APOD 2009 September 7

This vacation included a sight to remember.

Pictured above, a picturesque starscape capped a serene seascape as seen from **Turkey** this past August. In the above digitally stitched panorama, the Gelidonya Lighthouse shines in the foreground before a calm **Mediterranean Sea.**

On the left, Jupiter is the brightest point in the image and since on the same side of the Sun as the Earth, was near its yearly brightest. Glowing just shy of **magnitude -3, Jupiter** was brighter than any star in the sky, and brighter even than Mars was during its famously bright opposition of 2003 August.

On the right, the band of the Milky Way Galaxy fades into distant atmospheric haze above the horizon.

Jupiter is nearing the closest part of its elliptical orbit to the Sun and so will appear even brighter during its next opposition in 2010 September.

Ciel à l'œil nu (vu de l'Himalaya)

APOD 2009 December 5

Himalayan Skyscape

Credit & Copyright: Babak Tafreshi (TWAN)

Capella, alpha star of the constellation Auriga, rises over Mt. Everest in this panoramic view of the top of the world at night. The scene was recorded in late November near Namche Bazar, Nepal, gateway to the Himalayan mountain range. **Moonlight illuminates the famous peaks** of Everest (8840 meters) and Lhotse (8516 meters) at the far left, and a stupa (a Buddhist religious monument) in the foreground, along the main trail to the Everest Base Camp. The light in the valley is from the Tengboche Monastery, also along the trail at about 4000 meters. From left to right above the moonlit peaks, the stars of Auriga give way to bright giant star Aldebaran eye of the Taurus the Bull, the Pleiades star cluster, alpha Ceti, and finally alpha Phoenicis of the Phoenix.

APOD 2011 January 3

Winter Hexagon Over Stagecoach Colorado

Credit & Copyright: Jimmy Westlake (Colorado Mountain College)

If you can find **Orion**, you might be able to find the Winter Hexagon. The Winter Hexagon involves some of the brightest stars visible, together forming a large and easily found pattern in the winter sky of Earth's northern hemisphere. The stars involved can usually be identified even in the bright night skies of a big city, although here they appear over darker Stagecoach, Colorado, USA..

The six stars that compose the Winter Hexagon are Aldebaran, **Capella, Castor** (and Pollux), **Procyon, Rigel, and Sirius**. Here, the band of our Milky Way Galaxy runs through the center of the Winter Hexagon, while the Pleiades open star cluster is visible just above.

The Winter **Hexagon asterism** engulfs several constellations including much of the iconic steppingstone **Orion.**

APOD 2006 June 29

Old Moon and Sister Stars

Credit & Copyright: Vincent Jacques

An old crescent Moon shares the eastern sky over **Menton, France** with the sister stars of the Pleiades cluster in this **early morning** skyscape recorded just last Friday, June 23rd. (Bright Venus was also near the eastern horizon, but is not pictured here.) Astronomical images of the well-known Pleiades often show the cluster's alluring blue reflection nebulae, but they are washed out here by the **bright moonlight**. Still, while the crescent Moon is overexposed, surface features can be seen on the dim lunar night side illuminated by earthshine - light from sunlit planet Earth. Of course, you can spot a young crescent Moon in the early evening sky tonight. Having left the Pleiades behind, a lovely lunar crescent now appears in the west, lining up with planets Mars, Saturn, and Mercury along the solar system's ecliptic plane.

Les Pléïades au télescope

APOD 2006 January 9

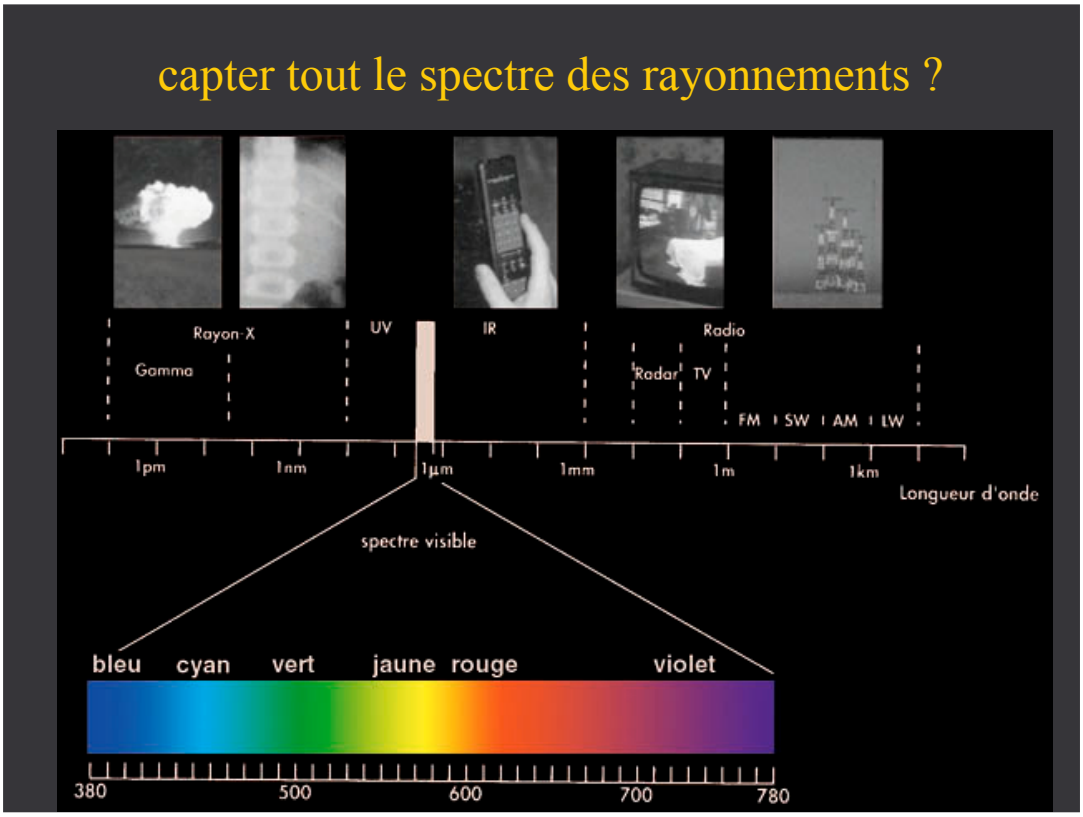
Perhaps the most famous star cluster on the sky, the Pleiades can be seen without binoculars from even the depths of a light-polluted city. Also known as the **Seven Sisters** and M45, the Pleiades is one of the brightest and closest open clusters.

The Pleiades contains over 3000 stars, is about **400 light years away**, and only **13 light years across**.

Quite evident in the above photograph are the **blue reflection nebulae** that surround the brighter cluster stars.

Low mass, faint, brown dwarfs have also been found in the Pleiades.

(Editors' note: The prominent diffraction spikes are caused by the telescope itself and may be either distracting or provide aesthetic enhancement, depending on your point of view.)



Crédits : www.cours-online.be

APOD 2009 October 14

Pleiades and Stardust

Credit & Copyright: Rogelio Bernal Andreo (Deep Sky Colors)

Have you ever seen the Pleiades star cluster? Perhaps the most famous star cluster on the sky, the Pleiades can be seen without binoculars from even the depths of a light-polluted city. Also known as the **Seven Sisters** and M45, the Pleiades is one of the brightest and closest open clusters. Hurtling through a cosmic dust cloud a mere 400 light-years away, the Pleiades or Seven Sisters star cluster is well-known for its striking **blue reflection nebulae**.

This remarkable wide-field (3 degree) image of the region shows the famous star cluster near the center, while highlighting lesser known **dusty reflection nebulas nearby**, across an area that would span over 20 light-years. In this case, the sister stars and cosmic dust clouds are not related, **they just happen to be passing through the same region of space**.

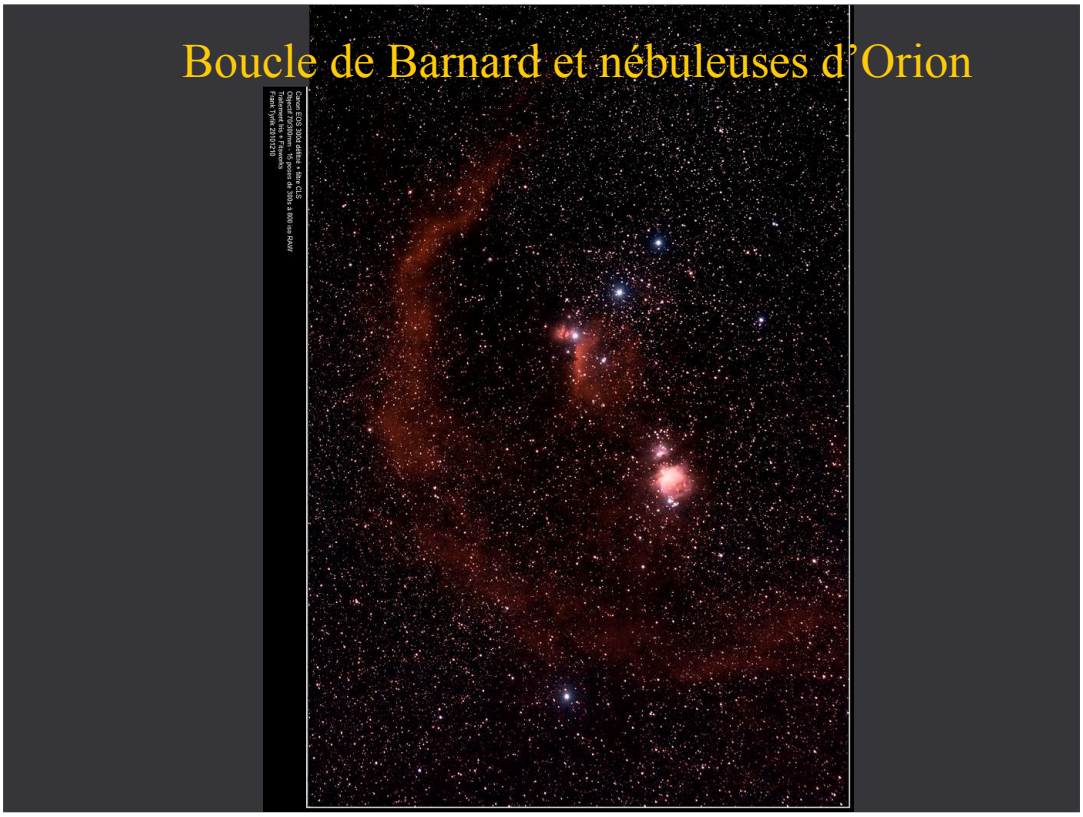
ciel d’été vers le sud, photographie

APOD 2007 May 25

In this gorgeous skyscape, gas giant Jupiter along with the stars and **cosmic dust clouds of the Milky Way** hang over the southern horizon in the early morning hours as seen from Stagecoach, Colorado, USA.

Recorded on Thursday, Jupiter is the brightest object near picture center. Along with the stunning Milky Way, Jupiter is hard to miss, but a careful inspection of the view also reveals main belt asteroid Vesta. Of all the asteroids Vesta is the brightest and is now just bright enough to be visible to the naked eye from locations with very dark, clear skies. Vesta (as well as Jupiter) appears relatively bright now because it is near opposition, literally opposite the Sun in planet Earth's sky and closest to Earth in its orbit.

For Vesta, this opposition offers the best viewing in many years. The year 2007 also coincides with the 200th anniversary of the asteroid's discovery. Starting late next month, NASA plans to launch the Dawn mission intended to explore Vesta (and Ceres) and the main asteroid belt.



Astrosurf frank-astro

Frank Tyrlik 2010/12/10.

la pommeraie sur sèvre (85)

Par une belle nuit glaciale de vendredi à samedi, j'ai imagé la boucle de Barnard au Canon 300d défiltré + téléobjectif de 70/300 Sigma réglé à 70mm

Canon EOS 300d défiltré + filtre CLS

Objectif 70/300mm

15 poses de 300s (= **1h15m**) à 800 iso RAW

Traitement Iris + Fitworks

Nébuleuse de la Flamme et Tête de Cheval

Portail Canon EOS numérique

http://www.eos-numerique.com/forum

Avatar de **Sendell**

Animateur Atelier "Astronomie”

Boîtier: 7D, 40DAstro

Objectif(s): 8-500/1.4-5.6

IC434 est la nébuleuse, nuage d'hydrogène ionisé par une étoile proche (la plus brillante en haut de la photo), devant laquelle est présent le nuage de poussière à la forme si reconnaissable, découvert en 1888 grâce à la photographie.

En bas à gauche on voit la Nébuleuse de la Flamme (NGC2024)

2 heures (30x4m) de pose, EOS 350D "Baader" ISO800, lunette TMB80 384mm f4.8, sur monture Losmandy Titan. Prétraitements avec DeepSkyStacker (5 darks, 9 flats, 9 offset), traitements avec Photoshop

Dernière modification par Sendell ; 20/02/2009 à 12h07.

Wikipedia (en)

http://en.wikipedia.org/wiki/Orion_Nebula

distance **1100 al**

Gallery

Panoramic image of the Orion Nebulae, taken by Ioannidis Panos with an 8 Inch Newtonian telescope and a Nikon D70 camera.

Wikipedia

http://www.spitzer.caltech.edu/images/2154-sig08-004-Hands-in-a-Bag-color-Visible-vs-Infrared-Light

Infrared light can pass right through objects that stop visible light entirely. In the image on the left, you can't see the man's hands at all - the **plastic bag** stops the visible light from passing through. In the infrared image on the right, shot with a thermal infrared camera sensitive from 7.5-13 microns, the bag seems to disappear, and his hands are visible. But just like infrared light can get through some things that visible light doesn't, it's also stopped by some things that let visible light through. Notice the **eyeglasses** in both images. In infrared light, they're completely opaque.

Wikipedia

Two views of the Trapezium cluster in the Orion Nebula, from the **Hubble Space Telescope.**

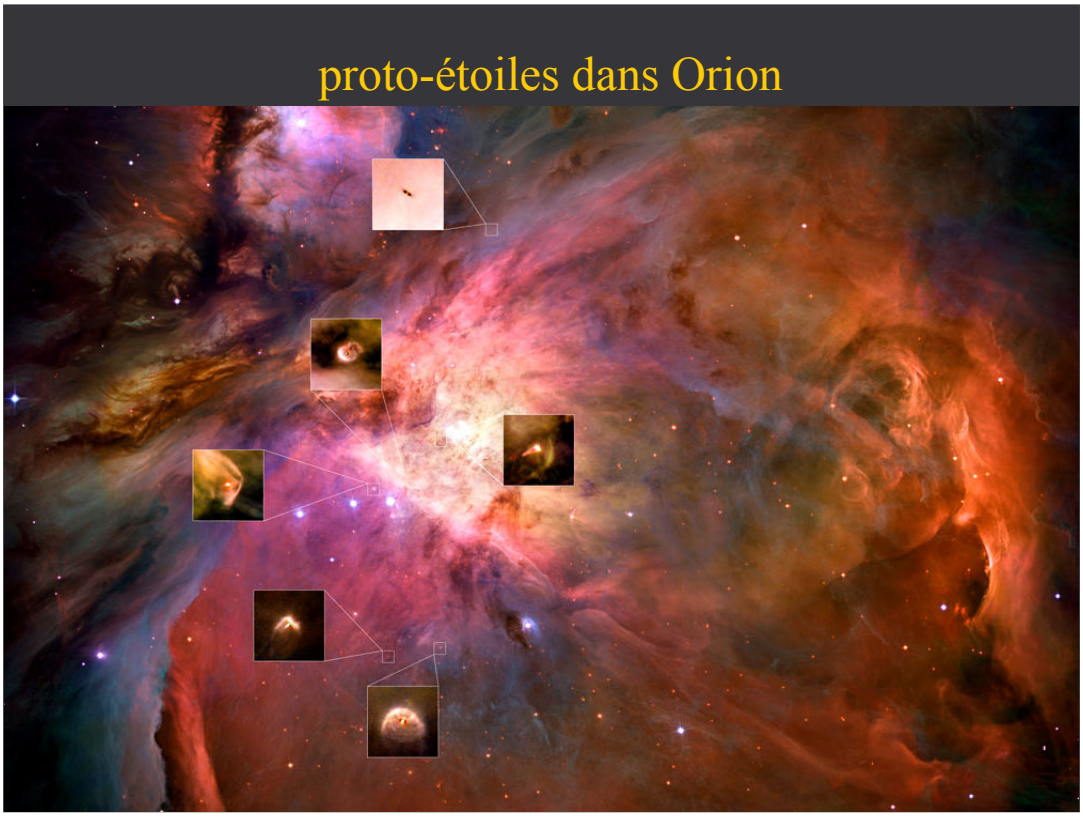
The image on the left, an optical spectrum image taken with Hubble's WFPC2 camera, shows a few stars shrouded in glowing gas and dust.

On the right, an image taken with Hubble's NICMOS infrared camera penetrates the haze to reveal a swarm of stars as well as brown dwarfs.

Source: http://hubblesite.org/newscenter/newsdesk/archive/releases/2000/19

Credits for near-infrared image: NASA; K.L. Luhman (Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass.); and G. Schneider, E. Young, G. Rieke, A. Cotera, H. Chen, M. Rieke, R. Thompson (Steward Observatory, University of Arizona, Tucson, Ariz.)

Credits for visible-light picture: NASA, C.R. O'Dell and S.K. Wong (Rice University)



Hubble's sharpest image of the Orion Nebula with proplyd highlights. Credit: NASA, ESA

Looking like a graceful watercolour painting, the Orion Nebula is one of the most photogenic objects in space and one of the **Hubble Space Telescope's favourite targets.** As newborn stars emerge from the nebula's mixture of gas and dust, protoplanetary discs, also known as proplyds, form around them: the centre of the spinning disc heats up and becomes a new star, but remnants around the outskirts of the disc attract other bits of dust and clump together. Proplyds are thought to be young planetary systems in the making. In an ambitious survey of the familiar nebula using Hubble's Advanced Camera for Surveys (ACS), researchers have discovered **42 protoplanetary discs**.

Visible to the naked eye, the Orion Nebula has been known since ancient times, but was first described in the early 17th century by the French astronomer Nicolas-Claude Fabri de Peiresc — who is given credit for discovering it. **At 1500 light-years away**, the nebula, also known as Messier 42, is **the closest star-forming region to Earth** with stars massive enough to heat up the surrounding gas, setting it ablaze with colour, and making the region stand out to stargazers.

Orion Nebula proplyd atlas. Credit: NASA, ESA

The brighter discs are indicated by a glowing cusp in the excited material and facing the bright star, but which we see at **a random orientation** within the nebula, so some appear edge on, and others face on, for instance. Other interesting features enhance the look of these captivating objects, such as emerging jets of matter and shock waves. The dramatic shock waves are formed when the stellar wind from the nearby massive star collides with the gas in the nebula, sculpting boomerang shapes or arrows or even, in the case of 181-825, a space jellyfish!

It is relatively rare to see visible images of proplyds, but the high resolution and sensitivity of Hubble and the Orion Nebula's proximity to Earth allow for precise views of these potential planetary systems.

This proplyd atlas is the first scientific outcome from the HST Treasury Program on the Orion Nebula.

http://spacefellowship.com/news/art17000/born-in-beauty-proplyds-in-the-orion-nebula.html

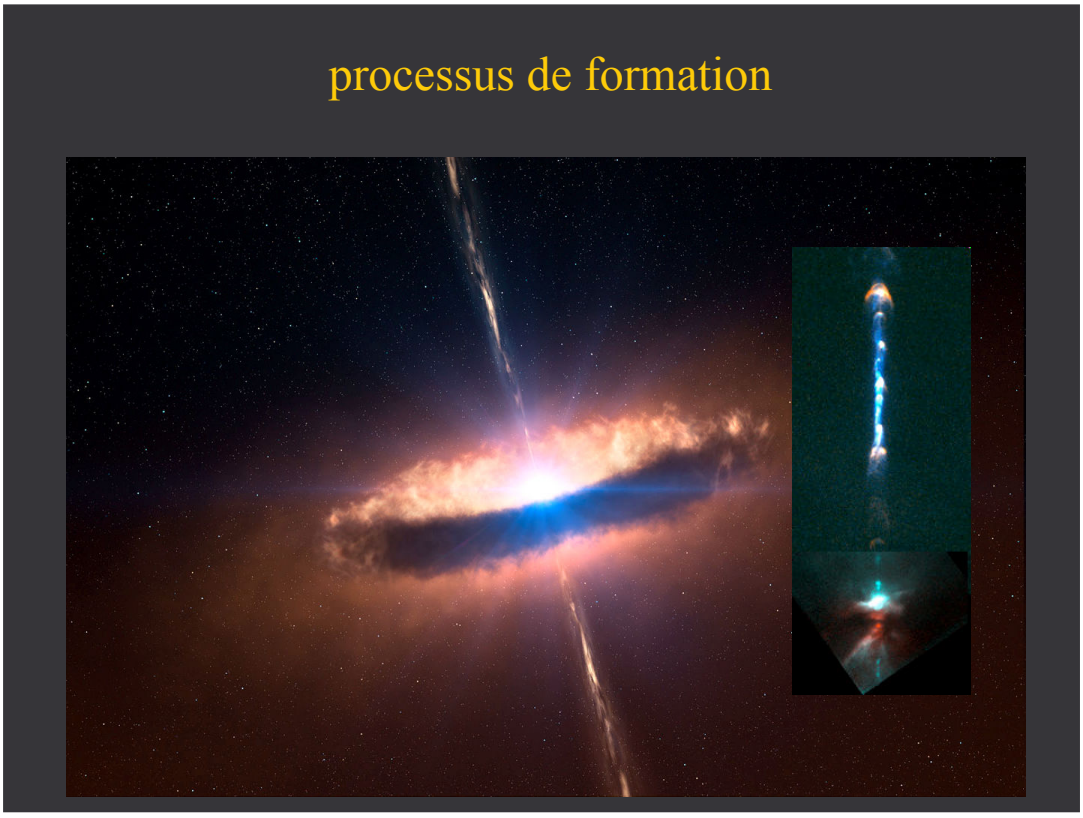
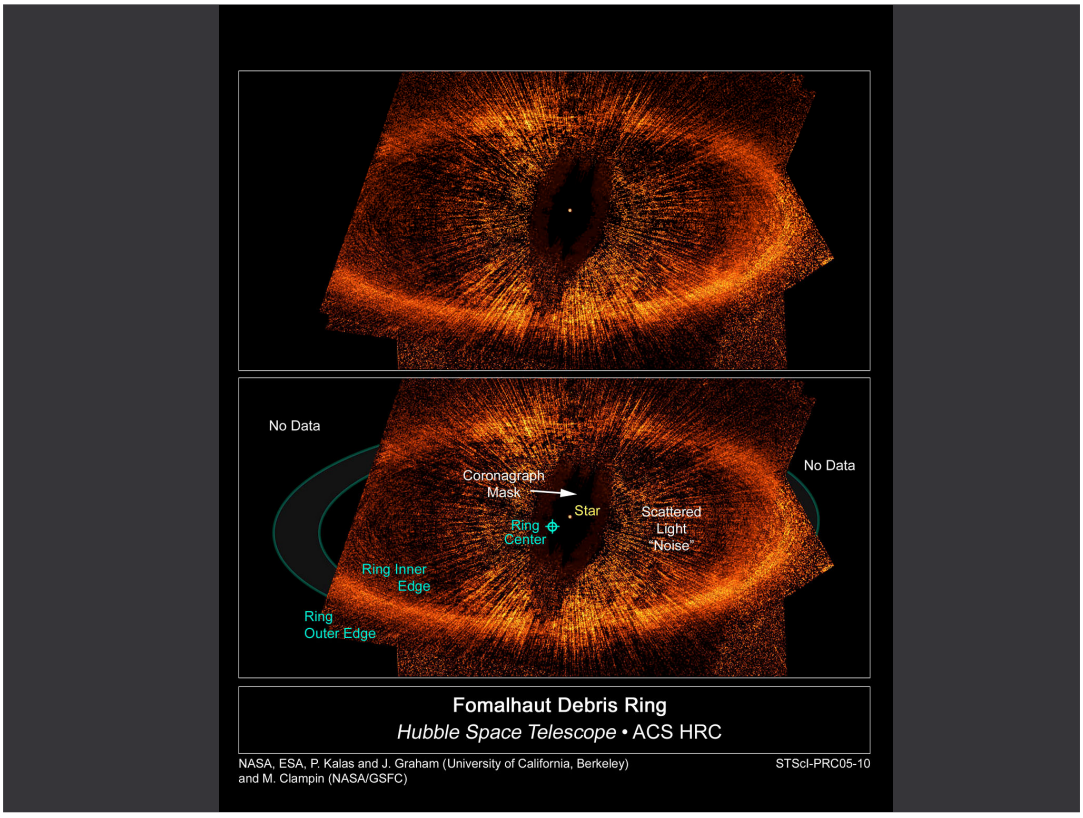


Image prise par le télescope spatial Spitzer en infrarouge: Objet Herbig-Haro HH 46/47, qui contient une protoétoile.

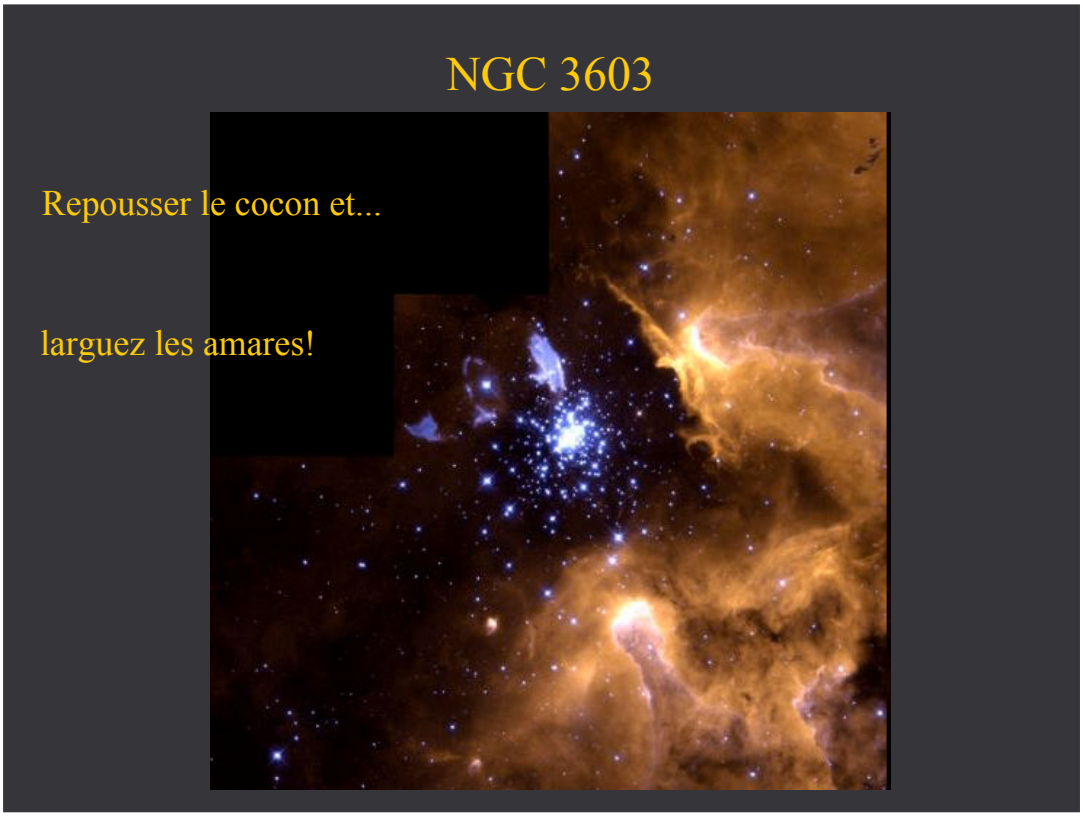


The top view, taken by NASA/ESA Hubble Space Telescope, is the first visible-light image of a dust ring around the nearby, bright young star Fomalhaut (HD 216956). The image offers the strongest evidence yet that an unruly planet may be tugging on the dusty belt. Part of the ring [at left] is outside the telescope's view. The ring is tilted obliquely to our line of sight.

The center of **the ring is about** 1.4 billion miles (**15 astronomical units**) away **from the star**. The dot near the ring's center marks the star's location. Astronomers believe that an unseen planet moving in an elliptical orbit is reshaping the ring.

The view at bottom points out important features in the image, such as the ring's inner and outer edges. Astronomers used the Advanced Camera for Surveys' (ACS) coronagraph aboard Hubble to block out the light from the bright star so they could see the faint ring. Despite the coronagraph, some light from the star is still visible in this image, as can be seen in the wagon wheel-like spokes that form an inner ring around Fomalhaut [labeled "scattered light 'noise'"].

NASA, ESA, P. Kalas and J. Graham (University of California, Berkeley), and M. Clampin (NASA's Goddard Space Flight Center)



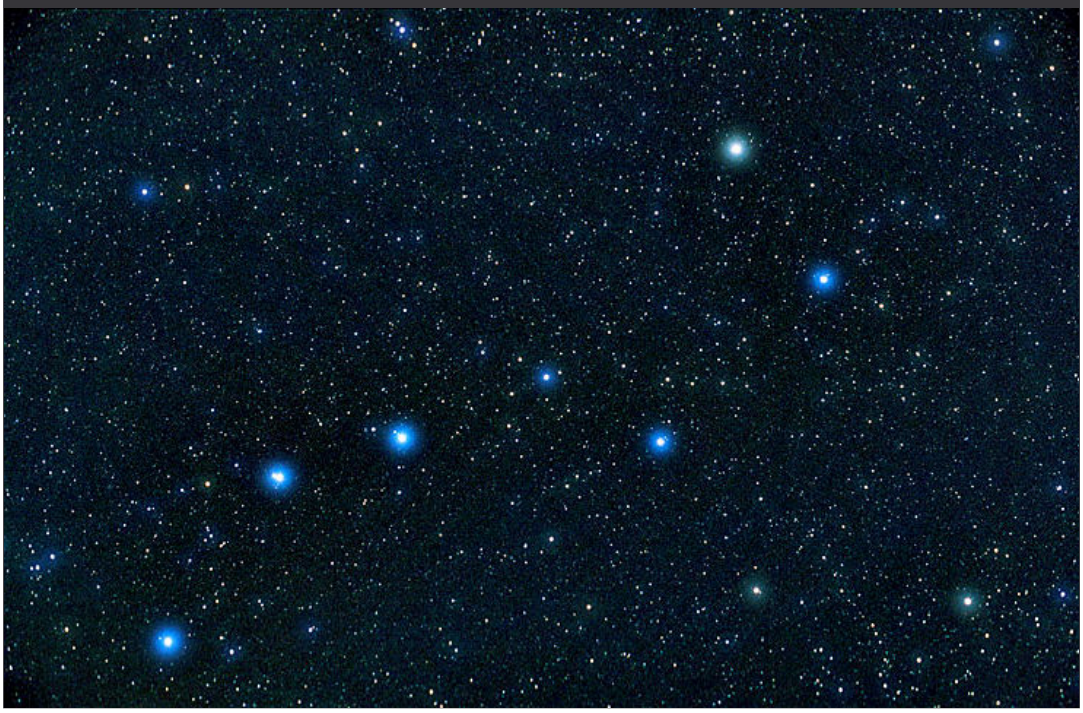
June 4, 1999

NGC 3603: From Beginning To End

Credit: Wolfgang Brandner (JPL/IPAC), Eva K. Grebel (U. Wash.), You-Hua Chu (UIUC), NASA

From beginning to end, **different stages of a star's life appear in this exciting Hubble Space Telescope picture** of the environs of galactic emission nebula NGC 3603. For the beginning, eye-catching "pillars" of glowing hydrogen at the right signal newborn stars emerging from their dense, gaseous, nurseries. Less noticeable, dark clouds or "Bok globules" at the top right corner are likely part of a still earlier stage, prior to their collapse to form stars. At picture center lies a cluster of bright hot blue stars whose strong winds and ultraviolet radiation have cleared away nearby material. Massive and young, they will soon exhaust their nuclear fuel. Nearing the end of its life, the bright supergiant star Sher 25 is seen above and left of the cluster, surrounded by a glowing ring and flanked by ejected blobs of gas. The ring structure is reminiscent of Supernova 1987a and Sher 25 itself may be only a few thousand years from its own devastating finale. But what about planets? Check out the two teardrop-shaped objects below the cluster toward the bottom of the picture. Although larger, these emission nebulae are similar to suspected proto-planetary disks (proplyds) encompassing stars in the Orion Nebula.

Constellation et ... amas ouvert ?



Wikipedia

Toutes les étoiles du courant de la Grande Ourse occupent la même région de la Voie lactée, se déplacent à des vitesses similaires dans la même direction. Elles possèdent **une métallicité voisine et approximativement le même âge**. Ces points de convergence suggèrent que ces étoiles partagent une origine commune.

D'après l'âge de ces composantes, on pense que le courant de la Grande Ourse est **un ancien amas ouvert**. Celui-ci se serait formé à partir d'une nébuleuse protostellaire il y a environ 500 millions d'années, ce qui est relativement jeune. Les étoiles de l'amas se sont ensuite progressivement dispersées sous l'action des forces de marée et le groupe occupe aujourd'hui une région de l'espace mesurant approximativement **30 années-lumière de large sur 18** al.

Son noyau se situe **à environ 80 années-lumière de nous**.

Le courant de la Grande Ourse a été découvert en 1869 par Richard Proctor qui remarqua, qu'*à l'exception de Dubhe et Alkaid*, les étoiles de la Grande Ourse possèdent **un mouvement propre qui les fait toutes se diriger vers un même point situé dans le Sagittaire**. Ainsi, à la différence de la plupart des autres constellations et astérismes, la Grande Ourse est constitué en grande partie d'étoiles étroitement liées les unes aux autres.

Albireo: rester en couple!

Wikipedia

Albireo se trouve au bout du bec du Cygne et son nom provient d'un mot arabe signifiant d'ailleurs le Bec.

Il s'agit de l'une des plus belles étoiles doubles (les deux objets sont situés à 380 années-lumière de la Terre et séparés de 34 secondes d'arc sont à environ **4 000 unités astronomiques l'un de l'autre**) du ciel, une étoile dorée (de magnitude 3,08) que l'on peut facilement distinguer, dans un petit télescope, de son compagnon bleu (de magnitude 5,11). Elles orbitent en **7 300 ans** et la plus brillante est elle-même double, composée d'une géante jaune et d'une étoile de la séquence principales très proches l'une de l'autre. L'étoile bleue tourne rapidement sur elle-même et est de ce fait entourée d'un disque de gaz provenant de sa propre surface.

Etoiles binaires

Pendant longtemps les astronomes ont considéré **qu'environ la moitié des étoiles appartenaient à des systèmes binaires ou triples**. Depuis, la recherche indique que la situation n'est pas si simple. La fraction d'étoiles binaires **peut effectivement varier en fonction du temps**, puisque certains phénomènes comme les supernovae peuvent détacher une étoile de son compagnon. De plus, **il n'est pas clair** non plus si la fraction de binaire originelle, lors de la formation des étoiles, est universelle ou non, et **si elle est la même pour les étoiles de toute masse initiale.**

Comment les étoiles se distribuent-elles dans la galaxie ?

une galaxie spirale vue d'au dessus:

M83

This is an image of the galaxy M83, taken by the European Southern Observatory's Wide Field Imager on the ESO/MPG 2.2-metre telescope at La Silla, Chile.

notre galaxie vue de l’intérieur

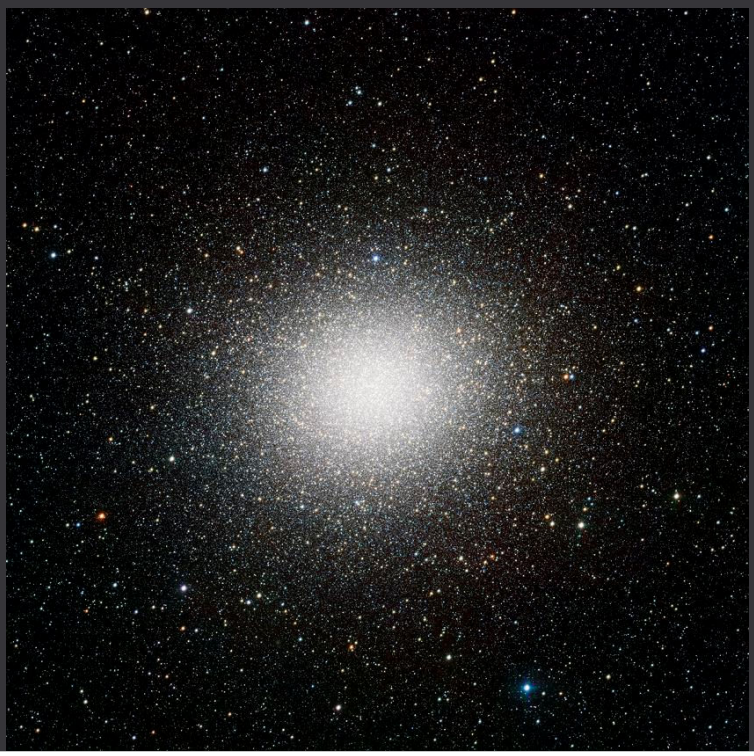
2005 October 4

The Milky Way in Stars and Dust

Credit & Copyright: Serge Brunier

The disk of our Milky Way Galaxy is home to hot nebulae, cold dust, and billions of stars. This disk can be seen from a dark location on Earth as a band of diffuse light across the sky. This band crosses the sky in dramatic fashion in the above series of wide angle sky exposures from Chile. The deepness of the exposures also brings to light a vast network of complex dust filaments. Dust is so plentiful that it obscures our Galaxy's center in visible light, hiding its true direction until discovered by other means early last century. The Galactic Center, though, is visible above as the thickest part of the disk. The diffuse glow comes from billions of older, fainter stars like our Sun, which are typically much older than the dust or any of the nebulae. One particularly photogenic area of darkness is the Pipe Nebula visible above the Galactic Center. Dark dust is not the dark matter than dominates our Galaxy -- that dark matter remains in a form yet unknown.

amas globulaire Omega Centauri (VST Paranal)



http://www.eso.org/public/images/archive/category/starclusters/

Le télescope du VLT dédié aux grands sondages (VST pour VLT Survey Telescope), le dernier équipement installé à l'Observatoire de Paranal de l'ESO, a diffusé ses premières images impressionnantes du ciel austral. Le VST est un télescope de 2,6 mètres à la pointe de la technologie, équipé de l'énorme caméra OmegaCAM de 268-megapixels, conçu pour cartographier le ciel à la fois rapidement et avec des images de très grande précision. C'est un télescope optique qui complète parfaitement VISTA, le télescope pour les grands sondages en infrarouge de l'ESO. Les nouvelles images de la nébuleuse Oméga et de l'amas globulaire Omega du Centaure révèlent la puissance de VST.

Wikipedia

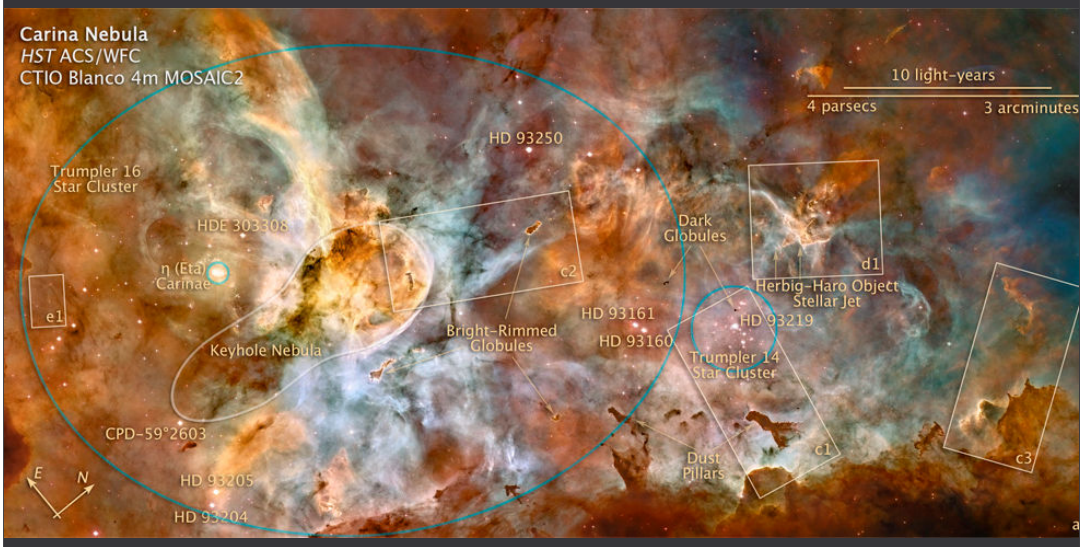
L'amas globulaire M13 ou Messier 13, très souvent appelé le Grand Amas d'Hercule ou simplement Hercule, est parmi les objets les plus imposants du catalogue Messier. Il a été découvert par Edmond Halley en 1714, et ajouté par Charles Messier dans son catalogue le 1er juin 1764.

Comportant plus de 100 000 étoiles, il est aussi l'un des plus vieux objets : son **âge est estimé à 12 ou 14 milliards d'années**. Il apparaît avec un diamètre de 20 minutes d'arc, soit un **diamètre réel de 150 années-lumière**.

Il a cependant la particularité de contenir de nombreuses ***étoiles jeunes*** (appartenance confirmée d'après leur vitesse angulaire), ce qui est inhabituel pour un amas de cet âge : les scientifiques pensent que ces étoiles ne sont pas nées à l'intérieur de l'amas, mais ont plutôt été **capturées** par ce dernier.

Distance **25100 al** (7700 pc)

nébuleuse de la Carène



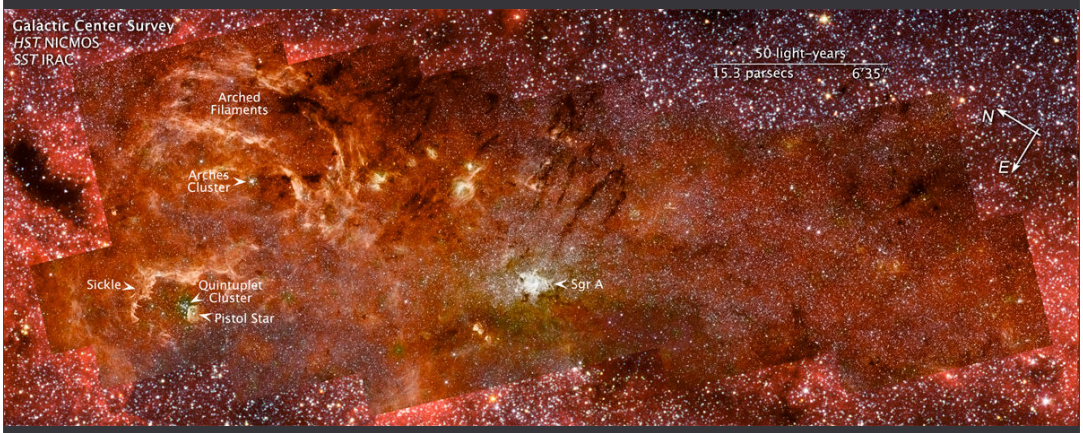
Wikipedia:

La nébuleuse de la Carène (ou Grande nébuleuse de la Carène, Nébuleuse d'Eta Carinae, NGC 3372) est une grande nébuleuse brillante qui englobe plusieurs amas ouverts d'étoiles. On y compte Eta Carinae et HD 9312A, deux des étoiles les plus massives et lumineuses de notre galaxie, la Voie lactée. La nébuleuse se situe **à une distance estimée entre 6 500 et 10 000 années-lumière de la Terre.** Elle fait partie de la constellation de la Carène. La nébuleuse comprend plusieurs étoiles de classe O.

Cette nébuleuse est **l'une des plus grandes régions HII de la Voie lactée**. Sa **magnitude apparente est de 1,0**.

Elle est également l'une des plus importantes nébuleuses diffuses observable. Bien que **quatre fois plus grande et encore plus lumineuse que la nébuleuse d'Orion,** la nébuleuse de la Carène est bien moins connue en raison de sa situation éloignée sur l'hémisphère sud. Elle fut découverte par Nicolas Louis de Lacaille en 1751-1752, depuis le cap de Bonne-Espérance.

Le cœur de notre Voie Lactée



Futura Sciences

Les images prises dans l'infrarouge par Hubble et Spitzer donnent la vue la plus détaillée à ces longueurs d'onde du cœur de la Voie lactée.

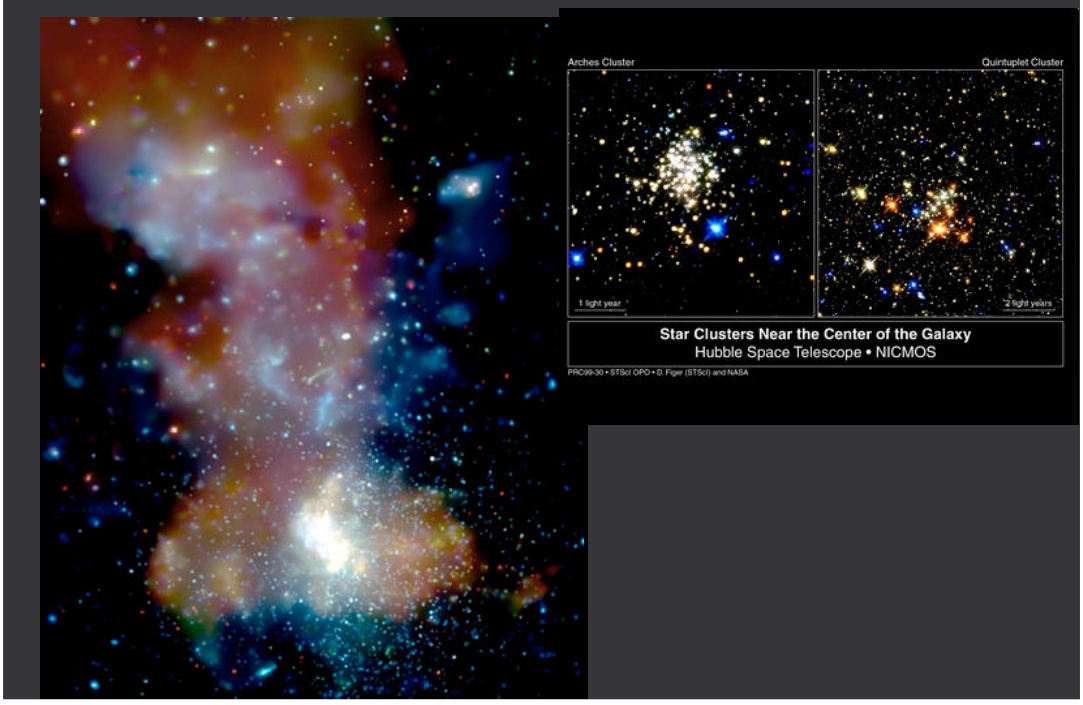
Le centre de la Galaxie s'est dérobé au regard de l'homme pendant des siècles. La présence **d'immenses nuages moléculaires, riches en poussières et opaques dans le domaine du visible**. Mais de nos jours, les caméra Near Infrared Camera and Multi-Object Spectrometer (Nicmos) et Infrared Array Camera (Irac), permettent de sonder cette partie de la Voie lactée où se trouve un **trou noir géant** associé à la source radio Sagittarius A*.

Sur **une région s'étendant sur 300 années-lumière**, on y observe des étoiles massives ainsi que la structure complexe formées par des nuages de plasma, du gaz chaud et ionisé, en interaction avec la formation, l'évolution et la mort de ces étoiles.

La résolution spatiale atteinte par la caméra Nicmos est impressionnante. Bien que **distante de 26.000 années-lumière**, la région observée révèle des détails de 0,025 année-lumière, c'est-à-dire à peine plus grands que 20 fois la taille de notre propre système solaire.

On peut ainsi observer **l'étoile du Pistolet. Cette supergéante bleue est l'une des étoiles les plus massives de notre Galaxie**. Sa luminosité équivaut à **cinq millions de soleils comme le nôtre**. Cet astre vorace consomme en six secondes autant d'énergie que notre étoile en un an. Bien visible aussi est **l'Amas des Arches, l'amas ouvert le plus dense de la Voie lactée**. Agée de 2 à 4 millions d'années, cet amas d'un diamètre inférieur à une année-lumière n'en contient pas moins de 150 étoiles plus massives et plus grandes que le Soleil. Il est situé à moins de 100 années-lumière du centre de la Galaxie.

amas près du centre galactique



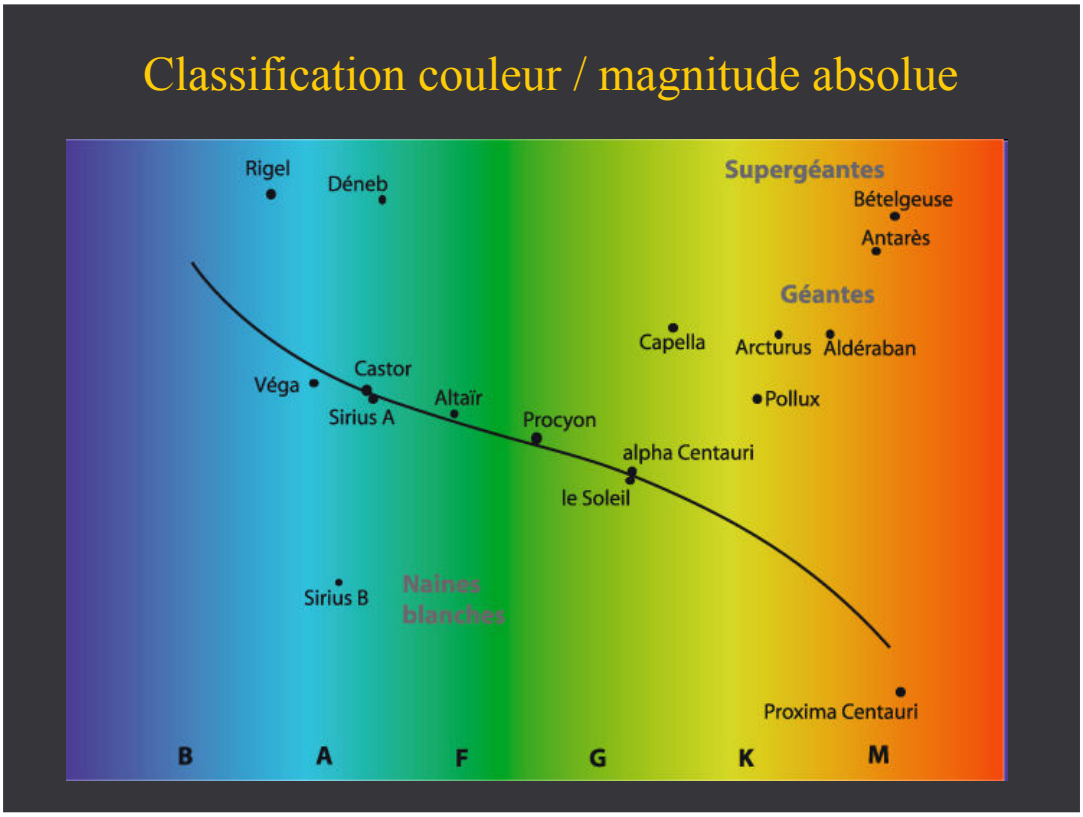
Smithsonian Institution : **Arches, Quintuplet, and GC Star Clusters**: Rough and Crowded Neighborhood at Galactic Center

Description: The clusters, Arches (upper right), Quintuplet (upper center), and the GC cluster (bottom center), **contain massive stars** that appear as very bright, point-like X-ray sources when winds from their surfaces collide with those from an orbiting companion. Vast amounts of energy are also released when these stars explode as supernovas, heating the surrounding material. Stellar corpses in this image also emit X-rays as either neutron stars or black holes in binary systems. Collisions between the clusters themselves and cooler molecular clouds of gas contribute to the diffuse X-rays seen in this image.

Wikipedia:

The Quintuplet cluster is a dense cluster of massive young stars near the Galactic Center (GC). Its name comes from the fact it has five prominent supergiant stars residing in it. Along with the Arches cluster it is one of two in the immediate GC region. Due to heavy extinction by dust in the vicinity, it is invisible to optical observation and must be studied in the X-ray, radio, and infrared bands.

The Quintuplet cluster is approximately 4 million years old, and has a mass in excess of 10,000 times that of the Sun. It also contains **the Pistol star, one of the most luminous in the Galaxy, which is probably close to becoming a supernova.**



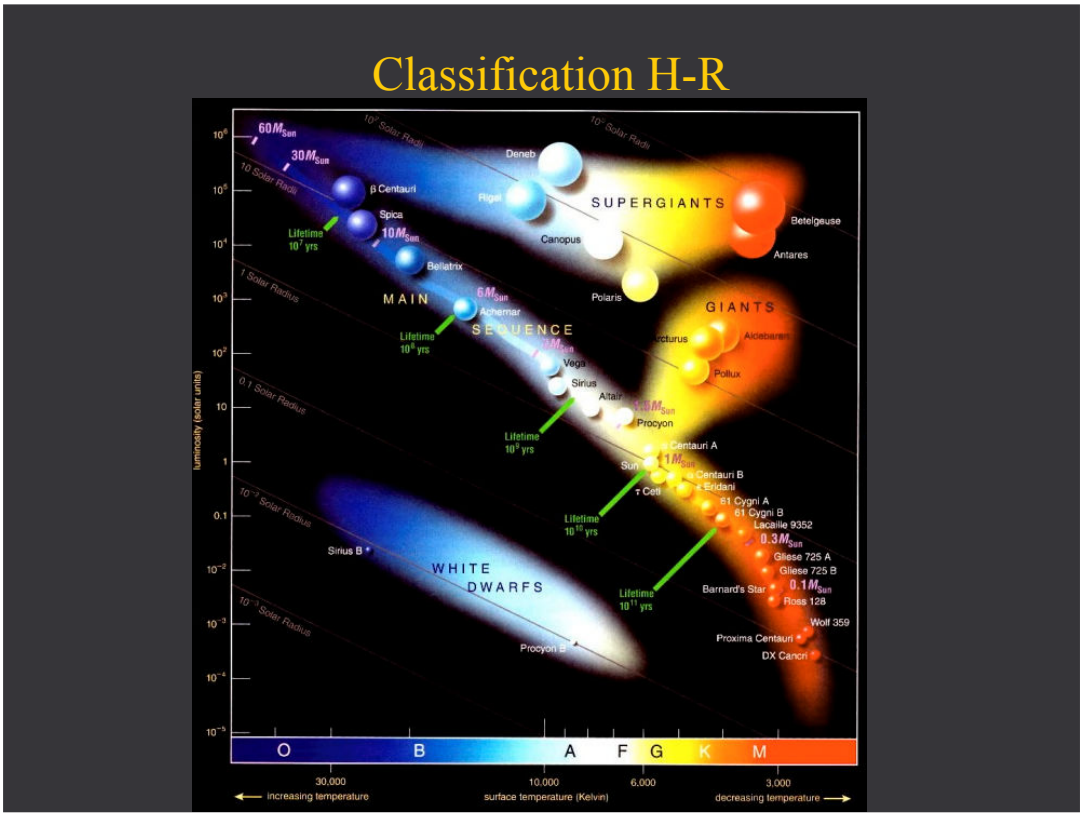
La majorité des étoiles se groupent sur une bande diagonale : la séquence principale. Elle reflète le lien entre la température de surface d'une étoile et sa luminosité. **Un étoile plus chaude est plus lumineuse**. La couleur de l'étoile est aussi directement liée à sa température. Une étoile chaude est bleue, une étoile froide est rouge. L'intensité des raies spectrales varient également avec la température. Les étoiles O et B sont chaudes, les étoiles M sont froides. Le Soleil est une étoile jaune, de type spectral G.

Il existe une **relation entre la masse et la position des étoiles sur la séquence principale** : les étoiles massives ont une luminosité plus grande et sont plus chaudes, elles se placent en haut de la séquence, les étoiles de petite masse en bas.

La séquence principale n'est pas peuplée uniformément : environ **90% des étoiles sont moins massives et moins lumineuses que le Soleil**, pour la plupart de type M.

La luminosité dépend par ailleurs de la taille d'une étoile. Les étoiles situées au-dessus du diagramme HR sont systématiquement plus brillantes que les étoiles de la séquence principale de même température parce qu'elles sont plus grosses : il s'agit de la branche des géantes et supergéantes. Elles ne représentent que quelques % des étoiles mais elles sont plusieurs milliers de fois plus brillantes que le Soleil. Ce sont elles qui dominent parmi les étoiles visibles à l'oeil nu.

http://lunap.obs-besancon.fr/lunap/Niveau1/soleiletoiles/Textes/classification.htm



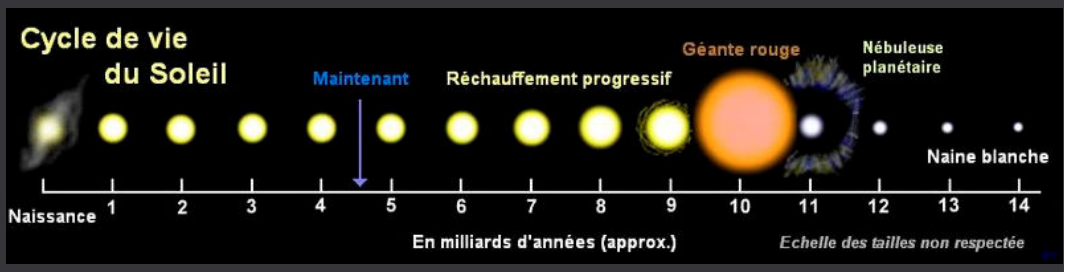
http://www.slackerastronomy.org/slackerpedia/index.php/Hertzsprung-Russell_Diagram

The Hertzsprung-Russell Diagram (commonly referred to the "HR Diagram"), pioneered independently by Elnar Hertzsprung and Henry Norris Russell, plots luminosity (or absolute magnitude or apparent magnitude) as a function of temperature (or color or spectral type) for stars. It's usefullness comes from how it illustrates stellar evolution of many different types of stars in one glance.

It is a diagram that anyone who takes Astronomy 101 has come to love, fear or both. But it's quite remarkable in how it essentially creates a graphical way to represent the complexities of stellar evolution in one simple plot.

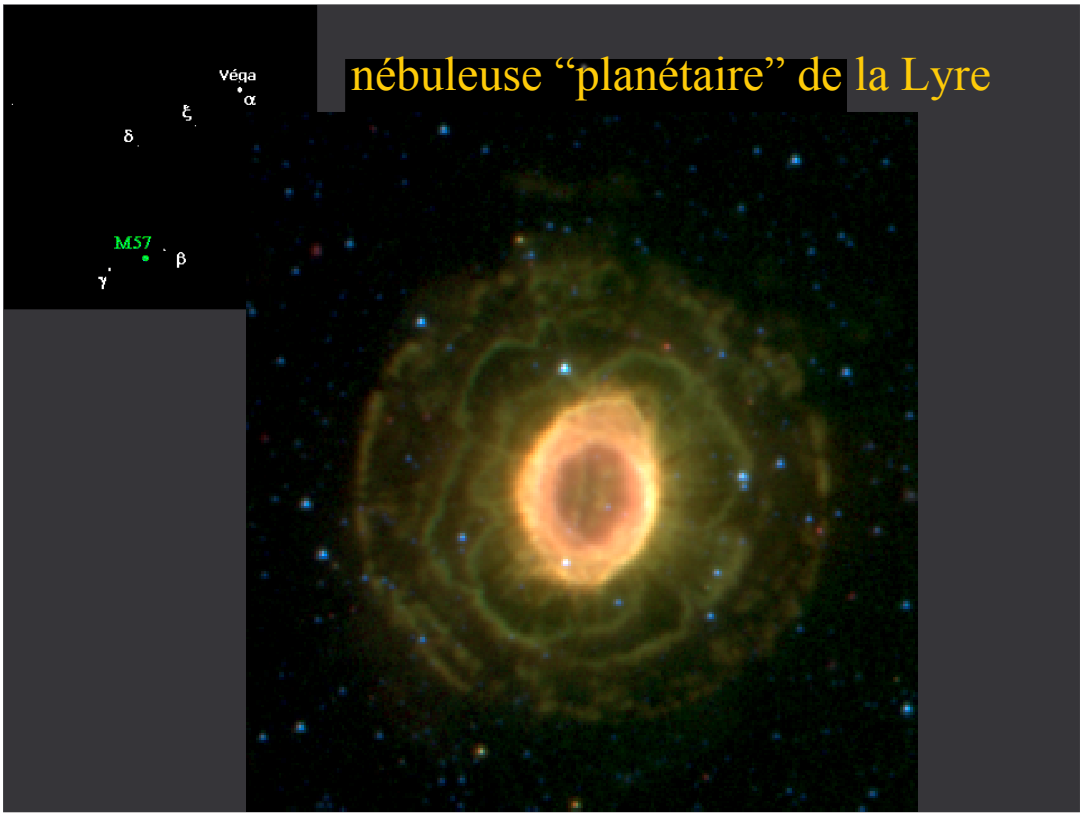
The original H-R Diagram plotted the absolute magnitude of stars (which is directly related to their optical luminosity) versus their spectral type (which to great degree reflects their temperatures). Luminosity and absolute magnitude and spectral type and temperature are derived parameters, and to some extent theoretical because they require additional (and not always well-defined) information to derive. A purely observational Hertzsprung-Russell Diagram which compares apparent magnitude against a photometric color is known as a **Color-Magnitude Diagram**.

Evolution des étoiles



http://fr.wikipedia.org/wiki/%C3%89volution_des_%C3%A9toiles

Masse de l'étoile (en masses solaires, Mo)	**30 Mo**	**10 Mo**	**3 Mo**	**1 Mo**	**0,3 Mo**
Luminosité pendant la séquence principale	10 000	1 000	100	1	0,004
Vie sur séquence principale (en milliards d'années)	0,06	0,10	0,30	10	800
Les réactions nucléaires s'arrêtent aux noyaux de	**fer**	**silicium**	**oxygène**	**carbone**	**hélium**
Phénomène terminal	supernova	supernova	nébuleuse planétaire	vent stellaire	vent stellaire
Masse éjectée	24 Mo	8,5 Mo	2,2 Mo	0,3 Mo	0,01 Mo
Nature du noyau résiduel	trou noir	étoile à neutrons	naine blanche	naine blanche	naine blanche
Masse du cadavre stellaire	6 Mo	1,5 Mo	0,8 Mo	0,7 Mo	0,3 Mo



Begin your examination with the colored image (left) taken with the Hubble Space Telescope (**HST**). By clicking on the image at the top of the page, you should be able to see a faint central star. It is the outer layers of gas have that been ejected from this star that produces the spectacular ring. This ring is essentially a geometric result of our vantage point. **The expulsion of the star's outer layers produces a spherical shell of ionized gas**. We have an oblique view of the outer shell, and our line-of-sight passes through more of the luminous gas, producing a bright outer ring.

The color image was assembled from three black-and-white photos taken through different color filters. **Blue** reveals the emission from **very hot helium**, which is located primarily close to the hot central star. **Green** represents **ionized oxygen**, which is located farther from the star. **Red** shows **ionized nitrogen**, which is radiated from the coolest gas, located farthest from the star. The rich palette of colors seen in most planetary nebulae (plural of nebula) are due to a mixture of strong spectral emission lines. Careful study of these spectral lines permits astronomers to determine the chemical composition of nebulae. You should also be able to see filaments of dust in the outer layers of the nebula.

The **Spitzer** image details additional structure not seen in the other images. The outer regions are especially prominent in this new image because Spitzer sees the **infrared light from hydrogen molecules**. The molecules emit infrared light because they have absorbed ultraviolet radiation from the star or have been heated by the wind from the star.

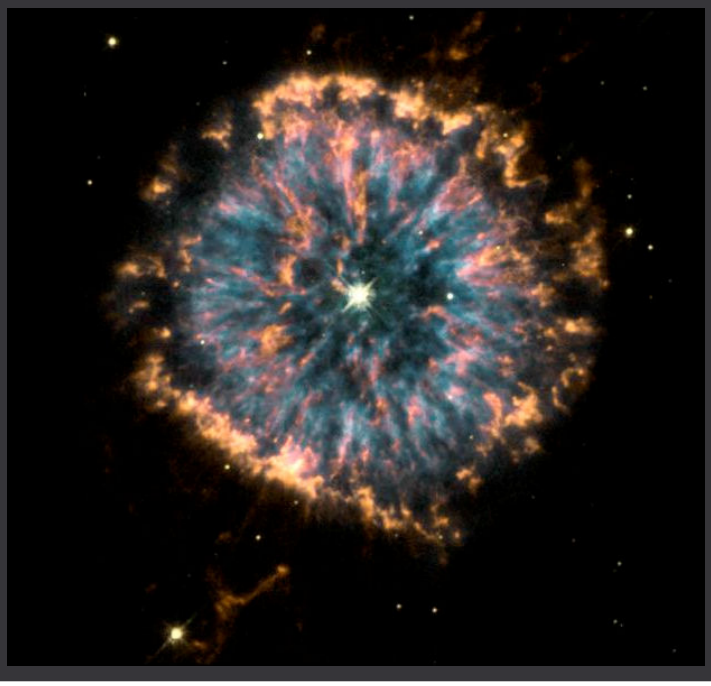
NGC7027

This composite colour image of NGC 7027 is among the first data of a planetary nebula taken with NICMOS. This picture is actually composed of three separate images taken at different wavelengths. The **red colour represents cool molecular hydrogen gas**, the most abundant gas in the universe.

Credit: William B. Latter (SIRTF Science Center/Caltech) and NASA/ESA

NGC6543

NGC6751



Tycho-Brahé 1572

SN 1572 (ou Nova de Tycho') est une supernova survenue dans la constellation de Cassiopée, et l'une des rares à avoir été visible à l'œil nu.

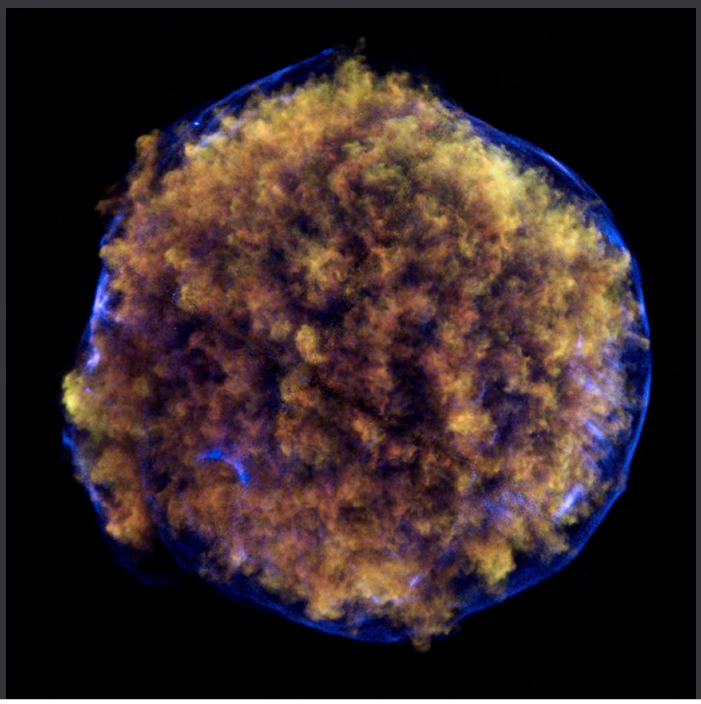
Elle fut observée le 11 novembre 1572 par Tycho Brahe, depuis Herrevad Abbey1alors **qu'elle était plus brillante que Vénus, avec une magnitude apparente de -4**. À partir de mars 1574, sa luminosité était tombée en dessous du seuil de visibilité à l'œil nu.

L'antiquité, à la suite d'Aristote, distinguait le monde sublunaire, soumis à la génération et à la corruption et, au-delà de l'orbite lunaire, le monde céleste, présumé éternel et immuable. Pour "expliquer" l'apparition de cette étoile nouvelle, certains contemporains en déduisaient que l'objet devait être apparu entre la Lune et la Terre.

Dans un premier temps, Tycho Brahe a fait remarquer que l'objet n'a pas de parallaxe diurne dans le contexte des étoiles fixes d'arrière plan. Ce qui implique qu'il se trouvait forcément plus loin que la Lune et les planètes, qui elles, affichent de telles parallaxes. Ensuite, il constate que, pendant plusieurs mois, l'objet n'a pas modifié sa position par rapport aux étoiles fixes, comme le font les planètes. Cela lui inspire la conclusion que le nouvel objet céleste n'était pas une planète, mais une étoile fixe dans le domaine stellaire, au-delà de toutes les planètes.

Il publia à ce sujet un petit livre appelé De Stella Nova, De la nouvelle étoile (1573). Nous savons aujourd'hui que cette supernova se trouve à 7 500 années-lumière de la Terre.

Tycho SNR

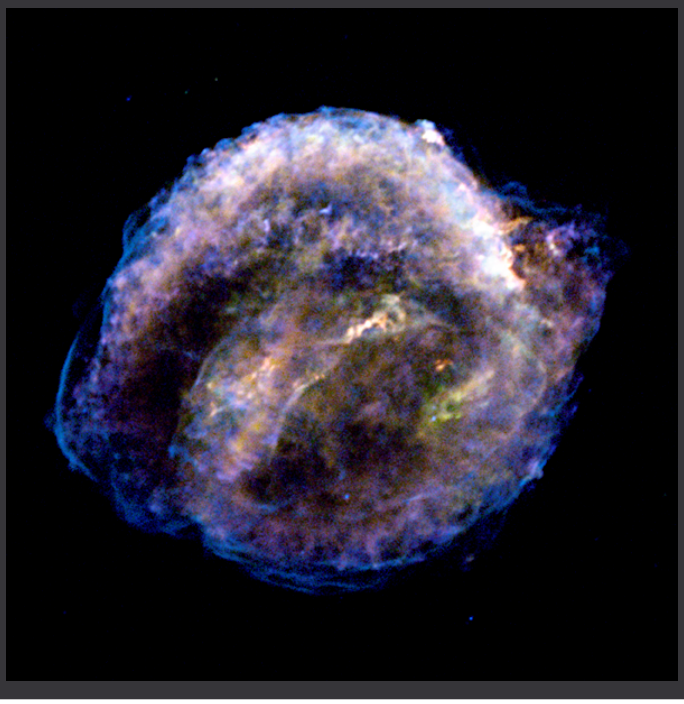


This new image of Tycho's supernova remnant, dubbed Tycho for short, contains striking new evidence for what triggered the original supernova explosion, as seen from Earth in 1572. Tycho was formed by a Type Ia supernova, a category of stellar explosion used in measuring astronomical distances because of their reliable brightness.

Low and medium energy X-rays in red and green show expanding debris from the supernova explosion. High energy X-rays in blue reveal the blast wave, a shell of extremely energetic electrons. Also shown in the lower left region of Tycho is a blue arc of X-ray emission. Several lines of evidence support the conclusion that this arc is due to a shock wave created when a white dwarf exploded and blew material off the surface of a nearby companion star (see accompanying illustration below).

http://chandra.harvard.edu/photo/2011/tycho2/

Kepler SNR



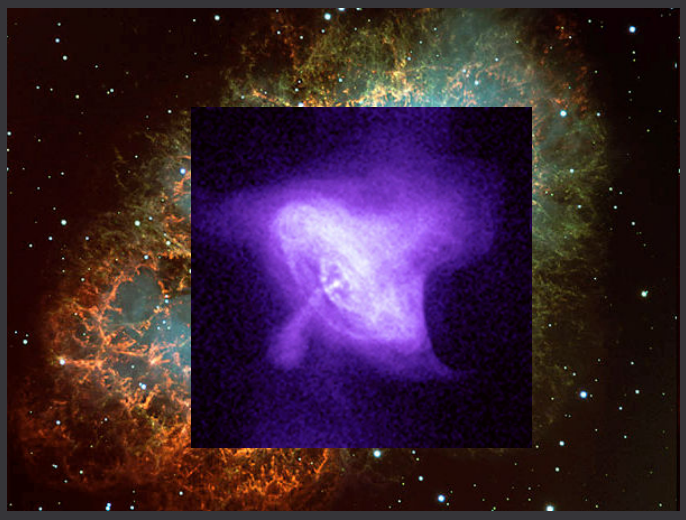
Using NASA's **Chandra X-ray** Observatory, scientists have created a stunning new image of one of the youngest supernova remnants in the galaxy. This new view of the debris of an exploded star helps astronomers solve a long-standing mystery, with implications for understanding how a star's life can end catastrophically and for gauging the expansion of the universe.

Over 400 years ago, sky watchers -- including the famous astronomer Johannes Kepler -- noticed a bright new object in the night sky. Since the telescope had not yet been invented, only the unaided eye could be used to watch as a new star that was initially brighter than Jupiter dimmed over the following weeks.

Chandra's latest image marks a new phase in understanding the object now known as Kepler's supernova remnant. By combining nearly nine days of Chandra observations, astronomers have generated an X-ray image with unprecedented detail of one of the brightest recorded supernovas in the Milky Way galaxy.

http://chandra.harvard.edu/photo/2007/kepler/

SNR: nébuleuse du Crabe

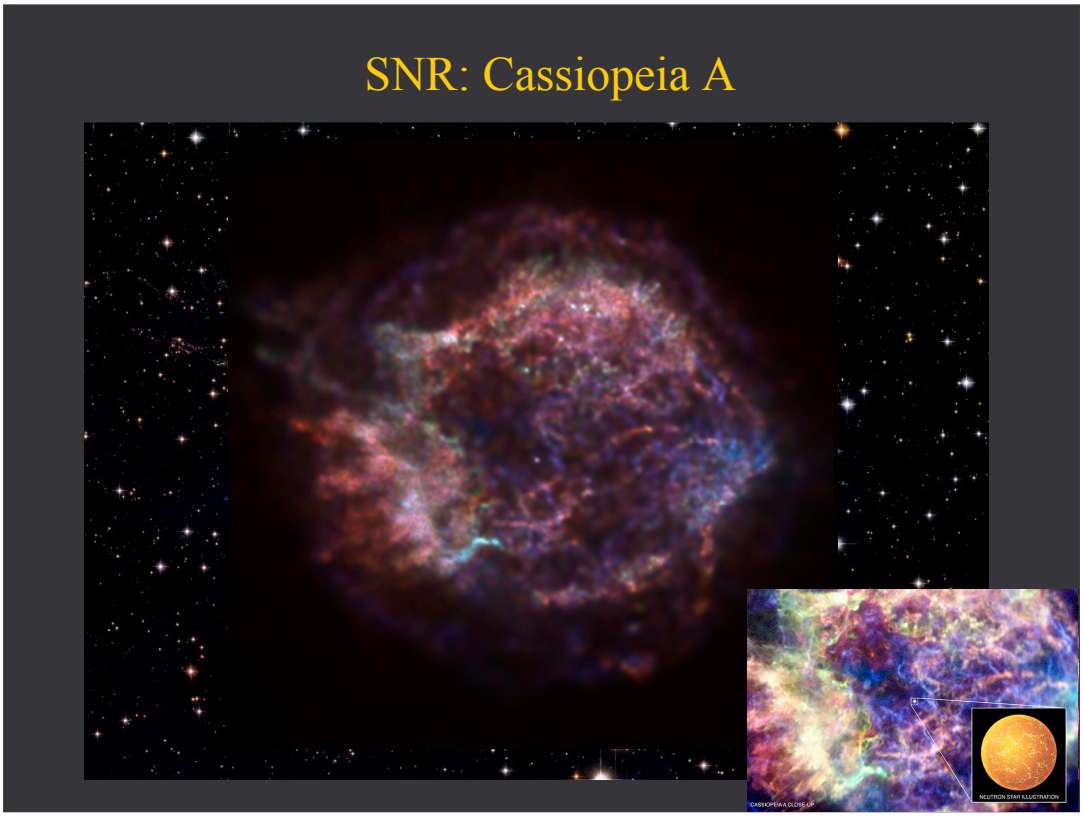


APOD 2002 July 14

The Crab Nebula from VLT

Credit: FORS Team, 8.2-meter VLT, ESO

The Crab Nebula, filled with mysterious filaments, is the result of a star that was seen to explode in **1054 AD**. This spectacular supernova explosion was recorded by **Chinese and** (quite probably) **Anasazi Indian astronomers**. The filaments are mysterious because they appear to have less mass than expelled in the original supernova and higher speed than expected from a free explosion. In the above picture taken recently from a Very Large Telescope, the color indicates what is happening to the electrons in different parts of the Crab Nebula. **Red** indicates the **electrons are recombining with protons to form neutral hydrogen**, while **blue** indicates the **electrons are whirling around the magnetic field** of the inner nebula. In the nebula's very center lies a pulsar: a **neutron star rotating**, in this case, **30 times a second**



Wikipedia:

La supernova n'ayant pas été observée à l'époque de l'explosion, ce n'est que près de trois siècles plus tard, (en 1947), que le rémanent fut découvert en radio, où le nom de Cassiopée A lui fut attribué ainsi que le nom de 3C 461. Sa contrepartie optique, très faible, ne fut découverte que trois ans plus tard, (en 1950), après un positionnement plus précis de la **source radio**. Le rémanent est aussi catalogué sous la référence G111.7-2.1, correspondant à ses coordonnées galactiques (voir ici pour les autres noms de l'objet). Cassiopée A s'est également rendue célèbre en étant le tout premier objet photographié par le télescope X américain Chandra (ex AXAF). Le rémanent de la supernova est fortement soupçonné d'être une étoile à neutrons (voir ici pour des résultats récents, quoique le signal d'un pulsar n'ait pour l'heure pas encore été découvert).

Coolcosmos:

The **X-ray image** shows gaseous clumps of silicon, sulfur, and iron ejected from the exploded star. The gases in the X-ray image are at a temperature of about 50 million degrees. The visible light image reveals the wispy filaments of gas at the edge of the spherical shell. The infrared photo shows bright knots of thermal emission produced by dust mixed with the gas in the expanding shell. The radio emission is primarily radiation generated by fast-moving electrons immersed in a magnetic field. For additional images of Cassiopeia A at various wavelengths, visit our Multiwavelength Gallery.

Au delà de la voie lactée

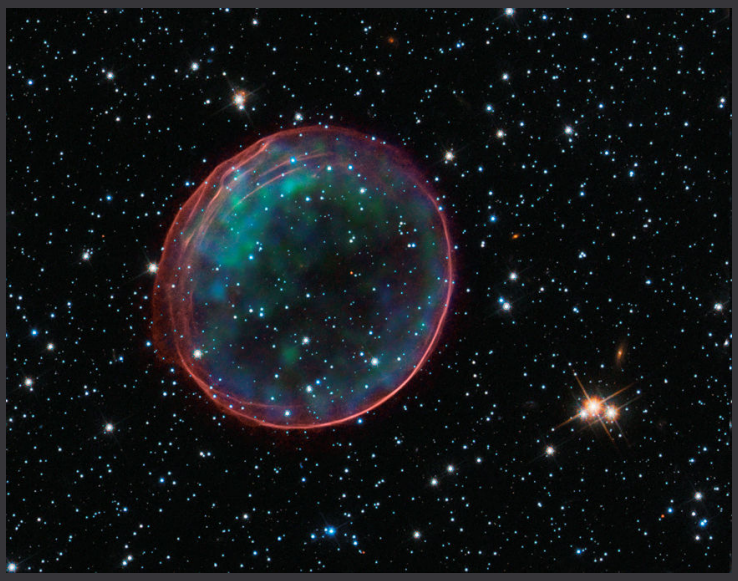
2007 March 30

Three Galaxies and a Comet

Credit & Copyright: Miloslav Druckmuller (Brno University of Technology)

Diffuse starlight and dark nebulae along the southern Milky Way arc over the horizon and sprawl diagonally through this gorgeous nightscape. The breath-taking mosaic spans a wide 100 degrees, with the rugged terrain of the Patagonia, Argentina region in the foreground. Along with the insider's view of our own galaxy, the image features our outside perspective on two irregular satellite galaxies - the **Large and Small Magellanic Clouds**. Recorded on January 28, the scene also captures the broad tail and bright coma of Comet McNaught, The Great Comet of 2007.

SNR : Grand Nuage de Magellan



http://www.lecosmographe.com/blog/?tag=grand-nuage-de-magellan

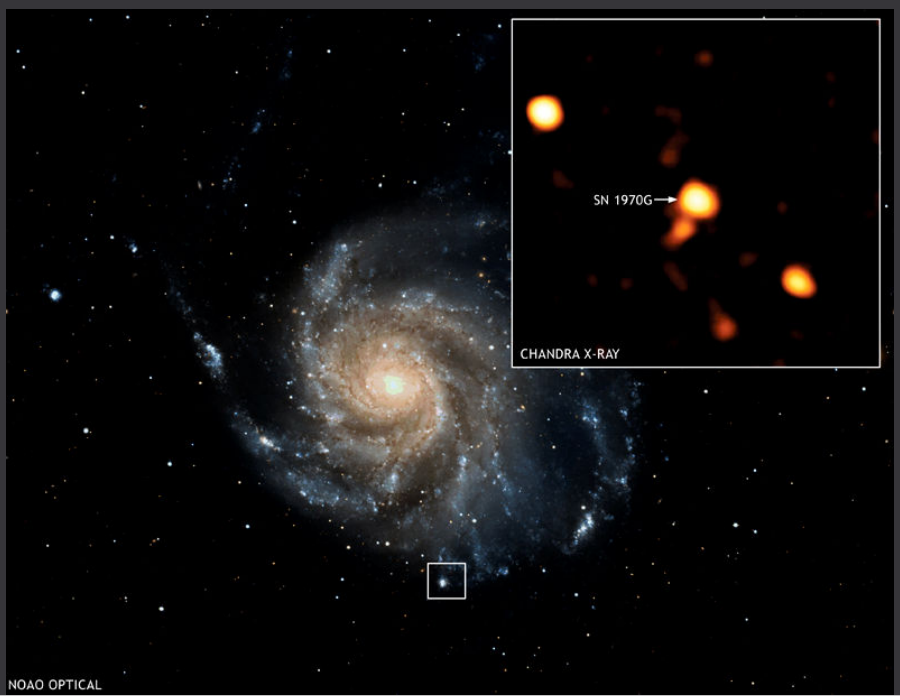
Rémanents de la supernova SNR 0509

Le télescope spatial Hubble capture en image les restes en anneaux d'une supernova qui **a explosée il y a 400 ans dans la galaxie du Grand Nuage de Magellan.**

Cet anneau est gigantesque. Ce sont les bords agités de la supernova SNR 0509-67.5. Le télescope spatial Hubble a saisi les contours des ruines d'une étoile qui a explosée violemment. Aujourd'hui, qui s'étend **sur 23 années-lumières** continue de s'étendre dans l'espace à raison de 5 000 kilomètres par seconde ! L'image capturée dans le visible par le télescope spatial, dévoile le gaz chauffé par les ondes de chocs. La supernova a probablement explosée il y a 400 ans. Bien entendu, cela a eu lieu il y a 400 ans plus 160 000 ans pour nous, observateurs terrestres, car la supernova est **éloignée de 160 000 années-lumière**, évoluant dans la petite galaxie voisine du Grand Nuage de Magellan.

Le télescope spatial **Chandra** a également réalisé des observations dans le **rayonnement X** mettant en relief la dispersion de la matière stellaire chauffée à plusieurs millions de degrés. Voir l'image composite ci-dessous compilée à celles du télescope Hubble.

Encore plus loin: dans SN1970G

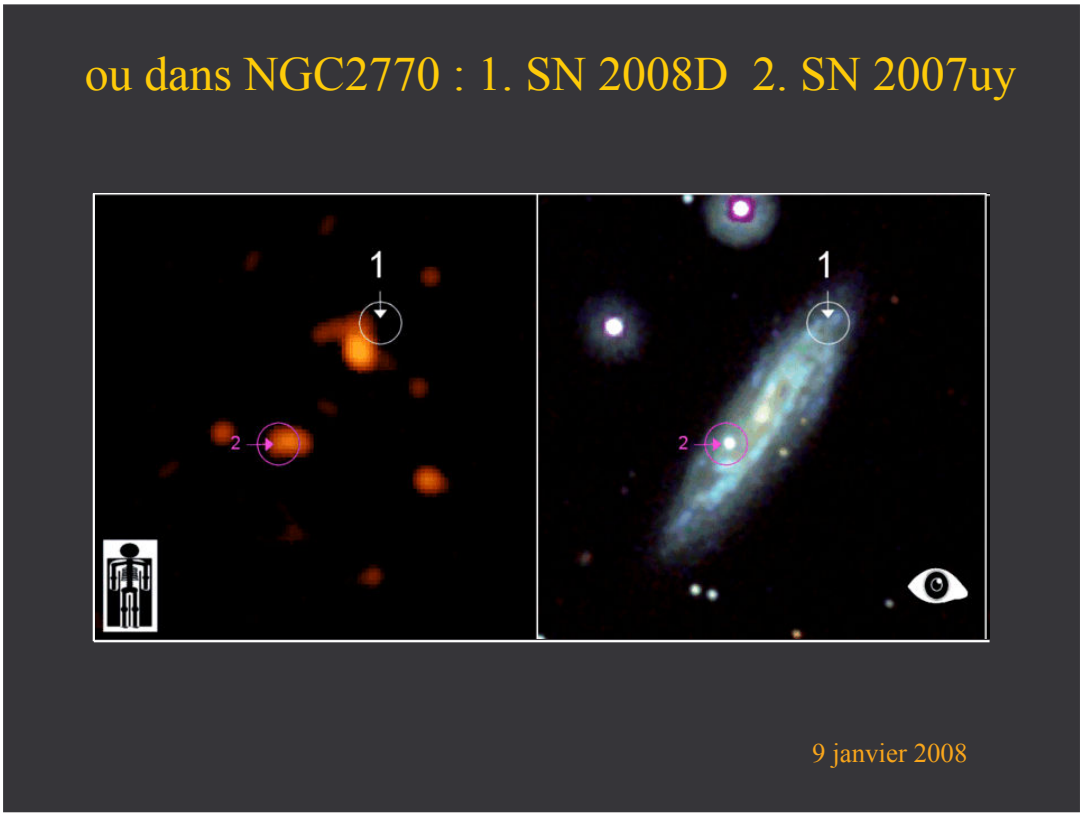


The Chandra image in the inset shows **X-rays from SN 1970G**, a supernova that was observed to occur in the galaxy M101 35 years ago. The bright cloud in the box in the optical image is not related to the supernova, which is located immediately to the upper right (arrow) of the cloud.

Before a massive star explodes as a supernova, it loses gas in a stellar wind that can last tens to hundreds of thousands of years, and creates a circumstellar gas shell around the star. The explosion generates shock waves that rush through this gas and heat it to millions of degrees. The X-rays from SN 1970G are likely due to this process.

By studying the spectrum and intensity of the X-rays from a supernova in the years after the explosion, astronomers can deduce information about the behavior of the star before it exploded. The observations of SN 1970G indicate that the progenitor star created its circumstellar shell by losing about one sun's worth of gas over a period of about 25,000 years before the explosion.

Astronomers estimate that in another 20 to 60 years the shock waves will have traversed the shell and encountered the interstellar medium. At this time SN 1970G will make the transition to the supernova remnant phase of its evolution.



Ciel et Espace:

En ce **9 janvier 2008**, l'équipe d'Alicia Soderberg, de l'université de Princeton (USA), surveillait, avec Swift, la supernova 2007uy dans la galaxie spirale NGC 2770, située à 90 millions d'années-lumière de la Terre. Soudain, le satellite a détecté **un sursaut de rayons** X en provenance d'une autre région de la même galaxie. L'alerte, immédiatement donnée a permis à plusieurs télescopes terrestres et spatiaux - dont Hubble, Chandra, le Very Large Array (Nouveau Mexique), le Gemini Nord, le Keck I (Hawaï) - de se mobiliser pour observer une nouvelle supernova : SN 2008D. Avec les données récoltées, des dizaines d'astronomes à travers le monde planchent maintenant pour reconstituer l'événement.

D'après l'équipe de Maryam Modjav, de l'université de Berkeley (USA), qui a publié ses résultats dans la revue "The Astrophysical Journal", c'est une étoile de type Wolf-Rayet (dont les couches externes d'hydrogène ont été soufflées par de puissants vents stellaires), 30 fois plus massive que le Soleil, mais de taille comparable, qui a donné naissance à SN 2008D.

(images de Wikipedia)

APOD 2004 nov 21

Spiral Galaxies in Collision

Credit: Debra Meloy Elmegreen (Vassar College) et al.,

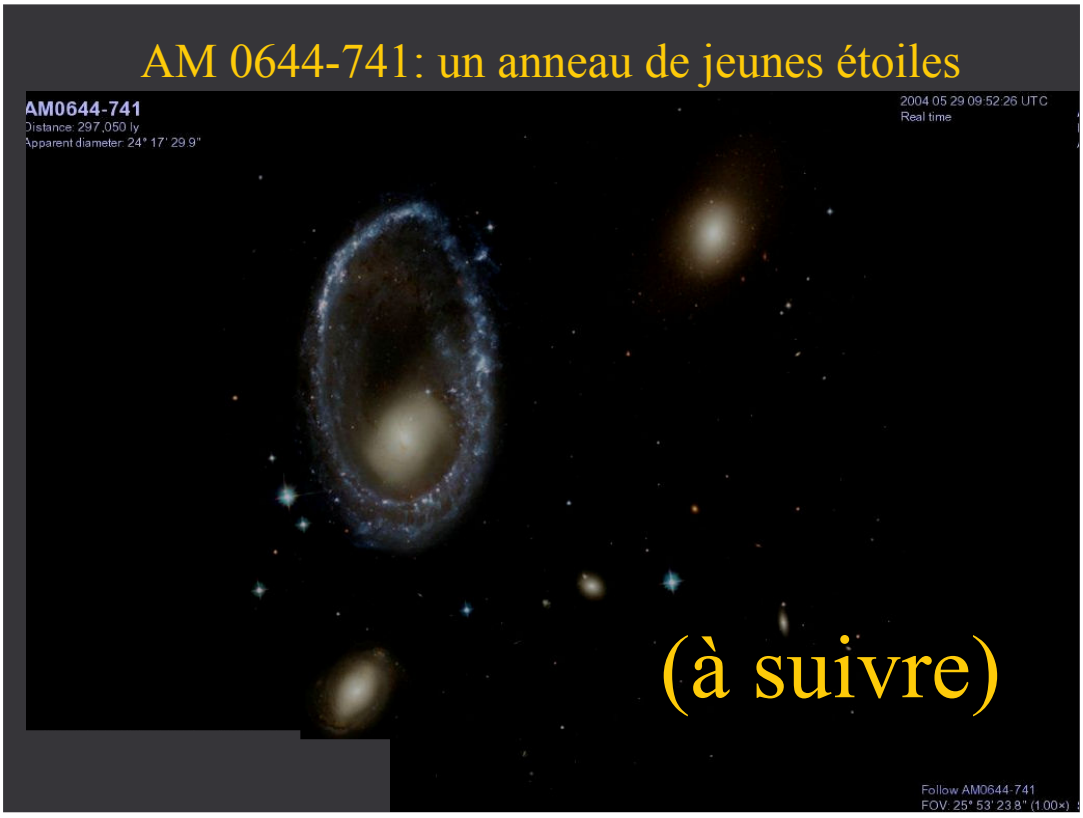
& the Hubble Heritage Team (AURA/ STScI/ NASA)

Billions of years from now, only one of these two galaxies will remain.

Until then, spiral galaxies NGC 2207 and IC 2163 will slowly pull each other apart, creating **tides of matter, sheets of shocked gas, lanes of dark dust, bursts of star formation, and streams of cast-away stars.**

Astronomers predict that NGC 2207, the larger galaxy on the left, will eventually incorporate IC 2163, the smaller galaxy on the right. In the most recent encounter that peaked 40 million years ago, the smaller galaxy is swinging around counter-clockwise, and is now slightly behind the larger galaxy.

The space between stars is so vast that when galaxies collide, the stars in them usually do not collide.



Wikipedia

The yellowish nucleus was once the center of a normal spiral galaxy. **Ring galaxies are formed when an intruder galaxy plunges directly through the disk of a target galaxy**. The collision creates a shock wave that causes the gas and dust to rush outward. As the shock ring plows outward, **gas and dust clouds collide, are compressed and then collapse gravitationally to form an abundance of new stars in a ring around the outside**. The ring is a region of rampant star formation dominated by young, massive, hot blue stars.

The **pink regions** along the ring are rarefied clouds of **glowing hydrogen gas** that is fluorescing as it **bombarded with strong ultraviolet light from the blue stars**. The ring of AM 0644-741 will continue to expand for about another 300 million years after which it will begin to disintegrate.

The ring was formed by a collision with another galaxy that triggered a gravitational disruption. The disruption caused dust in the galaxy to condense, and form stars, which forced it to then expand away from the galaxy, and create a ring. AM 0644-741 has a 150,000 light-year diameter.

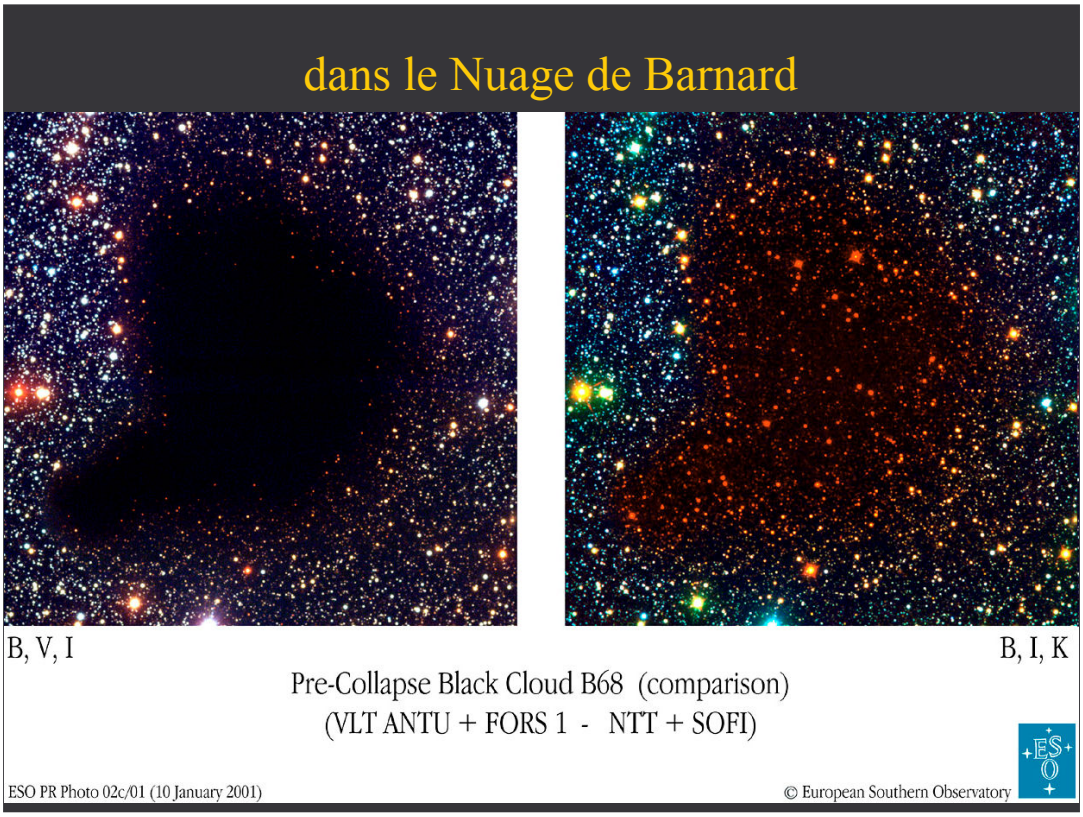
APOD 2011 May 7

Dawn of the Planets

Image Credit & Copyright: Luis Argerich

This month, four of the five naked-eye planets gather along the eastern horizon near dawn. The celestial grouping is seen here just before sunrise on May 5, from a beach near Buenos Aires, Argentina. Starting near the top of the frame, the brightest beacon is **Venus**. **Mercury** is below and right of Venus and brilliant **Jupiter** is lower still, near image center. Below Jupiter, **Mars** is relatively faint and struggles the most to shine through a thin cloud bank and the warming twilight glow.

Watch, and as the month progresses the tantalizing configuration will change, with Mars and Jupiter moving higher while Venus and Mercury wander through the sky closer to the rising sun.



http://lunap.obs-besancon.fr/lunap/Niveau1/galaxie/texte/galaxy.formationstellaire.htm

Le étoiles naissent dans des régions où le gaz est dense et froid. Dans ces nuages de gaz, la lumière visible est absorbé et on ne voit pas à travers.

Dans l'infrarouge proche on voit un peu quelques étoiles très rougies par la poussière.

Image d'un globule (Barnard 68) :

un nuage de gaz très dense dans lequel des étoiles sont en train de se former.

L'image de gauche est prise dans le visible : le globule est complètement opaque. L'image de droite est prise dans l'infrarouge : on y aperçoit des étoiles très rougies par la poussière. Ces images ont été prises au télescope de 8.2m VLT ANTU situé au Chili. http://www.eso.org/outreach/press-rel/pr-2001/pr-01-01.html

M78 et autour

http://www.spitzer.caltech.edu/images/3658-sig11-008-Making-a-Spectacle-of-Star-Formation-in-Orion

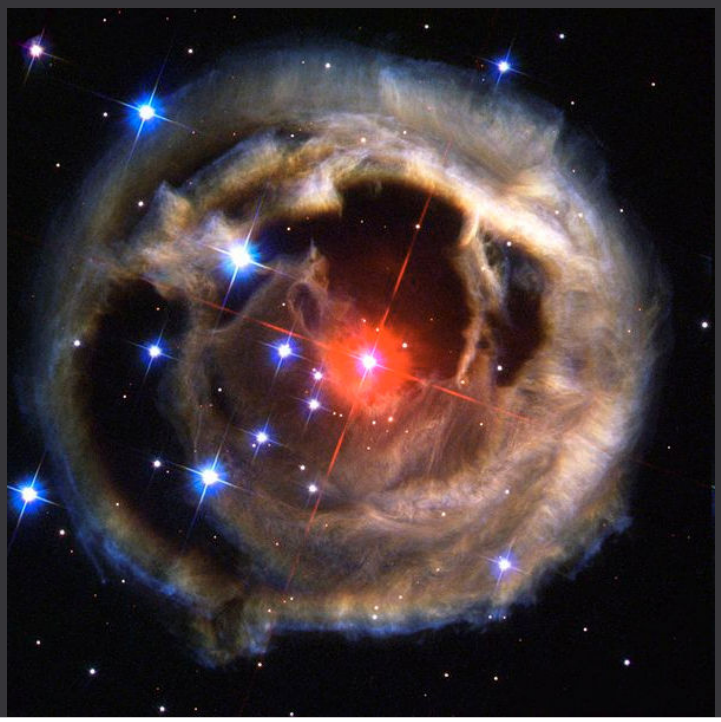
Looking like a pair of eyeglasses only a rock star would wear, this nebula brings into focus a murky region of star formation. NASA's Spitzer Space Telescope exposes the depths of this dusty nebula with its infrared vision, showing stellar infants that are lost behind dark clouds when viewed in visible light.

Best known as M78, the two round greenish nebulae are actually cavities carved out of the surrounding dark dust clouds. The extended dust is mostly dark, even to Spitzer's view, but the edges show up in mid-wavelength infrared light as glowing red frames surrounding the bright interiors. M78 is easily seen in small telescopes to the naked eye in the constellation of Orion, just to the northeast of Orion's belt, but looks strikingly different, with dominant, dark swaths of dust. Spitzer's infrared eyes penetrate this dust, revealing the glowing interior of the nebulae.

The light from young, newborn stars are starting to carve out cavities within the dust, and eventually, this will become a larger nebula.

A string of baby stars that have yet to burn their way through their natal shells can be seen as red pinpoints on the outside of the nebula. Eventually these will blossom into their own glowing balls, turning this two-eyed eyeglass into a many-eyed monster of a nebula.

V838 Monoceros (HST)



Wikipedia

V838 Monocerotis (ou V838 Mon) est une étoile de la constellation de la Licorne. Le 6 janvier 2002, elle a produit un éclat très intense, qui a illuminé le nuage de poussières qui l'entoure, en éjectant une coquille de poussières. Cette enveloppe a été détectée en infrarouge grâce au télescope de 8 m, Gemini à Hawaï.

Depuis cette date, l'astre était suivi de près par les scientifiques, notamment grâce au télescope spatial Hubble, car le phénomène qui a provoqué l'augmentation soudaine de sa luminosité était encore mal compris.

De récentes observations menées depuis 2008 suggèrent que cette brusque augmentation de luminosité serait la conséquence d'un fait extrêmement rare dans l'univers : la collision entre deux étoiles. Ce résultat devra être étayé par des observations supplémentaires