Center does not use the term "meteoroid".

… Meteoroid

Composition

Almost all meteoroids contain extraterrestrial nickel and iron. They have three main classifications: iron, stone, and stony-iron. Some stone meteoroids contain grain-like inclusions known as chondrules and are called chondrites. Stony meteoroids without these features are called "achondrites", which are typically formed from extraterrestrial igneous activity; they contain little or no extraterrestrial iron. The composition of meteoroids can be inferred as they pass through Earth's atmosphere from their trajectories and the light spectra of the resulting meteor. Their effects on radio signals also give information, especially useful for daytime meteors, which are otherwise very difficult to observe.

From these trajectory measurements, meteoroids have been found to have many different orbits, some clustering in streams *(see meteor showers)* often associated with a parent comet, others apparently sporadic. Debris from meteoroid streams may eventually be scattered into other orbits. The light spectra, combined with trajectory and light curve measurements, have yielded various compositions and densities, ranging from fragile snowball-like objects with density about a quarter that of ice, to nickel-iron rich dense rocks. The study of meteorites also gives insights into the composition of non-ephemeral meteoroids.

In the Solar System

Most meteoroids come from the asteroid belt, having been perturbed by the gravitational influences of planets, but others are particles from comets, giving rise to meteor showers. Some meteoroids are fragments from bodies such as Mars or our moon, that have been thrown into space by an impact.

Meteoroids travel around the Sun in a variety of orbits and at various velocities. The fastest move at about 42 kilometers per second through space in the vicinity of Earth's orbit. This is escape velocity from the sun, equal to the square root of 2 times Earth's speed, and is the upper speed limit of objects in the vicinity of Earth, unless they come from interstellar space. Earth travels at about 29.6 kilometers per second, so when meteoroids meet the atmosphere head-on (which only occurs when meteors are in a retrograde orbit such as the Eta Aquarids, which are associated with the retrograde Halley's Comet) the combined speed may reach about 71 kilometers per second. Meteoroids moving through Earth's orbital space average about 20 km/s. On January 17, 2013 at 05:21 PST, a 1 meter-sized comet from the Oort cloud entered Earth atmosphere over a wide area in California and Nevada.

The object had a retrograde orbit with perihelion at 0.98 ± 0.03 AU. It approached from the direction of the constellation Virgo, and collided head-on with Earth atmosphere at 72 ± 6 km/s vapourising more than 100 km above ground over a period of several seconds.

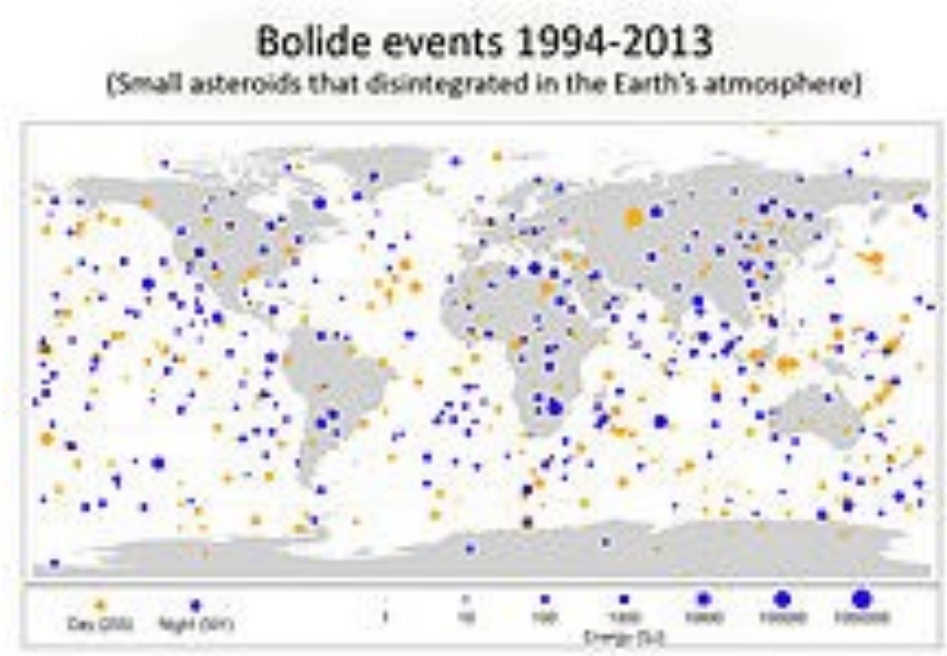
Collision with Earth's atmosphere

When meteoroids intersect with Earth's atmosphere at night, they are likely to become visible as meteors. If meteoroids survive the entry through the atmosphere and reach Earth's surface, they are called meteorites. Meteorites are transformed in structure and chemistry by the heat of entry and force of impact. A noted 4-meter asteroid, 2008 TC3, was observed in space on a collision course with Earth on 6 October 2008 and entered Earth's atmosphere the next day, striking a remote area of northern Sudan. It was the first time that a meteoroid had been observed in space and tracked prior to impacting Earth. NASA has produced a map showing the most notable asteroid collisions with Earth and its atmosphere from 1994 to 2013 from data gathered by U.S. government sensors.

… Meteoroid

Meteors

Meteor seen from the site of the Atacama Large Millimeter Array (ALMA)



World map of large meteoric events

A **meteor**, known colloquially as a "shooting star" or "falling star", is the visible passage of a glowing meteoroid, micrometeoroid, comet or asteroid through Earth's atmosphere, after being heated to incandescence by collisions with air molecules in the upper atmosphere, creating a streak of light via its rapid motion and sometimes also by shedding glowing material in its wake. Although a meteor may seem to be a few thousand feet from the Earth, meteors typically occur in the mesosphere at altitudes from 76 to 100 km (47 to 62 mi). The root word *meteor* comes from the Greek *meteōros*, meaning "high in the air".

Millions of meteors occur in Earth's atmosphere daily. Most meteoroids that cause meteors are about the size of a grain of sand. Meteors may occur in showers, which arise when Earth passes through a stream of debris left by a comet, or as "random" or "sporadic" meteors, not associated with a specific stream of space debris. A number of specific meteors have been observed, largely by members of the public and largely by accident, but with enough detail that orbits of the meteoroids producing the meteors have been calculated. All of the orbits passed through the asteroid belt. The atmospheric velocities of meteors result from the movement of Earth around the Sun at about 30 km/s (18 miles/second), the orbital speeds of meteoroids, and the gravity well of Earth.

… Meteoroid

Meteors become visible between about 75 to 120 km (47 to 75 mi) above Earth. They usually disintegrate at altitudes of 50 to 95 km (31 to 59 mi). Meteors have roughly a fifty percent chance of a daylight (or near daylight) collision with Earth. Most meteors are, however, observed at night, when darkness allows fainter objects to be recognized. For bodies with a size scale larger than 10 cm to several meters meteor visibility is due to the atmospheric ram pressure (not friction) that heats the meteoroid so that it glows and creates a shining trail of gases and melted meteoroid particles. The gases include vaporised meteoroid material and atmospheric gases that heat up when the meteoroid passes through the atmosphere. Most meteors glow for about a second.

History

Although meteors have been known since ancient times, they were not known to be an astronomical phenomenon until early in the 19th century. Prior to that, they were seen in the West as an atmospheric phenomenon, like lightning, and were not connected with strange stories of rocks falling from the sky. In 1807, Yale University chemistry professor Benjamin Silliman investigated a meteorite that fell in Weston, Connecticut. Silliman believed the meteor had a cosmic origin, but meteors did not attract much attention from astronomers until the spectacular meteor storm of November 1833. People all across the eastern United States saw thousands of meteors, radiating from a single point in the sky. Astute observers noticed that the radiant, as the point is now called, moved with the stars, staying in the constellation Leo.
The astronomer Denison Olmsted made an extensive study of this storm, and concluded that it had a cosmic origin. After reviewing historical records, Heinrich Wilhelm Matthias Olbers predicted the storm's return in 1867, which drew the attention of other astronomers to the phenomenon. Hubert A. Newton's more thorough historical work led to a refined prediction of 1866, which proved to be correct. With Giovanni Schiaparelli's success in connecting the Leonids (as they are now called) with comet Tempel-Tuttle, the cosmic origin of meteors was now firmly established. Still, they remain an atmospheric phenomenon, and retain their name "meteor" from the Greek word for "atmospheric".

Fireball

A **fireball** is a brighter-than-usual meteor. The International Astronomical Union (IAU) defines a fireball as "a meteor brighter than any of the planets" (apparent magnitude −4 or greater). The International Meteor Organization (an amateur organization that studies meteors) has a more rigid definition. It defines a fireball as a meteor that would have a magnitude of −3 or brighter if seen at zenith. This definition corrects for the greater distance between an observer and a meteor near the horizon. For example, a meteor of magnitude −1 at 5 degrees above the horizon would be classified as a fireball because, if the observer had been directly below the meteor, it would have appeared as magnitude −6.

Fireballs reaching apparent magnitude −14 or brighter are called bolides. The IAU has no official definition of "bolide", and generally considers the term synonymous with "fireball". Astronomers often use "bolide" to identify an exceptionally bright fireball, particularly one that explodes. They are sometimes called detonating fireballs *(also see List of meteor air bursts)*. It may also be used to mean a fireball which creates audible sounds. In the late twentieth century, bolide has also come to mean any object that hits Earth and explodes, with no regard to its composition (asteroid or comet). The word *bolide* comes from the Greek βολίς (*bolis*) which can mean *a missile* or *to flash*. If the magnitude of a bolide reaches −17 or brighter it is known as a superbolide. A relatively small percentage of fireballs hit Earth's atmosphere and then pass out again: these are termed Earth-grazing fireballs. Such an event happened in broad daylight over North America in 1972. Another rare phenomena is a meteor procession, where the meteor breaks up into several fireballs traveling nearly parallel to the surface of Earth.

… Meteoroid

A steadily growing number of fireballs are recorded at the American Meteor Society every year. There are probably more than 500,000 fireballs a year, but most will go unnoticed because most will occur over the ocean and half will occur during daytime.

Fireball Sightings reported to the American Meteor Society

Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Number	726	692	948	1,629	2,326	3,556	3,751	4,210	*3,577*

Effect on atmosphere

Ionization trail of a Perseid meteor seen against the constellation Corona Borealis with its ring of stars

The entry of meteoroids into Earth's atmosphere produces three main effects: ionization of atmospheric molecules, dust that the meteoroid sheds, and the sound of passage. During the entry of a meteoroid or asteroid into the upper atmosphere, an **ionization trail** is created, where the air molecules are ionized by the passage of the meteor. Such ionization trails can last up to 45 minutes at a time. Small, sand-grain sized meteoroids are entering the atmosphere constantly, essentially every few seconds in any given region of the atmosphere, and thus ionization trails can be found in the upper atmosphere more or less continuously. When radio waves are bounced off these trails, it is called meteor burst communications. Meteor radars can measure atmospheric density and winds by measuring the decay rate and Doppler shift of a meteor trail. Most meteoroids burn up when they enter the atmosphere. The left-over debris is called *meteoric dust* or just meteor dust. Meteor dust particles can persist in the atmosphere for up to several months. These particles might affect climate, both by scattering electromagnetic radiation and by catalyzing chemical reactions in the upper atmosphere. Meteoroids or their fragments may achieve **dark flight** after deceleration to terminal velocity. Dark flight starts when they decelerate to about 2–4 km/s (4,500–8,900 mph). Larger fragments will fall further down the strewn field.

Colours

The visible light produced by a meteor may take on various hues, depending on the chemical composition of the meteoroid, and the speed of its movement through the atmosphere. As layers of the meteoroid abrade and ionize, the colour of the light emitted may change according to the layering of minerals. Colours of meteors depend on the relative influence of the metallic content of the meteoroid versus the superheated air plasma, which its passage engenders:

… Meteoroid

Orange-yellow (sodium)

Yellow (iron)

Blue-green (magnesium)

Violet (calcium)

Red (atmospheric nitrogen and oxygen)

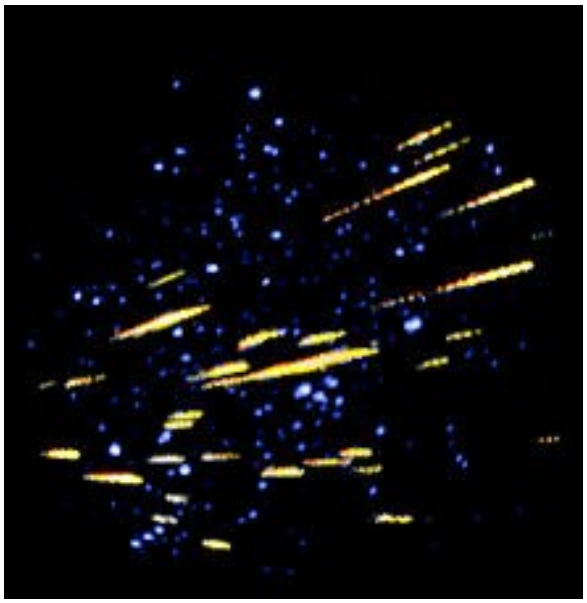
A meteor of the Leonid meteor shower. The photograph shows the meteor, afterglow, and wake as distinct components.

Acoustic manifestations

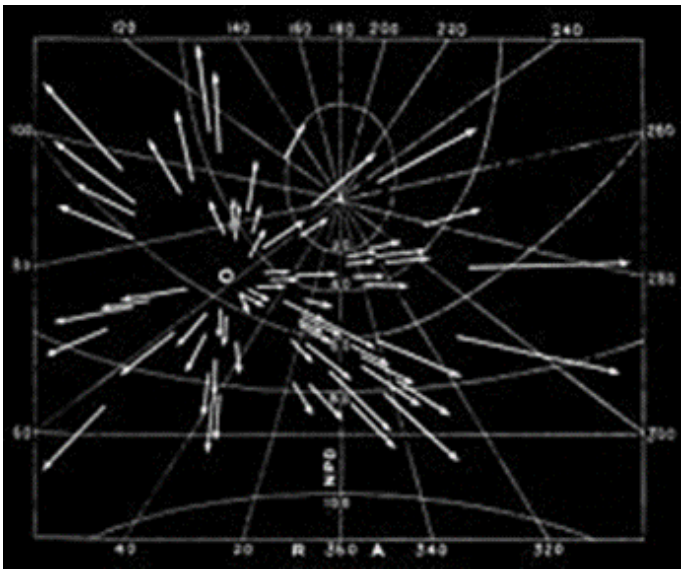
Sound generated by a meteor in the upper atmosphere, such as a sonic boom, typically arrives many seconds after the visual light from a meteor disappears. Occasionally, as with the Leonid meteor shower of 2001,"crackling", "swishing", or "hissing" sounds have been reported, occurring at the same instant as a meteor flare. Similar sounds have also been reported during intense displays of Earth's auroras.

Theories on the generation of these sounds may partially explain them. For example, scientists at NASA suggested that the turbulent ionized wake of a meteor interacts with Earth's magnetic field, generating pulses of radio waves. As the trail dissipates, megawatts of electromagnetic power could be released, with a peak in the power spectrum at audio frequencies. Physical vibrations induced by the electromagnetic impulses would then be heard if they are powerful enough to make grasses, plants, eyeglass frames, and other conductive materials vibrate. This proposed mechanism, although proven to be plausible by laboratory work, remains unsupported by corresponding measurements in the field. Sound recordings made under controlled conditions in Mongolia in 1998 support the contention that the sounds are real.

Meteor shower



Multiple meteors photographed over an extended exposure time during a meteor shower



Meteor shower on chart

… Meteoroid

A meteor shower is the result of an interaction between a planet, such as Earth, and streams of debris from a comet or other source. The passage of Earth through cosmic debris from comets and other sources is a recurring event in many cases. Comets can produce debris by water vapor drag, as demonstrated by Fred Whipple in 1951 and by breakup. Each time a comet swings by the Sun in its orbit, some of its ice vaporizes and a certain amount of meteoroids will be shed. The meteoroids spread out along the entire orbit of the comet to form a meteoroid stream, also known as a "dust trail" (as opposed to a comet's "dust tail" caused by the very small particles that are quickly blown away by solar radiation pressure).

The frequency of fireball sightings increases by about 10-30% during the weeks of vernal equinox. Even meteorite falls are more common during the northern hemisphere's spring season. Although this phenomenon has been known for quite some time, the reason behind the anomaly is not fully understood by scientists. Some researchers attribute this to an intrinsic variation in the meteoroid population along Earth's orbit, with a peak in big fireball-producing debris around spring and early summer. Others have pointed out that during this period the ecliptic is (in the northern hemisphere) high in the sky in the late afternoon and early evening. This means that fireball radiants with an asteroidal source are high in the sky (facilitating relatively high rates) at the moment the meteoroids "catch up" with Earth, coming from behind going in the same direction as Earth. This causes relatively low relative speeds and from this low entry speeds, which facilitates survival of meteorites. It also generates high fireball rates in the early evening, increasing chances of eye witness reports. This explains a part, but perhaps not all of the seasonal variation. Research is in progress for mapping the orbits of the meteors to gain a better understanding of the phenomenon.

Notable meteors

1992—Peekskill, New York - The Peekskill Meteorite was filmed on October 9, 1992 by at least 16 independent videographers. Eyewitness accounts indicate the fireball entry of the Peekskill meteorite started over West Virginia at 23:48 UT (±1 min). The fireball, which travelled in a north-easterly direction, had a pronounced greenish colour, and attained an estimated peak visual magnitude of −13. During a luminous flight time that exceeded 40 seconds the fireball covered a ground path of some 700 to 800 km. One meteorite recovered at Peekskill, New York, for which the event and object gained their name, had a mass of 12.4 kg (27 lb) and was subsequently identified as an H6 monomict breccia meteorite. The video record suggests that the Peekskill meteorite had several companions over a wide area. The companions are unlikely to be recovered in the hilly, wooded terrain in the vicinity of Peekskill.

2009—Bone, Indonesia - A large fireball was observed in the skies near Bone, Indonesia on October 8, 2009. This was thought to be caused by an asteroid approximately 10 meters in diameter. The fireball contained an estimated energy of 50 kilotons of TNT, or about twice the Nagasaki atomic bomb. No injuries were reported.

2009—Southwestern US - A large bolide was reported on 18 November 2009 over south-eastern California, northern Arizona, Utah, Wyoming, Idaho and Colorado. At 00:07 local time a security camera at the high altitude W. L. Eccles Observatory (2930 m above sea level) recorded a movie of the passage of the object to the north. Of particular note in this video is the spherical "ghost" image slightly trailing the main object (this is likely a lens reflection of the intense fireball), and the bright fireball explosion associated with the breakup of a substantial fraction of the object. An object trail can be seen to continue northward after the bright fireball event. The shock from the final breakup triggered seven seismological stations in northern Utah; a timing fit to the seismic data yielded a terminal location of the object at 40.286 N, -113.191 W, altitude 27 km. This is above the Dugway Proving Grounds, a closed Army testing base.

… Meteoroid

2013—Chelyabinsk Oblast, Russia - The Chelyabinsk meteor was an extremely bright, exploding fireball, known as superbolide, measuring about 17 to 20 meters across, with an estimated initial mass of 11,000 tonnes, as the relatively small asteroid entered Earth's atmosphere. It was the largest known natural object to have entered Earth's atmosphere since the Tunguska event in 1908. Over 1,500 people were injured mostly by glass from shattered windows caused by the air burst approximately 25 to 30 km above the environs of Chelyabinsk, Russia on 15 February 2013. An increasingly bright streak was observed during morning daylight with a large contrail lingering behind. At no less than 1 minute and up to at least 3 minutes after the object peaked in intensity (depending on distance from trail), a large concussive blast was heard that shattered windows and set-off car alarms, which was followed by a number of smaller explosions.

Gallery of meteors

Orionid

Orionid

Two Orionids and Milky

Multi-colored Orionid

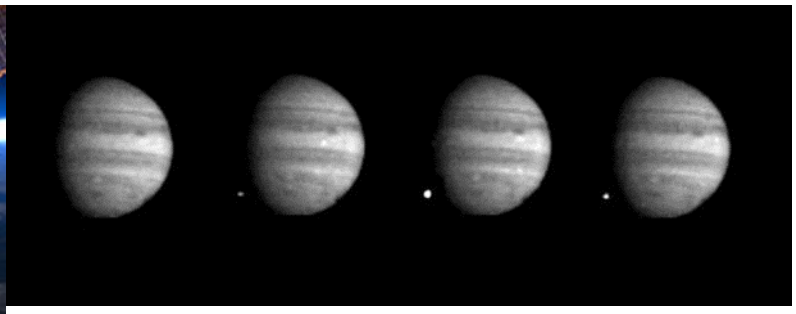
Orionid

The brightest meteor, a fireball, leaves a smoky, persistent trail drifting in high-altitude winds, which is seen at the right-hand side of the image left by Orionid.

A fireball seen over the desert of Central Australia. Although this occurred during the Lyrids, its North-East entry angle indicates it is sporadic.

… Meteoroid

Looking down from the International Space Station at a meteor as it passes through the atmosphere



Comet Shoemaker–Levy 9 colliding with Jupiter: The sequence shows fragment W turning into a fireball on the planet's dark side.

Meteorites

Murnpeowie meteorite, an iron meteorite with regmaglypts resembling thumbprints (Australia, 1910)

A meteorite is a portion of a meteoroid or asteroid that survives its passage through the atmosphere and hits the ground without being destroyed. Meteorites are sometimes, but not always, found in association with hypervelocity impact craters; during energetic collisions, the entire impactor may be vaporized, leaving no meteorites.

Geologists use the term, "bolide", in a different sense from astronomers to indicate a very large impactor. For example, the USGS uses the term to mean a generic large crater-forming projectile in a manner "to imply that we do not know the precise nature of the impacting body ... whether it is a rocky or metallic asteroid, or an icy comet for example".

Meteoroids also hit other bodies in the solar system. On such stony bodies as the Moon or Mars that have little or no atmosphere, they leave enduring craters.

Frequency of impacts

The diameter of the largest impactor to hit Earth on any given day is likely to be about 40 centimeters (16 inches), in a given year about 4 meters, and in a given century about 20 meters. These statistics are obtained by the following:

Over at least the range from 5 centimeters (2.0 inches) to roughly 300 meters (980 feet), the rate at which Earth receives meteors obeys a power-law distribution as follows:

$$N(> D) = 37D^{-2.7}$$

where N ($>D$) is the expected number of objects larger than a diameter of D meters to hit Earth in a year. This is based on observations of bright meteors seen from the ground and space, combined with surveys of near-Earth asteroids. Above 300 meters in diameter, the predicted rate is somewhat higher, with a two-kilometer asteroid (one million-megaton TNT equivalent) every couple of million years — about 10 times as often as the power-law extrapolation would predict.

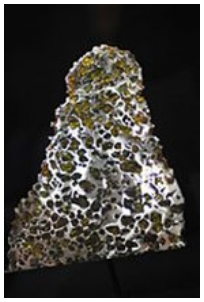
… Meteoroid

Impact craters

Meteoroid collisions with solid Solar System objects, including the Moon, Mercury, Callisto, Ganymede and most small moons and asteroids, create impact craters, which are the dominant geographic features of many of those objects. On other planets and moons with active surface geological processes, such as Earth, Venus, Mars, Europa, Io and Titan, visible impact craters may become eroded, buried or transformed by tectonics over time. In early literature, before the significance of impact cratering was widely recognised, the terms cryptoexplosion or cryptovolcanic structure were often used to describe what are now recognised as impact-related features on Earth. Molten terrestrial material ejected from a meteorite impact crater can cool and solidify into an object known as a tektite. These are often mistaken for meteorites.

Gallery of meteorites

Two tektites, molten terrestrial ejecta from a



A partial slice of the Esquel

Willamette Meteorite, from Oregon, USA

Meteorite, which fell in Wisconsin in 1868

Marília Meteorite, a chondrite H4, which fell in Marília, Brazil

Children posing behind the Tucson Meteorite at the Arizona Museum of Natural History

Meteorite with brecciation and carbon inclusions from Tindouf, Algeria

Members Moments

Logan Naidoo, astronaut Dr Don Thomas, Sheryl Venter and Mike Hadlow

Astronaut Dr Don Thomas meets Redav and Amith Rajpal

… Members Moments

Piet Strauss and Dr Don Thomas

Dr Thomas talking to students at Durban Girls College on 10 November.

The Month Ahead

Please return all raffle tickets ASAP so the draw can be done at the year-end function

MEETINGS:

The next meeting will be on Wednesday 13 December 2017 @ 19:30 - Year-End Function. Please advise Richard Roland if you will be attending so that catering arrangements can be made.

MNASSA:

Monthly Notes of the Astronomical Society of Southern Africa. Go to www.mnassa.org.za to download your free monthly copy.

MEMBERSHIP FEES:

Members - R 155 Family Membership - R 170 Joining Fee - R 35

Payment by cheque, made payable to **The Astronomical Society of Southern Africa - Natal Centre** and either posted to:

P O Box 20578, Durban North, 4016 or handed in to the treasurer.

EFT: **The Astronomical Society of Southern Africa - Natal Centre**.

Nedbank Account No. **1352 027 674** Durban North Branch Code **135 226**

Please include your initial and surname in the reference line.

CONTACT US:

Chairman & Observatory: Mike Hadlow (+27) 83 3264 085

Vice Chairlady & Events Co-ord & Librarian: Debbie Abel (+27) 83 3264 084

Secretary: Brian Finch (+27) 82 9241 222

Treasurer: Richard Rowland (+27) 82 9203 377

Publicity & Media Liaison: Logan Govender (+27) 83 2286 993

Publicity & Media Liaison: Sihle Kunene (+27) 83 2788 485

Equipment Curator & Teas: Robert Suberg (+27) 73 2324 092

School Liaison, Meet & Greet: Maryanne Jackson (+27) 82 8827 200

Publicity, Media Liaison, Meet & Greet: Sheryl Venter (+27) 82 2022 874

Speakers and Observations: Piet Strauss (+27) 83 7031 626

‘nDaba Editor, Webmaster & Facebook: John Gill (+27) 83 3788 797

All other contact information is available on our website: www.astronomydurban.co.za

ASSA Durban - Minutes of the Meeting

8 November 2017

Welcome: Chairman Mike Hadlow welcomed all present and commented on the good turnout.

Present: 36 members and 6 visitors.

Apologies: 6 Apologies received as per attendance book

Confirmation of previous minutes: Proposed by Farouk Amod, seconded by Logan Govender, the Minutes of the meeting held on 11 October 2017 were confirmed.

Matters arising from previous minutes : Nil.

Secretary`s Report: 2 x courses to be held at UCT in January 2018 were advertised. Details attached, anyone interested to contact Secretary.

Treasurer`s Report: Financial Balances as follows

Current a/c	R 5 376
Savings	R 28 356
Cash on hand	R 3 169
Telescope Fund	R 64 104

Special Projects: Telescope Fund raffle tickets to be returned by 30 November 2017
ASSA Symposium Cape Town March 2018: Names to LG.
Sutherland trip: w/e 13 April. Names to LG.
Northern Lights Tour : costs etc being established for 2018

Observatory: No public viewing was possible in October. Dome undercoating complete.

Publicity: Guinness Viewing attempt scheduled for 18 May 2018. Media Liaison course plus viewing scheduled for 18 November. Year end function set for 13 December and members requested to advise Treasurer of their attendance.

General: 15 Sky Guides 2018 remain available for purchase. A GoTo telescope is available for purchase from Clinton Armitage.

Finally a panel of 6 members (C.A, P.S, L.G, M.W, J.G, P.D.) answered questions on various astronomy matters including life in the universe, living on the moon, gravitational waves, composition of Neptune, fossils on other bodies, human/alien threats, free oxygen availability, dark matter etc.

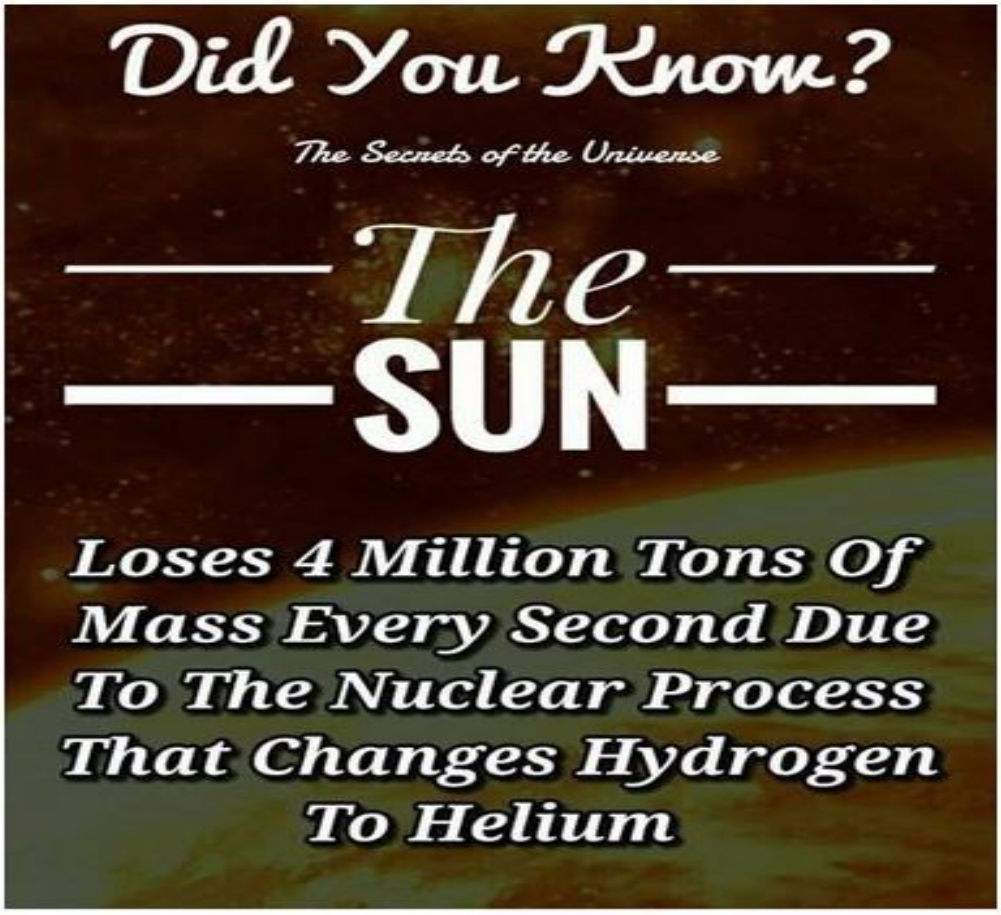
The Chairman thanked all members of the panel for their input and the meeting closed at 21:30

Mike Hadlow — Chairman

Brian Finch — Secretary

Public Viewing Roster

2016-2017	Phone		Phone	Assistant	Date start	Public viewing	Date end
Mike Hadlow	0833264085	Kira Wisniewski	0741034724	Brian Finch	12/10/16	28/10/16	09/11/16
M Jackson	0828827200	Brian Jackson	0828867100	Debbie Abel	09/11/16	25/11/16	14/12/16
John Visser	0823573091	John Gill	0833788797	Peter Foster	14/12/16	30/12/16	11/01/17
David Ellinger	0837639519	Marcia George	0734288394	Mike Hadlow	11/01/17	27/01/17	08/02/17
Mark Hardie		Kirsty Pirie		Kira Wisniewski	08/02/17	24/02/17	08/03/17
Brian Finch		Debbie Abel	0833264084	Maryanne Jackson	08/03/17	24/03/17	12/04/17
Chanu Chetty		Peter Foster	0826555445	John Gill	12/04/17	28/04/17	10/05/17
Navi Naidoo	0844660001	O Rambilass	0837783931	John Visser	10/05/17	26/05/17	14/06/17
Mike Hadlow	0833264085	Kira Wisniewski	0741034724	Sheryl Venter	14/06/17	23/06/17	12/07/17
M Jackson	0828827200	Brian Jackson	0828867100	-	12/07/17	23/07/17	09/08/17
John Visser	0823573091	John Gill	0833788797	-	09/08/17	18/08/17	13/09/17
David Ellinger	0837639519	Marcia George	0734288394	-	13/09/17	22/09/17	11/10/17
Mark Hardie		Kirsty Pirie		-	11/10/17	20/10/17	08/11/17
Brian Finch		Debbie Abel	0833264084	-	08/11/17	17/11/17	15/12/17
Chanu Chetty		Peter Foster	0826555445	-	13/12/17	15/12/17	10/01/18



Pre-Loved Astronomy Equipment

Orion Apex 127mm Compact Maksutov-Cassegrain Telescope

Includes a 25mm Sirius Plossl 1.25" eyepiece, 6x30 finder scope, 45-degree correct-image diagonal, soft carry case, Starry Night astronomy software.

Mounted on Sky-Watcher EQ5 German Equatorial Mount and Tripod.

Additional Orion Expanse 9 mm Ultra Wide Eyepiece.

PRICE: R 6 500

Current new price with extras: R 17 150

Contact Ernest Preiss - Cell: 082 379 3883

Celestron AVX Equatorial Mount

Ideal for astrophotography

2 years old and in excellent condition

Current new price is R 22 000

Contact John Gill 083 378 8797

Price: R 15 000

Green Laser Pointers

50mW — **R 450 each**
Contact Piet on 083 703 1626 on WhatsApp or SMS.

Will also be available at next ASSA meeting.

ASSA Symposium 2018

It is planned to have the 11th ASSA Symposium in Auditorium at the SAAO in Cape Town from Friday 9 to Sunday 11 March, 2018. The theme is:

Amateur Astronomy in the Digital Data Age – *how Amateurs can do real Science*

The aim being to try and recreate the link between professional and amateur astronomers. The advance of astronomical technology with large surveys has robbed the amateur community of many of the niche areas where it used to contribute to science: variable and double star work, comet discovery, SNe for example.

Several ASSA members are collaborating with professionals and it is hoped that the ASSA Symposium 2018 will make for new links and understanding by bringing one or two prominent experts to the Symposium with ideas as to where and how amateurs can contribute and collaborate – much of the needed technology is now within reach of the amateur community.

Some examples of this could be:

monitoring particular objects and/or variable stars
using robotic telescopes for educational and scientific purposes
photometry
spectroscopic SNe follow ups
participating in various Citizen Science projects, like ***"Zooniverse"***

The reasons for choosing Cape Town in March 2018 are the following:
there is a critical mass of both professionals and amateurs
it has several nearby institutions SAAO, UCT, Stellenbosch, UWC, AIMS and SKA HQ
the SAAO has a good accessible venue with catering facilities, good, cheap access by air/bus/car
weather in March usually OK – no SE!!

So before anyone plans to go away on Holiday next year, consider a visit to the fairest Cape – its closer to home, cheaper and also a good opportunity to visit friends and relations. Also remember that booking early saves lots of money that you can then spend in Cape Town!

There is a website, which will be regularly up-dated with the latest news, requests, costs and deadlines etc. Please check it weekly!

This will be a major event that will hopefully give direction to many ASSA members and forge new links

http://symposium2018.assa.saao.ac.za/

It will help the LOC* enormously to let us know if you are thinking of attending, by simply sending me an e-mail (case@saao.ac.za) saying that you are interested in coming or that you will be coming. Sending me an e-mail does NOT commit you to coming – it's merely information. Knowing how many people we need to cater for helps.

Many thanks for your support and look forward to seeing many of you here next year.

* LOC Case Rijsdijk – Chair
Dr Ian Glass
Eddy Nijeboer
Auke Slotegraaf

Preparing for the 11th ASSA Symposium in 2018

It has belatedly been brought to my attention that the Argus Cycle Tour will take place on Sunday, March 11, 2018! Whilst this would normally not affect our Astronomical pursuits, this does have some serious repercussions! The cyclists who take part often plan their participation 1 year ahead and this in turn means that travel to, and accommodation in, Cape Town could be a problem.

I have always maintained that there are no problems, only solutions, so if you are planning to attend the Symposium, decide now and then for:

local delegates this should make no difference,delegates who want/need to drive to Cape Town make sure you book your accommodation* as soon as possible – check the website given on the Symposium website, and delegates who are going to fly to Cape Town, book your flights and accommodation* as soon as possible – flights may well be cheaper now!

* Accommodation; it would make sense to stay with family or friends.

There is a small change to the programme – instead of a Public Lecture on the Friday evening/ night there will be a visit to the new digital Planetarium in the Iziko Museum – currently the world's most advanced one in the world.

As we have not yet finalized the costs, simply register on the website in the meantime; knowing how many delegates there are will help us a lot in planning the finer details of the Symposium.

Notice for the first call for papers will be sent out on Monday, 16 October so that the final programme can be drawn up, and by knowing the number of delegates will help us get a better idea for the registration fee – which we intend to reduce to a minimum. If funding permits, presenters could be subsidized.

Please remember that in 2020 we will be celebrating the SAAO's 200th Anniversary, and there will be preparatory Historical section planning meeting immediately before, and attached to, Symposium 2018; some might want to attend both.

ASSA Symposium 2018 can accommodate about 80 delegates; make sure of your place by registering early, for what I believe will be a memorable and rewarding Symposium with some significant spin-offs and enrichments.

I look forward to seeing many of you in Cape Town, at the SAAO, in March 2018.

Case Rijsdijk
Chair LOC

Mike Hadlow

From: capecentre@gmail.com on behalf of ASSA Cape Centre <capecentre@assa.saao.ac.za>
Sent: 08 November 2017 11:37 AM
To: undisclosed-recipients:
Subject: Fwd: Short courses on Cosmic Dust and Higgs Boson at UCT's 2018 Summer School

Dear Sir/Madam

Your members may be interested in the following two short courses offered in January 2018. The full programme may be browsed here: http://www.summerschool.uct.ac.za/summer-school-2018

1033 THE ORIGIN AND EVOLUTION OF COSMIC DUST

***Dr Shazrene Mohamed**, astronomer, University of Cape Town and South African Astronomical Observatory*

Cosmic dust is important for almost every field of research in astronomy: from studies of the cosmic microwave background radiation to the formation of planets in the Solar System. This course will explore the intimate link between the evolution of stars and the formation, growth and destruction of dust grains. The first lecture will discuss the nature of cosmic dust and outline the cosmic dust cycle. The second will focus on the low- and high-mass stellar systems that form and destroy dust. In the final lecture the observational aspects, for example infrared observations and the upcoming telescopes, such as the James Webb Space Telescope, will be discussed.

LECTURE TITLES

1. What is cosmic dust?

2. Dust around low- and high-mass stars

3. Dust and observational astronomy: current and future perspectives

Date: Monday 15–Wednesday 17 January

Time: 7.30 pm

COURSE FEES Full: R310,00 Staff: R155,00 Reduced: R80,00

1044 THE HIGGS BOSON

***Dr Heather Gray**, Lawrence Berkeley National Laboratory, United States*

This five-lecture course will begin with an introduction to particle physics and introduce the Higgs boson and the special role it plays in different theories. The various ways to produce and decay the Higgs boson

will be outlined. This will be followed by a discussion of the experimental tools, accelerators and detectors used to create and measure tiny particles. The next two lectures will examine two methods that have been, and are, used to detect the Higgs boson: either using light or heavy particles. These two methods played a critical role in the discovery of the Higgs boson at CERN in 2012. The final lecture will review what is currently known about the Higgs boson and discuss what scientific possibilities the future may hold.

LECTURE TITLES

1. What is the Higgs boson?
2. Accelerators and detectors: creating and measuring tiny particles
3. Seeing the Higgs with light
4. Seeing the Higgs with heavy particles
5. We've found the Higgs. What's next?

Date: 22–26 January

Time: 9.15 am

COURSE FEES Full: R510,00 Staff: R255,00 Reduced: R130,00

Kind regards

Finuala Dowling

Dr Finuala Dowling

Senior Lecturer

Centre for Extra Mural Studies

University of Cape Town

Room 3.21., Kramer Law Building, Rondebosch,
7700,South Africa

Email:finuala.dowling@uct.ac.za

Phone: +27 (0)21 650 2886

Fax: +27 (0)21 650 2893