



Dimensions de l'Univers Observable

Nuits des Etoiles 2012

Chassiers (Ardèche)

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Un seul **UNIVERS** pour l'**astrophysique**:

l'univers **OBSERVABLE** !

Cela n'empêche ni les théories ni les conceptions audacieuses...

POURVU qu'elles se confrontent

à l'**OBSERVATION**

quelque soit l'instrument

à la **MESURE** de **DIMENSIONS** physiques

quelque soit l'expérience (outils, méthodes)

Dimensions interplanétaires

le premier siècle de l'astronautique

40 000 km

400 000 km = 1,3s de lumière = 3j voyage

150 000 000 km = 8m de lumière = 1 UA

40 UA = 5h 20m de lumière = 10ans voyage

10/08/2012

Nuit des étoiles - Chassiers

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Où le mètre n'est plus l'unité de mesure la plus commode

Dimensions humaines/terrestres

- mètre, km - déplacements horizontaux ou verticaux
- le tour de la Terre 40 000 km, 90mn pour la Station Spatiale (8km/s)
- de la Terre à la Lune 400 000 km, plus de 3jours pour Apollo (10km/s), un peu plus d'une seconde pour la lumière ou la radio (300 000 km/s)

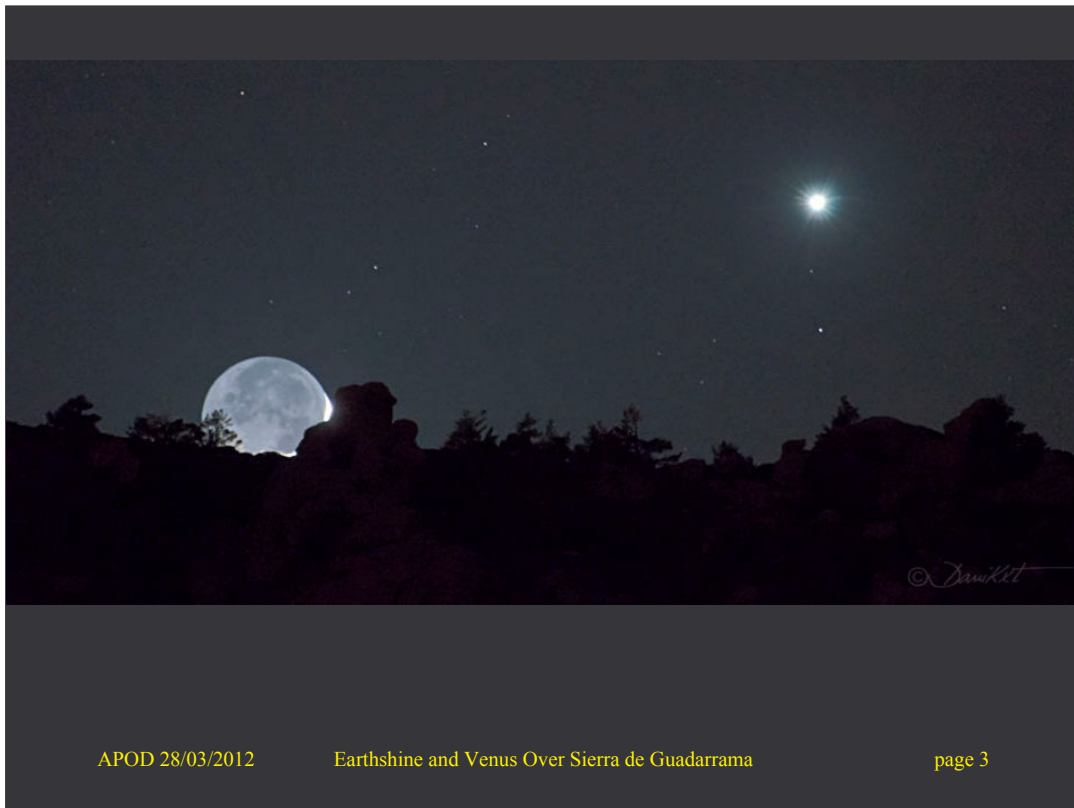
Dimensions interplanétaires

- le plan de l'écliptique
- l'UA (150 000 000 km)
- distances au soleil 0.3 0.7 1 1.5 5 10 20 30 UA

Dimensions de l'astronautique

- vitesse en dizaines de km/s
- voyages en mois, années
- télécommunications en minutes, heures

Terre-Lune	1,3 seconde
Soleil-Terre	8 minutes
Terre-Saturne et Titan	88 minutes
Soleil-Neptune	4,2 heures



Proches? Lointains? En km, en temps lumière, en temps de voyage

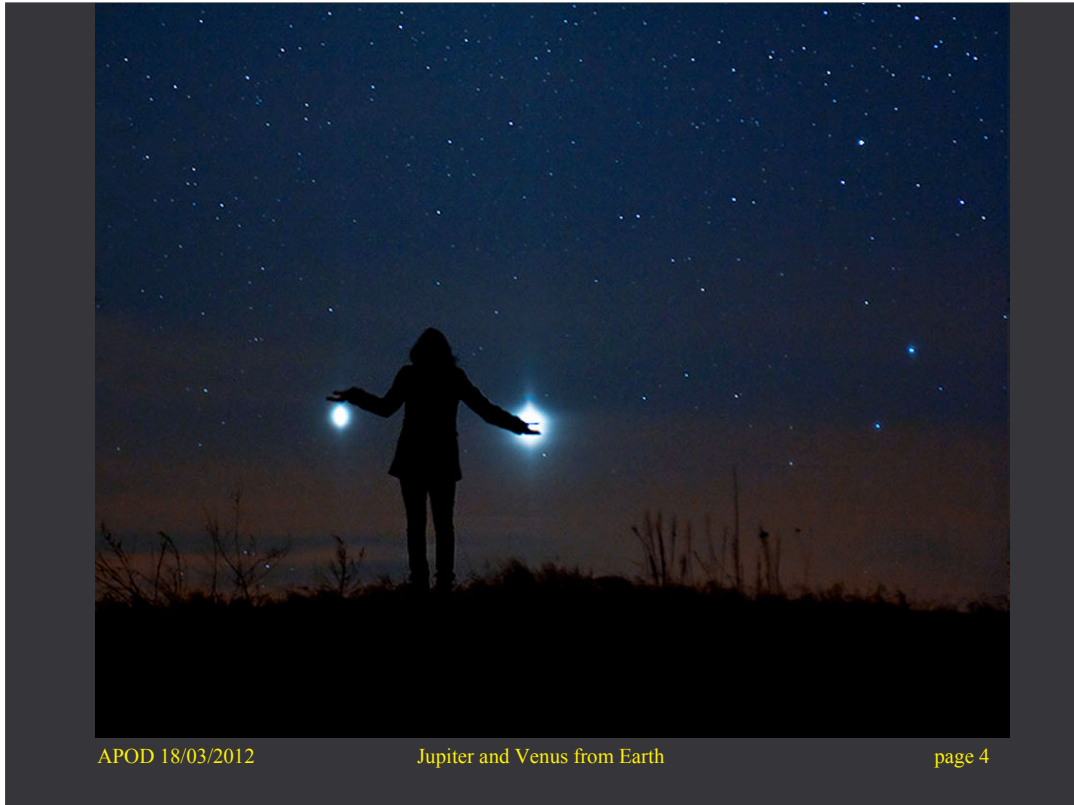
Earthshine and Venus Over Sierra de Guadarrama

Image Credit: Daniel Fernández (DANIKXT)

What just above that ridge? The **Moon**. Specifically, the Earth's Moon was caught just above the horizon in a young crescent phase. The familiar Moon might look a bit odd as the exposure shows significant Earthshine -- the illumination of the part of the Moon hidden from direct sunlight by the sun-reflecting Earth.

Also captured in the image is the bright planet **Venus** on the right. Venus and Jupiter passed only three degrees from each other last week during a photogenic planetary conjunction.

The above image was taken two days ago **near Madrid, Spain**. The foreground horizon silhouette includes some of the Seven Peaks of the Sierra de Guadarrama mountain range. Just a few minutes after this picture was taken, the Moon set.



APOD 18/03/2012

Jupiter and Venus from Earth

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Que peut-on mesurer depuis la terre ? Seulement des angles ?

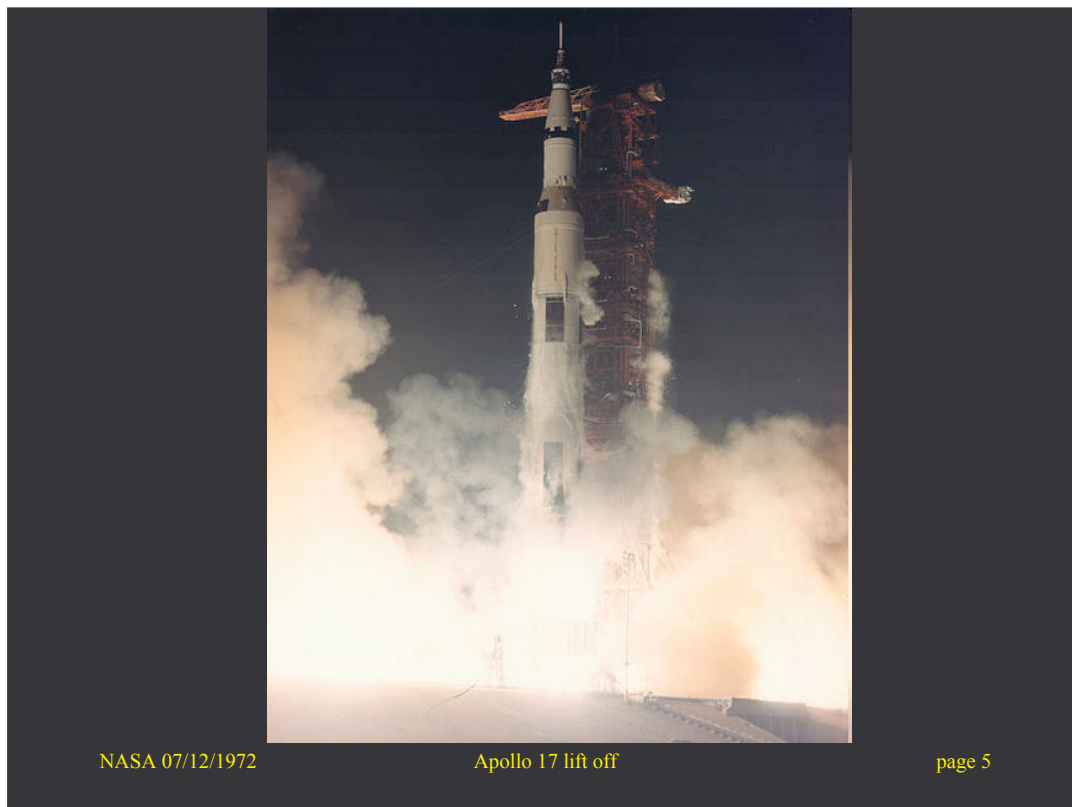
Rép: Mesures radar jusqu'à 1h lumière (Jupiter à 3/4h)

Jupiter and Venus from Earth Image Credit: Marek Nikodem (PPSAE)

It was visible around the world. The sunset conjunction of **Jupiter** and **Venus** was visible last week almost no matter where you lived on Earth. Anyone on the planet with a clear western horizon at sunset could see them. This week the two are still notable, even though Jupiter has sunk below the brighter Venus. And if you look higher in the sky you can see Mars as well.

Pictured above, a creative photographer traveled away from the town lights of Szubin, **Poland** to image a near closest approach of the two planets almost a week ago. The bright planets were separated only by **three degrees** and his daughter striking a humorous pose.

A faint red sunset still glowed in the background. Although this conjunction is drawing to a close, another conjunction between Venus and Jupiter will occur next May.

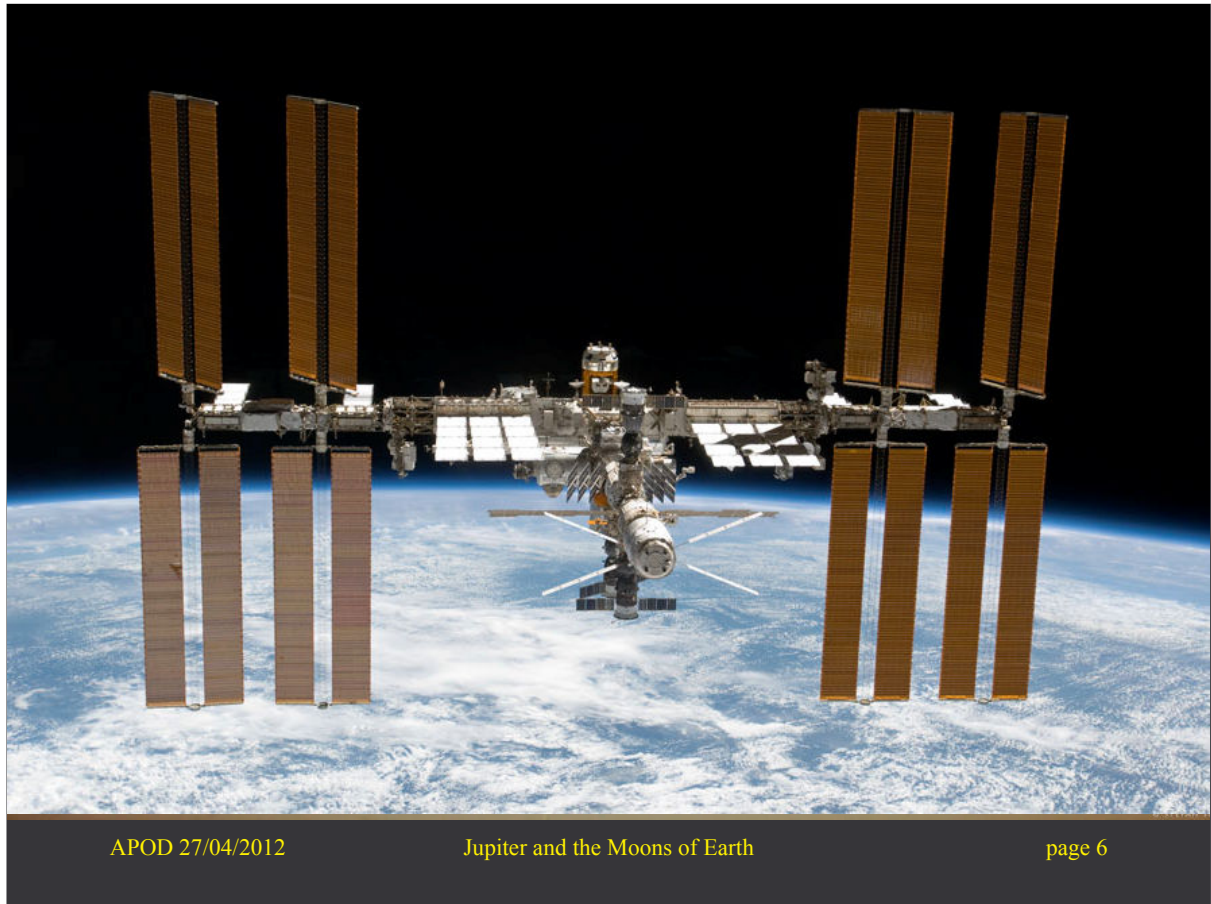


Les enfants, allons voir sur place!

http://fr.wikipedia.org/wiki/Apollo_17

Apollo 17 (7 décembre 1972 - 19 décembre 1972) est la dernière mission du programme spatial Apollo à emmener des hommes à la surface de la Lune. Avec cette mission, l'agence spatiale américaine, la NASA, conclut le projet lancé en 1961 par le président John F. Kennedy qui avait pour objectif d'amener des hommes sur la Lune. Apollo 17 est, comme Apollo 15 et 16, une mission de type J, caractérisée par un important volet scientifique. Le module lunaire utilisé permet aux astronautes de séjourner 3 jours sur la surface de la Lune ; les sorties extra-véhiculaires peuvent durer jusqu'à huit heures tandis que la mobilité des astronautes est accrue grâce au rover lunaire.

00h00	7/12 à 5h33	Décollage du centre spatial Kennedy
110h21	11/12 à 19h55	Atterrissage sur la Lune
114h22	11/12 à 23h56	Début de la première sortie extravéhiculaire 7h12 3,3 km 14,3 kg
137h55	12/12 à 23h29	Début de la seconde sortie extravéhiculaire 7h37 20,3 km 34,1 kg
160h53	13/12 à 22h25	Début de la troisième sortie extravéhiculaire 7h15 12,1 km 62 kg
185h22	14/12 à 22h54	Décollage de la Lune



Vue d'en bas, vue d'en haut!

Jupiter and the Moons of Earth

Image Credit & Copyright: Stefan Seip (TWAN)

Planet Earth has many moons. Its largest artificial moon, the **International Space Station**, streaks through this lovely skyview with clouds in silhouette against the fading light of a sunset.

Captured from Stuttgart, Germany last Sunday, the frame also includes Earth's largest natural satellite 1.5 days after its New Moon phase. Just below and left of the young crescent is Jupiter, another bright celestial beacon hovering near the western horizon in early evening skies. Only briefly, as seen from the photographer's location, Jupiter and these moons of Earth formed the remarkably close triple conjunction.

Of course, Jupiter has many moons too. In fact, close inspection of the photo will reveal tiny pin pricks of light near the bright planet, large natural satellites of Jupiter known as Galilean moons.



NASA 21/07/1969

Earth above Moon's horizon

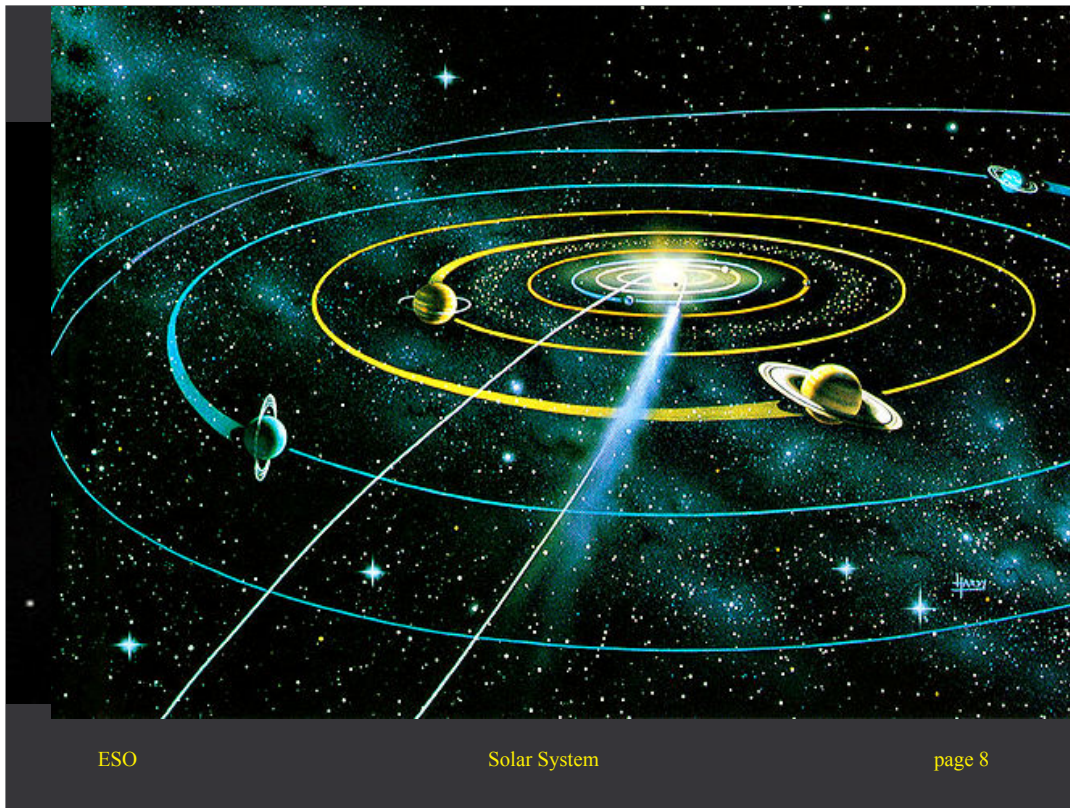
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Réciprocité: la Terre vue de la Lune!

From the Moon to the Earth

Credit: Apollo 11, NASA

After the most famous voyage of modern times, it was time to go home. After proving that humanity has the ability to go beyond the confines of planet Earth, the first humans to walk on another world -- Neil Armstrong and Buzz Aldrin -- flew the ascent stage of their Lunar Module back to meet Michael Collins in the moon-orbiting Command and Service Module. Pictured above on **1969 July 21**, the ascending spaceship was captured by Collins making its approach, with the Moon below, and Earth far in the distance. Tomorrow marks the 40th anniversary of the first human moon landing. Recently, NASA's moon-orbiting Lunar Reconnaissance Orbiter sent back the first pictures of most of the Apollo landing sites -- including Apollo 11 -- with enough resolution to see the Lunar Module descent stages left behind.



Le ballet des planètes dans l'écliptique

APOD 1996/09/21

The Plane of the Ecliptic is illustrated in this **Clementine** star tracker camera image which reveals (from right to left) the Moon lit by Earthshine, the Sun's corona rising over the Moon's dark limb, and the planets **Saturn, Mars, and Mercury**. The ecliptic plane is defined as the imaginary plane containing the Earth's orbit around the Sun. In the course of a year, the Sun's apparent path through the sky lies in this plane. The planetary bodies of our solar system all tend to lie near this plane, since they were formed from the Sun's spinning, flattened, proto-planetary disk. The snapshot above nicely captures a momentary line-up looking out **along this fundamental plane of our solar system**.

Orbits

Looking down on the north pole of the Earth, we can say that the planets revolve around the Sun in a counter-clockwise direction - west to east. The orbital velocities of the planets range from about 48 km/s for Mercury to 5 km/s for Pluto. The mean orbital velocity of Venus is 35.02 km/s. The orbits of all the planets lie very close to the plane of Ecliptic. Pluto's orbit, at $17^{\circ}09'$, has the greatest angle of inclination to the Ecliptic. Although all planetary orbits are elliptical, most of them are almost circular. The eccentricities range from 0.007 for Venus, which is the most circular, to 0.249 for Pluto, which is the most eccentric, and all are less than 0.1 except for Mercury and Pluto. Mercury has the shortest period of revolution (about 88 days), and Pluto has the longest (about 248 years).

Source: <http://www.eso.org/public/outreach/eduoff/vt-2004/>

Background/Infol2/EIS-C1.html



A 1h30 de distance radio!

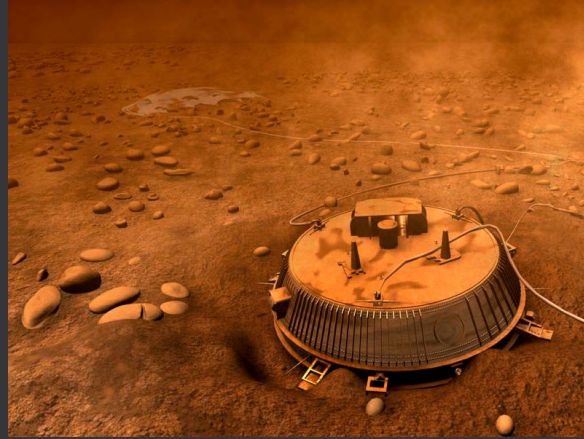
Six Moons of Saturn

Image Credit & Copyright: Rafael Defavari

How many moons does Saturn have?

So far 62 have been discovered, the smallest only a fraction of a kilometer across. Six of its largest satellites can be seen here, though, in a sharp Saturnian family portrait taken on March 9. Larger than Earth's Moon and even slightly larger than Mercury, Titan has a diameter of 5,150 kilometers and starts the line-up at the lower left. Continuing to the right across the frame are Mimas, Tethys, [Saturn], Enceladus, Dione, and Rhea at far right. Saturn's first known natural satellite, Titan was discovered in 1655 by Dutch astronomer Christiaan Huygens, while most recently the satellite provisionally designated S/2009 S1 was found by the Cassini Imaging Science Team in 2009.

Tonight, Saturn reaches opposition in planet Earth's sky, offering the best telescopic views of the ringed planet and moons.



APOD 17/01/2005

Titan Landscape

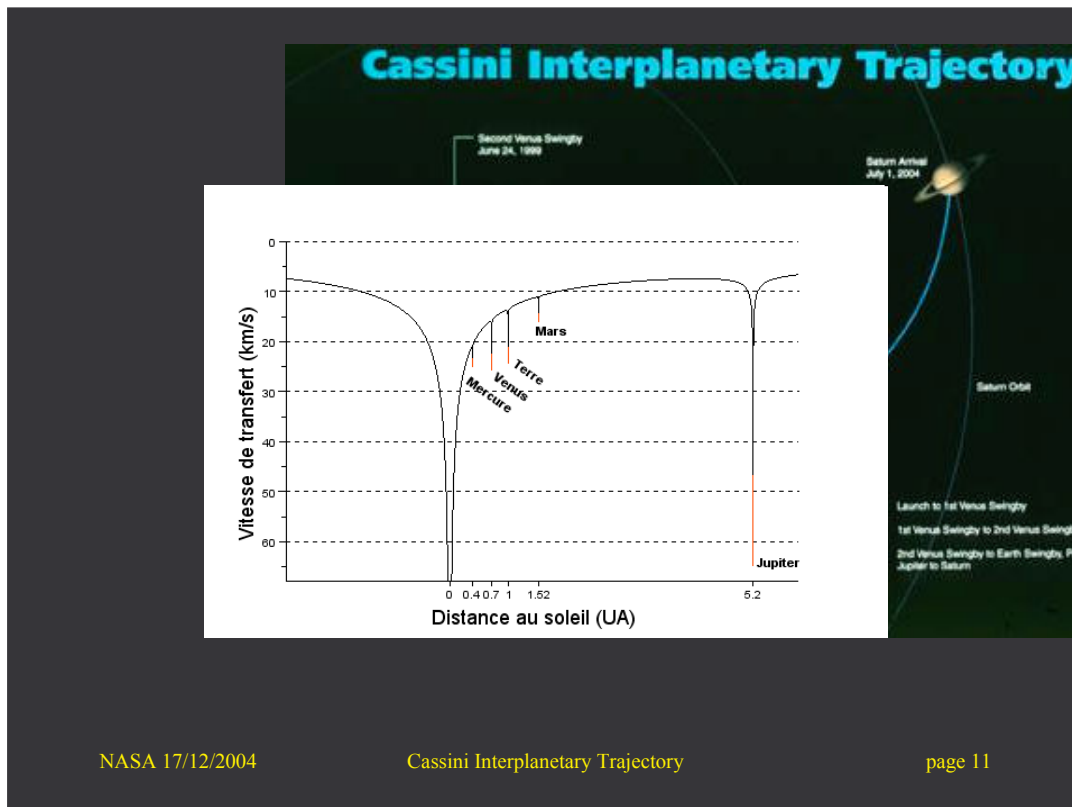
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Titan: le plus lointain “toucher” des humains

If you could stand on **Titan**, what might you see?

On **january 2005** the robotic **Huygens** probe landed on the enigmatic moon of Saturn and sent back the first ever images from beneath Titan's thick cloud layers. This color view from Titan gazes across a suddenly familiar but distant landscape on Saturn's largest moon. The scene was recorded by ESA's Huygens probe after a 2 1/2 hour descent through a thick atmosphere of nitrogen laced with methane. Bathed in an eerie orange light at ground level, rocks strewn about the scene could well be composed of water and hydrocarbons frozen solid at an inhospitable temperature of - 179 degrees C. The light-toned rock below and left of center is only about 15 centimeters across and lies 85 centimeters away. Touching down at 4.5 meters per second (16 kilometers per hour), the saucer-shaped probe is believed to have penetrated 15 centimeters or so into a surface with the consistency of wet sand or clay.

From the images sent back, an artist's impression of Huygens on Titan's surface has been reconstructed. In the foreground of the above image sits the car-sized lander that sent back images for more than 90 minutes before running out of battery power. The parachute that slowed Huygen's re-entry is seen in the background, attached to the lander by strong cords. Strange light smooth stones possibly containing water-ice are visible surrounding the landing craft. Analyses of Huygen's images and data shows that Titan's surface today has intriguing similarities to the surface of the early Earth.



Ce que vérifie la navigation spatiale

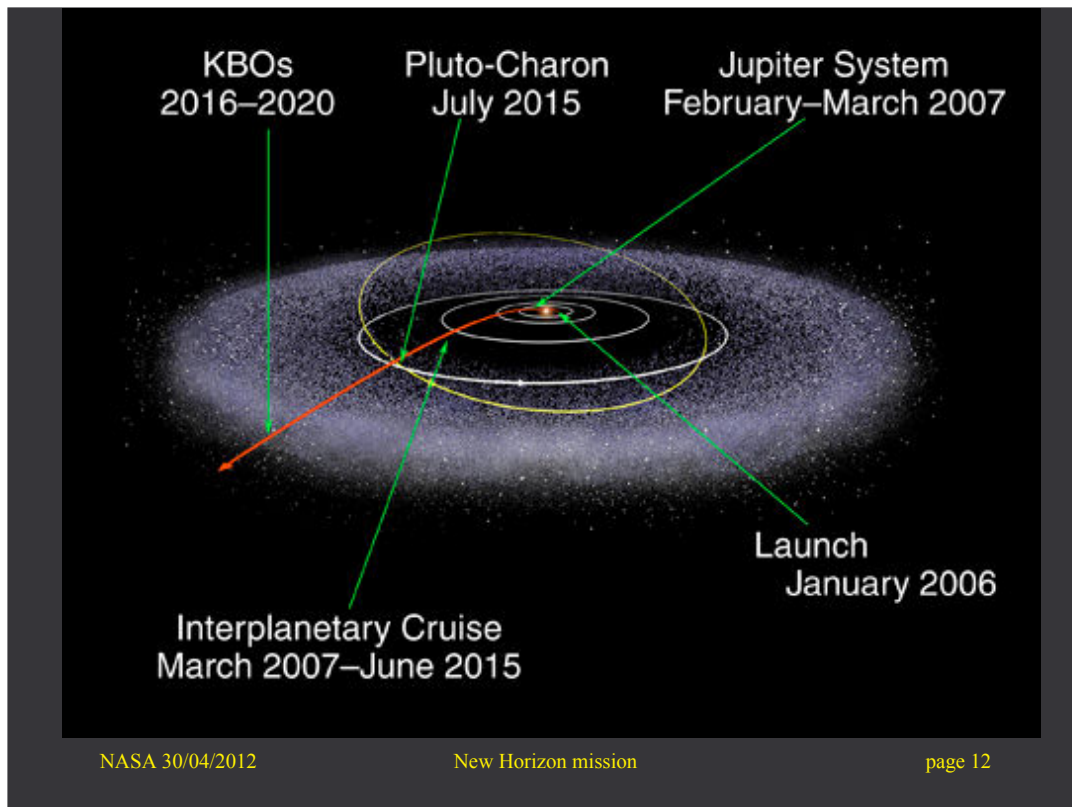
Interplanetary Trajectory

<http://saturn.jpl.nasa.gov/photos/imagdetails/index.cfm?imageId=782>

This graphic depicts the interplanetary flight path beginning with launch from Earth on 15 October 1997, followed by gravity assist flybys of Venus (26 April 1998 and 24 June 1999), Earth (18 August 1999), and Jupiter (30 December 2000). Saturn arrival 1 July 2004 marked the beginning of a four-year prime mission orbital tour of the Saturn System.

The gravity assist flybys of the different planets are designed to increase the spacecraft's velocity relative to the Sun so it can reach Saturn. During these planetary flybys, there is an exchange of energy between the planet and the spacecraft that accelerates the latter and changes its velocity direction relative to the Sun.

With the use of the VVEJGA (Venus-Venus-Earth-Jupiter Gravity Assist) trajectory, it takes 6.7 years for the Cassini spacecraft to arrive at Saturn. The spacecraft will log 5 billion kilometers (over 3 billion miles) during its 6.7 year cruise. This complex trajectory design means that the spacecraft must be capable of withstanding the thermal environment both inside the orbit of Venus (40 C) and at Saturn (-190 C).



Après 20 ans de navigation spatiale, quelques 10h de voyage pour la lumière

In 2006, NASA dispatched an ambassador to the planetary frontier. The New Horizons spacecraft is now halfway between Earth and Pluto, on approach for a dramatic flight past the icy planet and its moons in July 2015.

After 10 years and more than 3 billion miles, on a historic voyage that has already taken it over the storms and around the moons of Jupiter, New Horizons will shed light on new kinds of worlds we've only just discovered on the outskirts of the solar system.

Pluto gets closer by the day, and New Horizons continues into rare territory, as just the fifth probe to traverse interplanetary space so far from the Sun. And the first to travel so far, to reach a new planet for exploration.

Après 10 ans encore New Horizon aura dépassé 70 UA distance des plus lointains TNOs

Dimensions interstellaires

comment a-t-on arpenté la galaxie

au delà de 4 années-lumière
et de 40 000 ans de voyage

10/08/2012

Nuit des étoiles - Chassiers

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Proxima Centauri... distance 4 al !

Wikipedia (Programme Voyager) : Se déplaçant à plus de 17 km/s par rapport au Soleil, Voyager 1, porteur d'un message symbolique de l'Humanité, devrait être la première sonde spatiale à passer à proximité d'une étoile dans 40 000 ans.

Les deux méthodes de mesure des distances interstellaires:

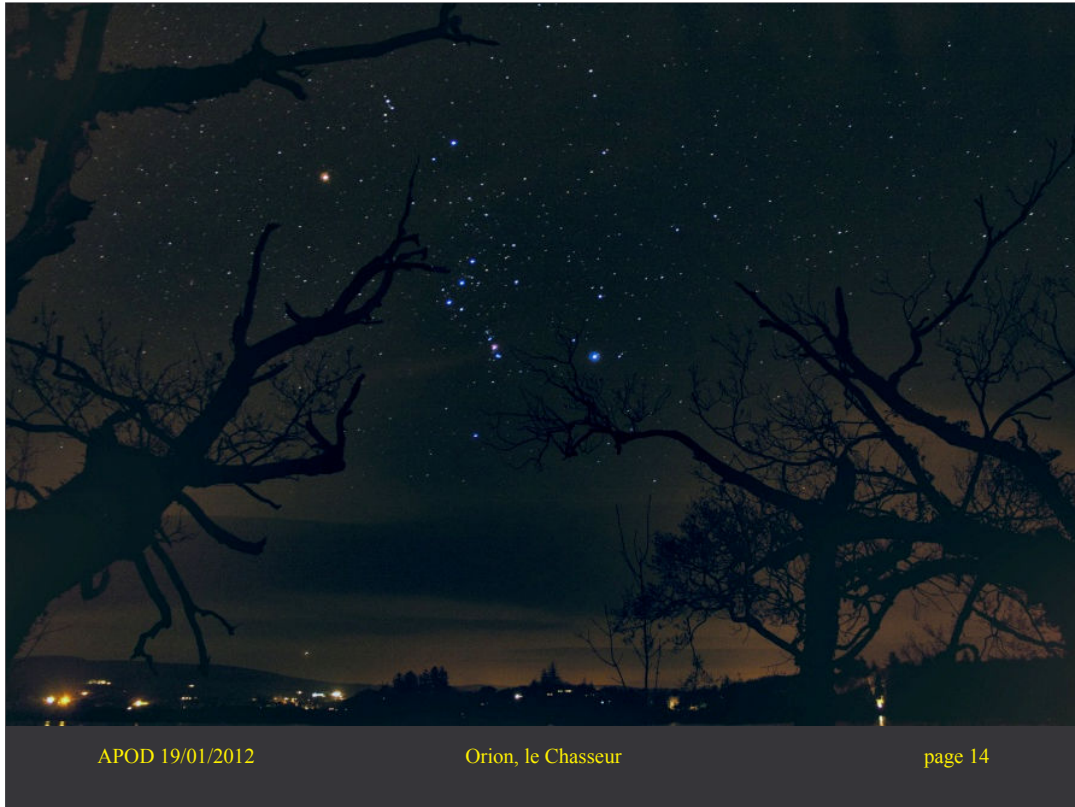
- la parallaxe

jusqu'à qqes 100aines d' al

- la luminosité perçue/ la luminosité absolue (chandelle standard)

au delà

- selon le type spectroscopique
 - amas globulaires
- selon l'éclat maximum typique
 - céphéides



Etoiles visibles à l'œil nu: quelques milliers, jusqu'à quelques milliers d'al

The Hunter's Stars

Image Credit & Copyright: Brendan Alexander (Donegal Skies)

Begin with many a blazing star, Orion, the Hunter, is one of the most easily recognizable constellations.

In this night skyscape from January 15, the hunter's stars rise in the northern hemisphere's winter sky, framed by bare trees and bounded below by terrestrial lights around Lough Eske (Lake of Fish) in County Donegal, Ireland.

Red giant star Betelgeuse is striking in yellowish hues at Orion's shoulder above and left of center. Rivaling the bright red giant, Rigel, a blue supergiant star holds the opposing position near Orion's foot. Of course, the sword of Orion hangs from the hunter's three belt stars near picture center, but the middle star in the sword is not a star at all.

A slightly fuzzy pinkish glow hints at its true nature, a nearby stellar nursery visible to the unaided eye known as the Orion Nebula.



Au télescope tout change!

Classic Orion Nebulae

Credit & Copyright: Kerry-Ann Lecky Hepburn (Weather and Sky Photography)

The Great Nebula in Orion, also known as M42, is one of the most famous nebulae in the sky. The star forming region's glowing gas clouds and hot young stars are near the center of this colorful deep sky image that includes the smaller nebula M43 and dusty, bluish reflection nebulae NGC 1977 and friends on the left. Located at the edge of an otherwise invisible giant molecular cloud complex, these eye-catching nebulae represent only a small fraction of this galactic neighborhood's wealth of interstellar material.

Captured with very modest equipment, the gorgeous skyscape was awarded Best in Show at the 2009 Starfest International Salon of Astrophotography. Judges commented that the detail and shading were exquisite in this version of a classic astronomical image.

The field spans nearly 3 degrees or about 75 light-years at the Orion Nebula's estimated distance of 1,500 light-years.



Comment évaluer la distance de cette étoile?

Dad Quiets **Omicron Ceti**

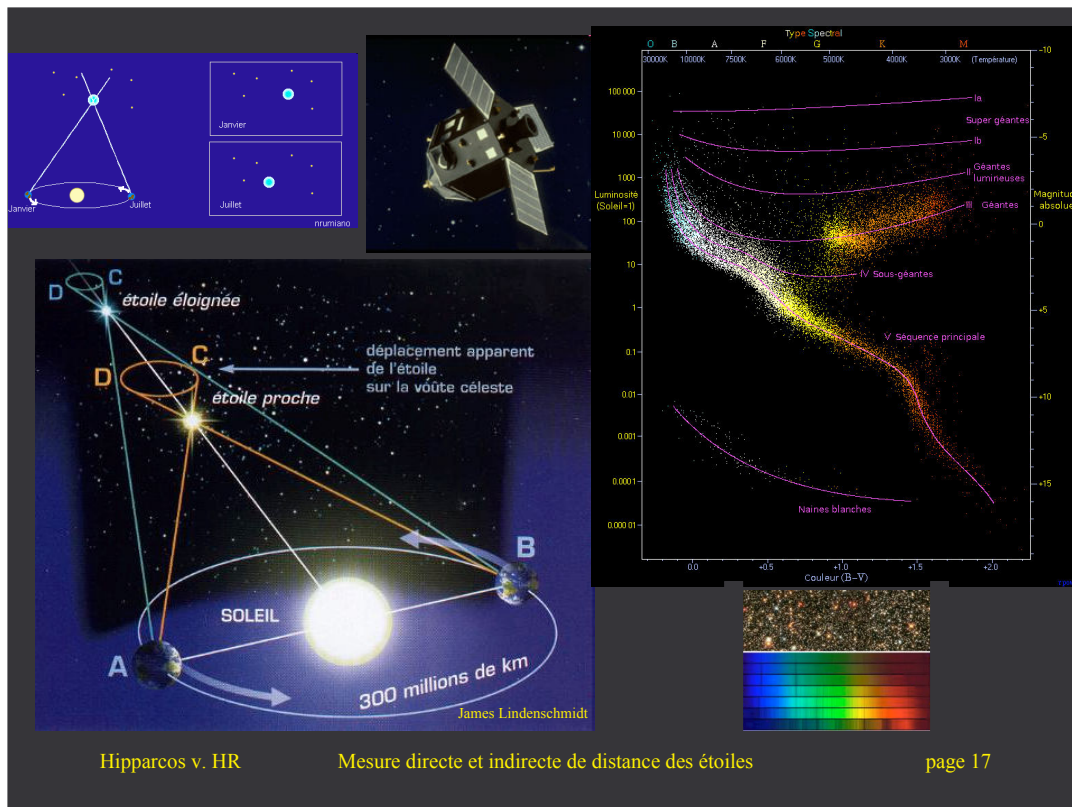
Image Credit & Copyright: Tamas Ladanyi (TWAN)

The Omicron Cetians have been silenced. After alien-like monsters were reported to disturb his daughter's sleep for four nights in a row, this father took action. When last questioned, the daughter seemed to indicate that the hullabaloo might have come from a planetary system possibly sounding like "Omicron Ceti".

Getting to the root of the problem, the dad then took his daughter outside and used a powerful laser to blast the alien's home world.

Humorously, the parent star Omicron Ceti now shows itself to be unstable and is dramatically increasing its brightness. Happy April Fool's Day from the folks at APOD.

In actuality, the star being pointed out is **Mira**, a famous variable star expected to reach its maximum brightness again in late August. The father in question was actually pointing out, to his daughter, the star that shares her name.



HIPPARCOS, premier satellite d'astrométrie, a permis d'élaborer un catalogue publié en 1997. Il fournit les coordonnées célestes et les composantes de mouvement de quelque 118 000 étoiles avec une précision 10 à 100 fois plus grande que les catalogues précédents, établis à l'aide d'instruments au sol.

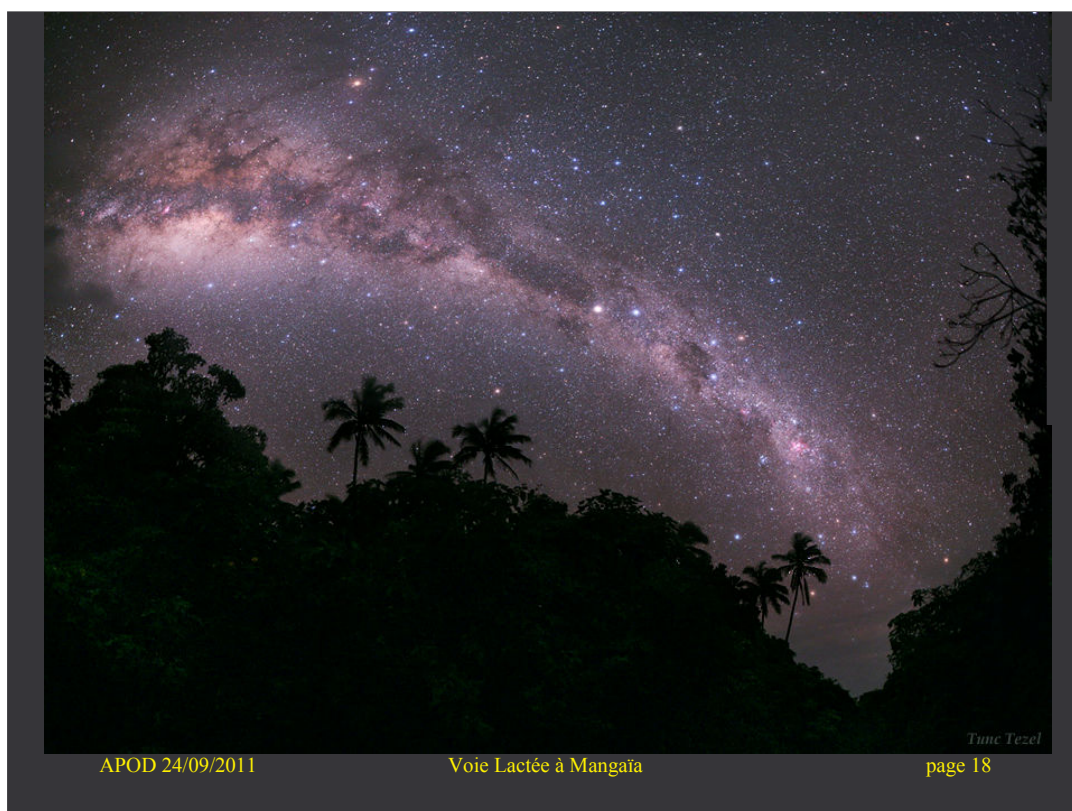
La mission a permis de cartographier près de 2,5 millions d'étoiles dans notre galaxie.

Essentiellement composé d'un télescope, HIPPARCOS est lancé en 1989 et fonctionne jusqu'en 1993. En raison d'une panne de son moteur d'apogée, il ne peut pas atteindre l'orbite géostationnaire initialement prévue. Cependant, grâce à une nouvelle programmation des observations et de leur dépouillement, la mission est sauvée et ses objectifs intégralement atteints.

Son télescope balaye systématiquement le ciel en visant simultanément 2 régions célestes distinctes, permettant de mesurer, pour un grand nombre d'étoiles prises 2 à 2, l'écart angulaire qui les sépare.

En combinant plusieurs millions de mesures, chacune relative à un couple, il a ensuite été possible de déterminer les paramètres astrométriques d'étoiles présélectionnées.

In fine, 2 catalogues d'étoiles ont été élaborés : le catalogue HIPPARCOS, rassemblant des informations d'une précision sans précédent sur près de 120 000 étoiles, et le catalogue Tycho, d'une précision moindre, mais portant sur plus de 2,5 millions d'étoiles. Des outils que les astronomes du monde entier utiliseront pendant au moins 30 ans.



La voie Lactée Océan d'étoiles

Mangaia's Milky Way

Image Credit & Copyright: Tunç Tezel (TWAN)

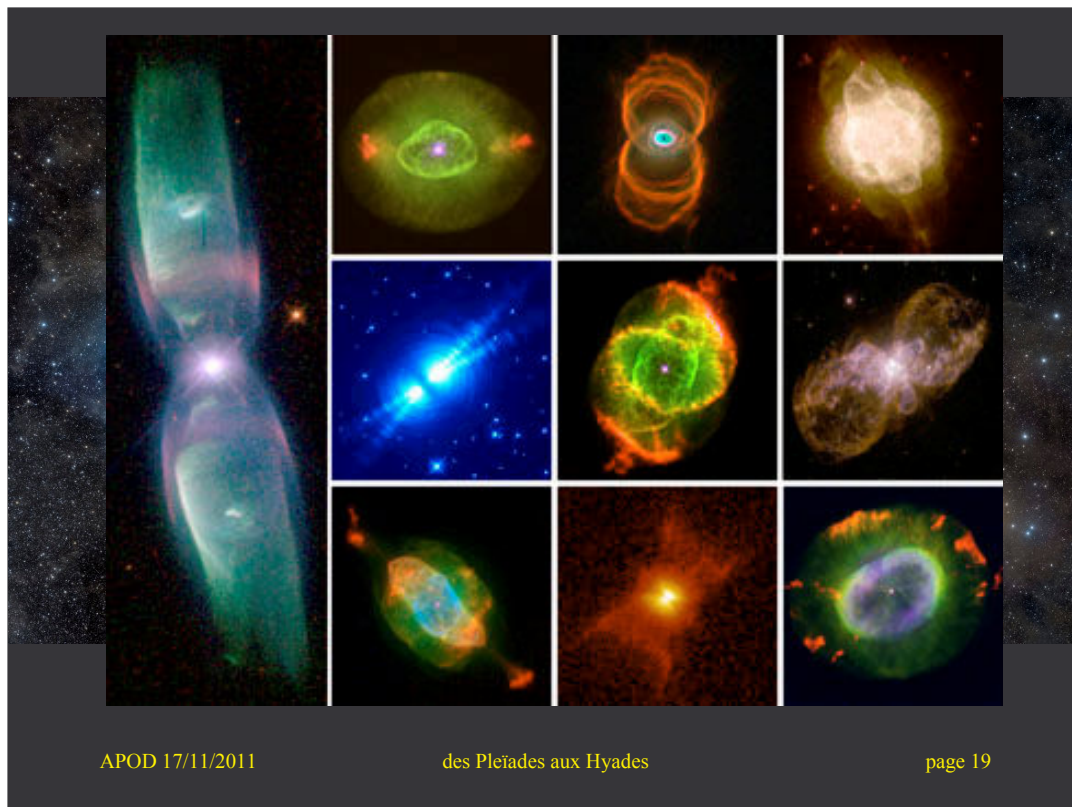
From Sagittarius to Carina, the Milky Way Galaxy shines in this dark night sky above planet Earth's lush island paradise of Mangaia.

Familiar to denizens of the southern hemisphere, the gorgeous skyscape includes the bulging galactic center at the upper left and bright stars Alpha and Beta Centauri just right of center.

About 10 kilometers wide, volcanic Mangaia is the southernmost of the Cook Islands. Geologists estimate that at 18 million years old it is the oldest island in the Pacific Ocean.

Of course, the Milky Way is somewhat older, with the galaxy's oldest stars estimated to be over 13 billion years old.

(Editor's note: This image holds the distinction of being selected as winner in the Royal Observatory, Greenwich, Astronomy Photographer of the Year competition in the Earth and Space category.)

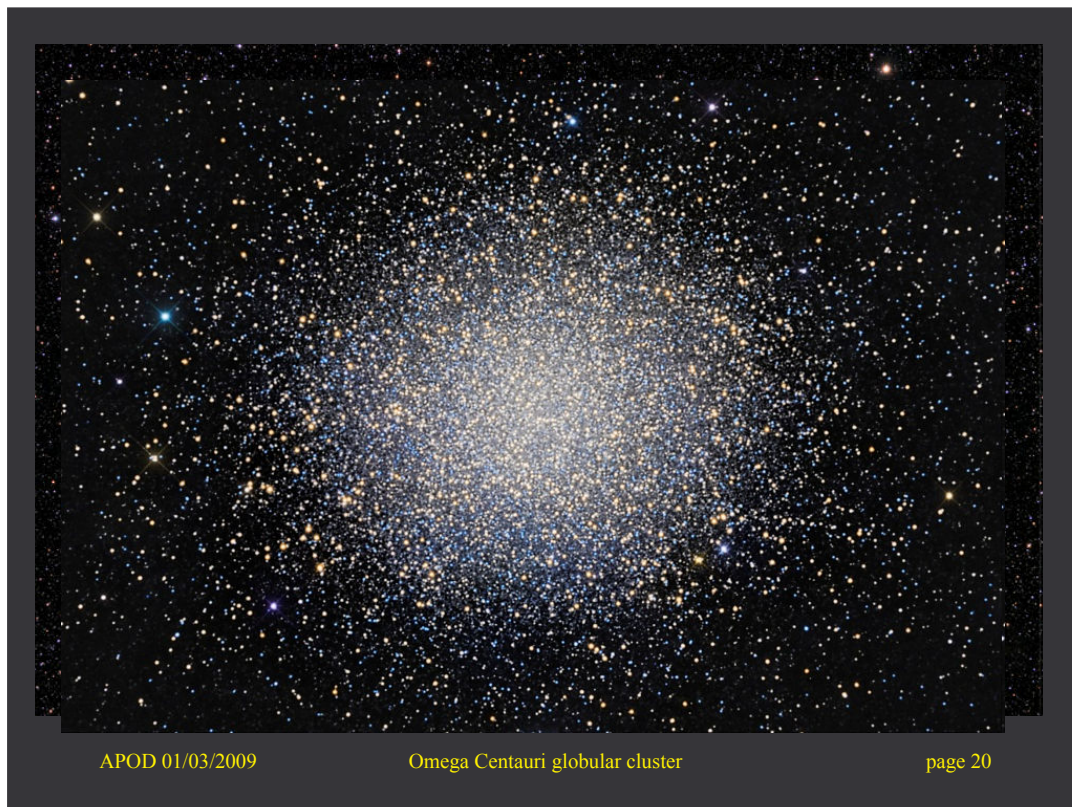


Au télescope il y a aussi les “nébuleuses”... et les poussières!

Pleiades to Hyades

Image Credit & Copyright: Rogelio Bernal Andreo

This cosmic vista stretches almost 20 degrees across the gentle constellation Taurus. It begins at the Pleiades and ends at the Hyades, two of the best known star clusters in planet Earth's sky. At left, the lovely Pleiades star cluster is about 400 light-years away. In a familiar celestial scene, the cluster stars shine through dusty clouds that scatter blue starlight. At right, the V-shaped Hyades cluster looks more spread out compared to the compact Pleiades and lies much closer, 150 light-years distant. Of course, the Hyades cluster stars seem anchored by bright Aldebaran, a red giant star with a yellowish appearance. But Aldebaran actually lies only 65 light-years away, by chance along the line of sight to the Hyades cluster. Faint dust clouds found near the edge of the Taurus Molecular Cloud are also evident throughout the remarkable 12 panel mosaic. The wide field of view includes the youthful star T Tauri and Hind's variable nebula about four degrees left of Aldebaran on the sky.



Amas globulaires lointains d'étoiles anciennes

Omega Centauri: The Largest Nearby Globular Cluster

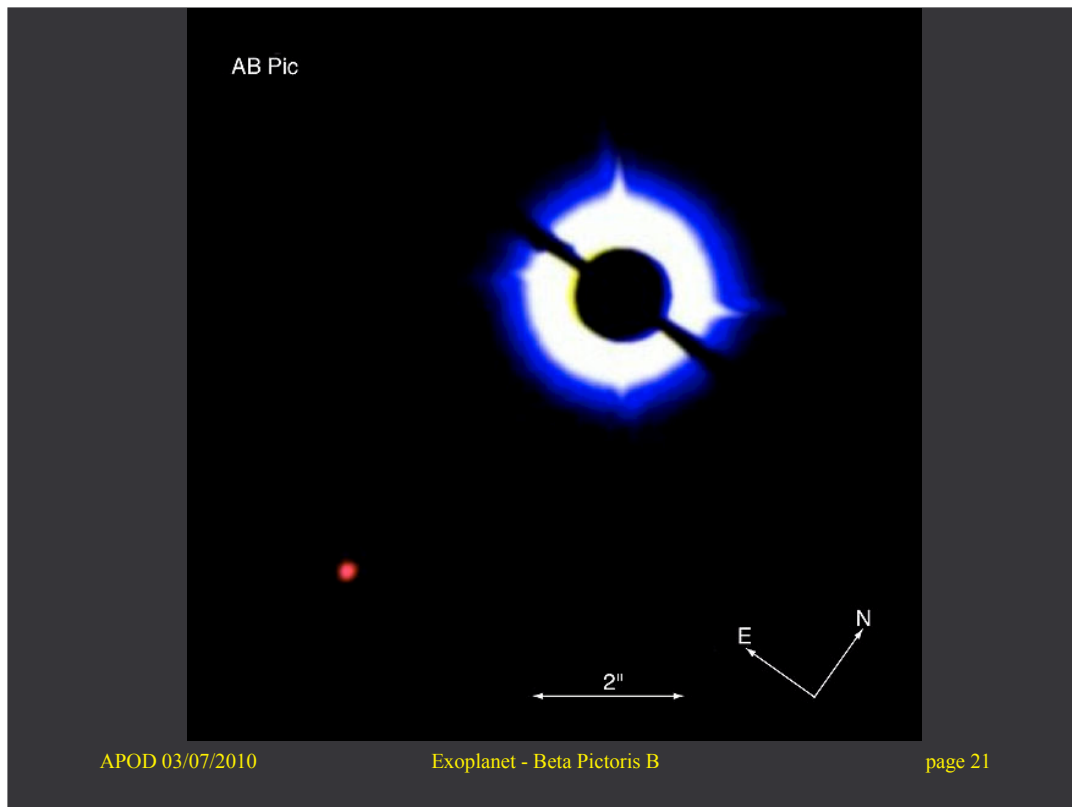
Credit & Copyright: Thomas V. Davis (tvdavisastropix.com)

This huge ball of stars predates our Sun. Long before humankind evolved, before dinosaurs roamed, and even before our Earth existed, ancient globs of stars condensed and orbited a young Milky Way Galaxy.

Of the 200 or so globular clusters that survive today, Omega Centauri is the largest, containing over ten million stars. Omega Centauri is also the brightest globular cluster, at apparent visual magnitude 3.9 it is visible to southern observers with the unaided eye.

Cataloged as NGC 5139, Omega Centauri is about **18,000 light-years away** and 150 light-years in diameter

Unlike many other globular clusters, the stars in Omega Centauri show several different ages and trace chemical abundances, indicating that the globular star cluster has a **complex history over its 12 billion year age**.



Et aussi des (exo) planètes

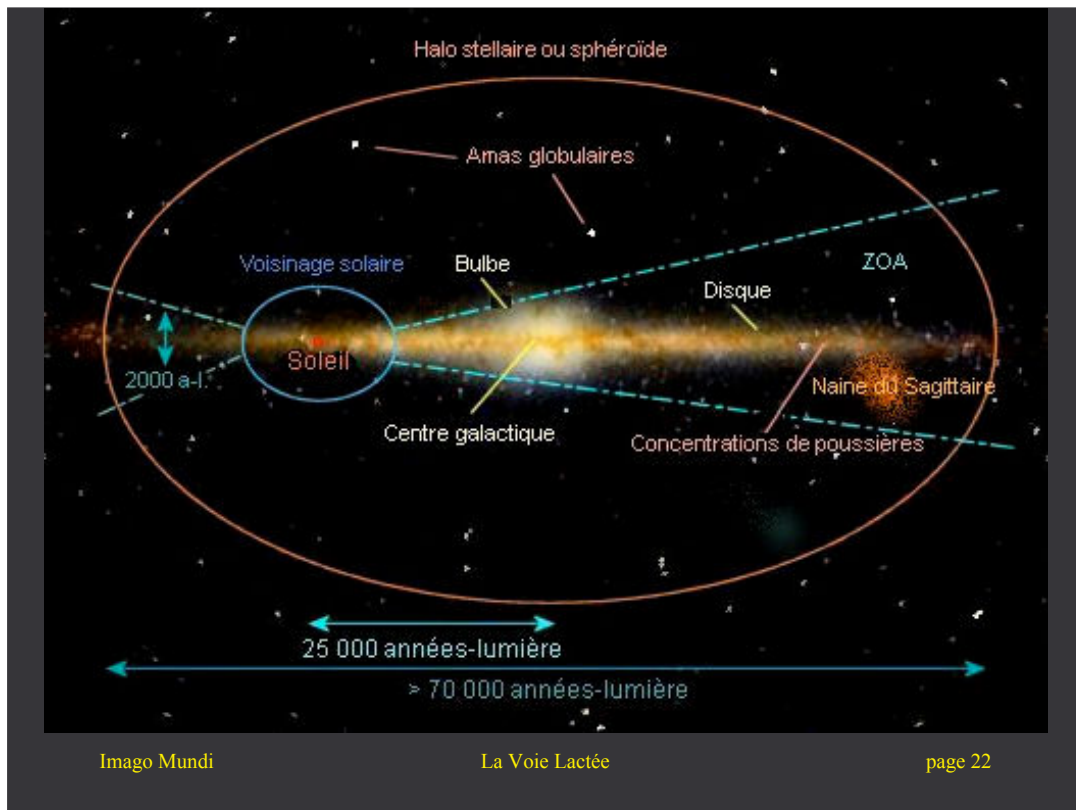
A Giant Planet for Beta Pic

Credit: A.-M. Lagrange, D. Ehrenreich (LAOG), et al., ESO

A mere 50 light-years away, young star Beta Pictoris became one of the most important stars in the sky in the early 1980s. Satellite and ground-based telescopic observations revealed the presence of a surrounding outer, dusty, debris disk and an inner clear zone about the size of our solar system -- strong evidence for the formation of planets. Infrared observations from European Southern Observatory telescopes subsequently detected a source in the clear zone, now confirmed as a giant planet orbiting Beta Pic. The confirmation comes as the planet is detected at two different positions in its orbit. Designated Beta Pictoris b, the giant planet must have formed rapidly as Beta Pic itself is only 8 to 20 million years old. With an orbital period estimated between 17 and 44 years, Beta Pictoris b could lie near the orbit of Saturn if found in our solar system, making it the closest planet to its parent star directly imaged ... so far.

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

Coronagraphic image of AB Pictoris showing a companion (bottom left), which is either a brown dwarf or a massive planet. The data was obtained on 16 March 2003 with NACO on the VLT, using a 1.4 arcsec occulting mask on top of AB Pictoris.



Récapitulons!



10/08/2012

près de 800 exoplanètes détectées à ce jour

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**Seulement 300 années-lumière, mais déjà un voyage...
au delà de la fiction!**

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

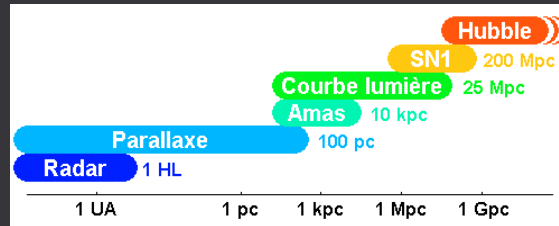
<http://exoplanet.hanno-rein.de>

A la limite des mesures par parallaxe(astrométriques)
détectées par d'autres méthodes:

- imagerie directe (optique adaptative + coronagraphie)
- transit
- vitesse radiale(effet Doppler+calcul)
- microlentille gravitationnelle

Dimensions intergalactiques

et questions cosmologiques



10/08/2012

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Notre galaxie, l'univers entiers ou seulement une île dans l'univers ?

Au début du XX^{ème} siècle

on n'imaginait qu'un seul univers pour toutes les étoiles et "nébuleuses" observables

Le "Grand débat" 1920-1924

Prouver qu'Andromède était au delà de la Voie Lactée fut une première étape... franchie grâceaux "chandelles standards" que sont apparues les Céphéïdes RR-Lyrae



APOD 18/09/2004

M31 - Andromeda Galaxy

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M31: The Andromeda Galaxy

Credit & Copyright: Robert Gendler (robgendlerastropixs.com)

Distance	778 ± 17 kpc (2,54 millions d' a.l.)
Vitesse radiale	-301 ± 7 km/s

Andromeda is the nearest major galaxy to our own Milky Way Galaxy.

Our Galaxy is thought to look much like Andromeda. Together these two galaxies dominate the Local Group of galaxies.

The diffuse light from Andromeda is caused by the hundreds of billions of stars that compose it.

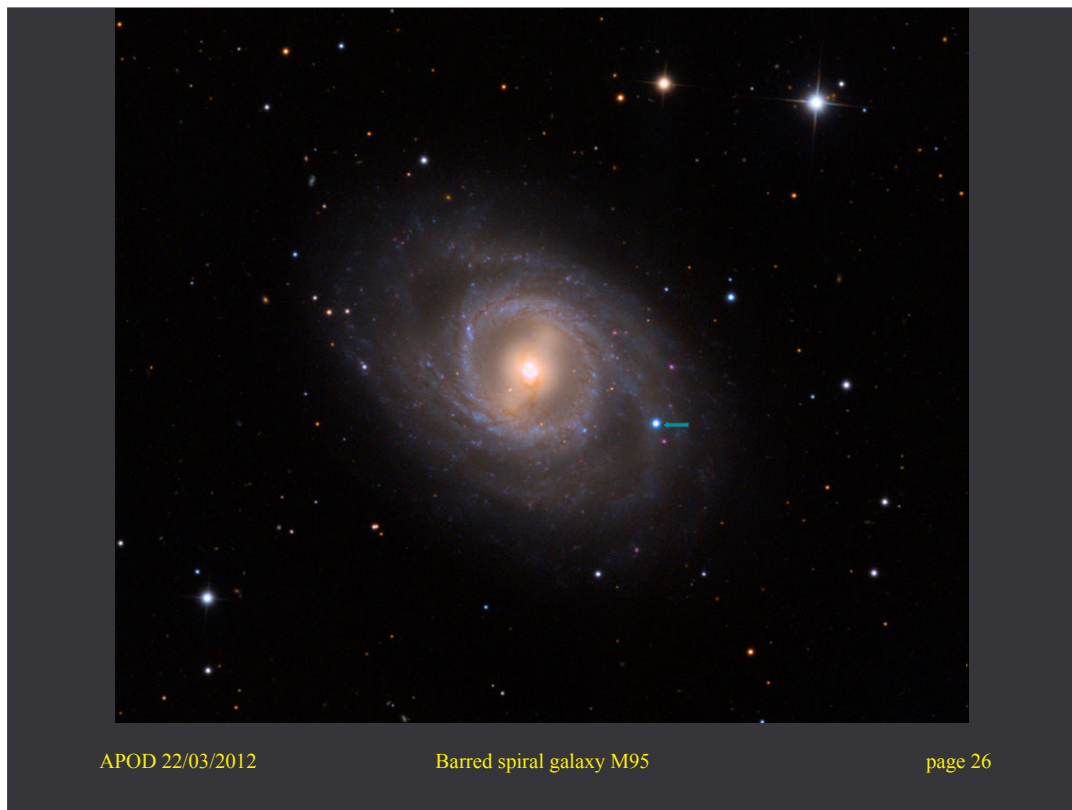
The several distinct stars that surround Andromeda's image are actually stars in our Galaxy that are well in front of the background object.

Andromeda is frequently referred to as M31 since it is the 31st object on Messier's list of diffuse sky objects.

M31 is so distant it takes about two million years for light to reach us from there. Although visible without aid, the above image of M31 is a digital mosaic of 20 frames taken with a small telescope.

Much about M31 remains unknown, including how the center acquired two nuclei.

Voir aussi <http://www.obspm.fr/messier/f/m031.html>



APOD 22/03/2012

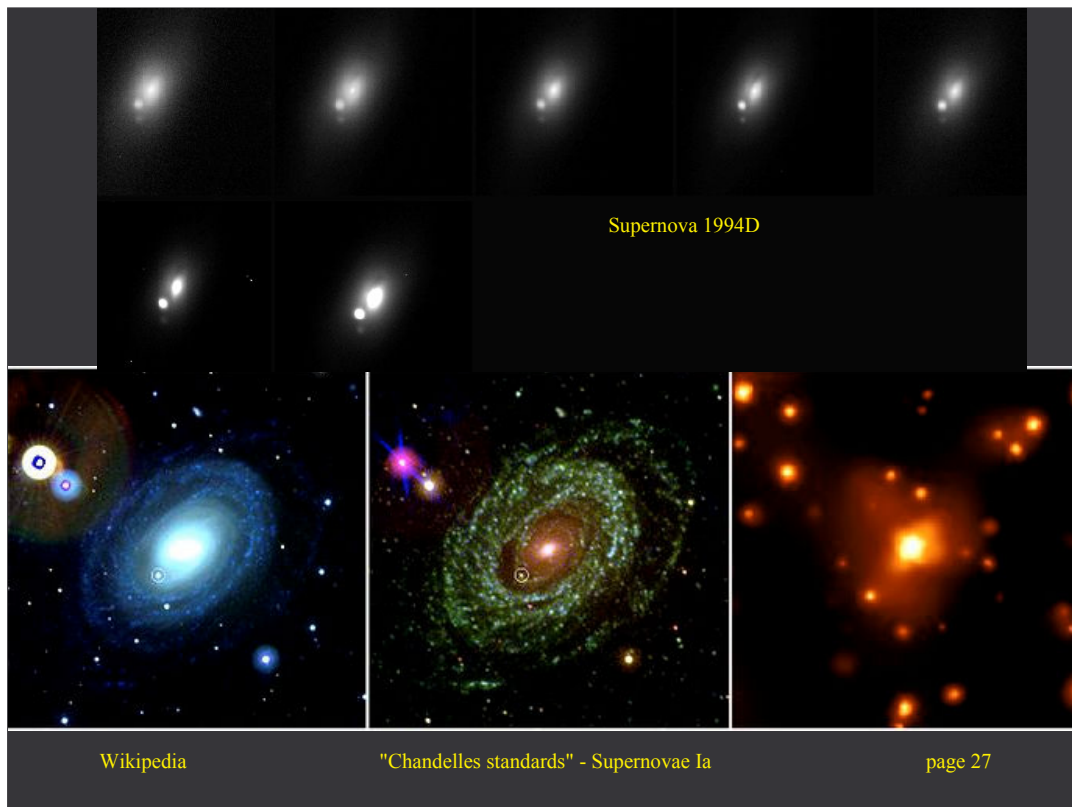
Barred spiral galaxy M95

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M95 with Supernova 2012aw

Image Credit & Copyright: Adam Block, Mt. Lemmon SkyCenter, University of Arizona

Barred spiral galaxy M95 is about 75,000 light-years across, comparable in size to our own Milky Way and **one of the larger galaxies of the Leo I galaxy group**. In fact, it is part of a not quite so famous trio of Leo galaxies with neighbors M96 and M105, about **38 million light-years distant**. In this sharp and colorful cosmic portrait, a bright, compact ring of star formation surrounds the galaxy's core. Surrounding the prominent yellowish bar are tightly wound spiral arms traced by dust lanes, young blue star clusters, and telltale pinkish star forming regions. As a bonus, follow along the spiral arm unwinding down and to the right and you'll soon get to M95's **latest supernova SN 2012aw, discovered on March 16** and now identified as the explosion of a massive star. A good target for small telescopes, the supernova stands out in this video feature (vimeo) comparing the recent image with a deep image of M95 without supernova taken in 2009.

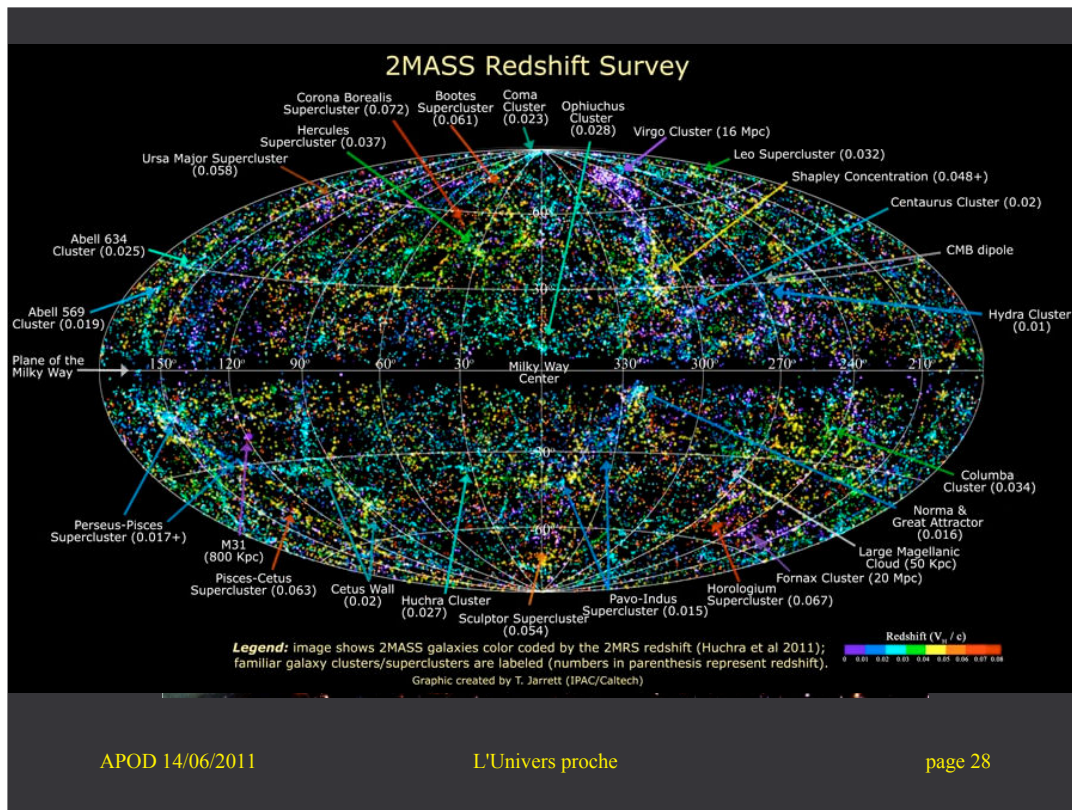


Supernova 2005ke de Type Ia, détectée en 2005.

Les trois images représentent l'explosion en lumière visible, dans l'ultraviolet et dans les rayons X. L'image au rayon X fournit la preuve qu'il s'agissait de l'explosion d'une naine blanche orbitant autour d'une géante rouge.

http://fr.wikipedia.org/wiki/Naine_blanche#Supernova_de_type_Ia

La masse d'une naine blanche isolée, qui ne serait pas en rotation, ne peut excéder la masse de Chandrasekhar d'à peu près 1,4 M masse solaire. Cependant, les naines blanches dans les systèmes binaires peuvent accréter de la matière de leur compagnon, ce qui augmente leur masse et leur densité (voir supra). Lorsque leur masse approche la limite de Chandrasekhar, cela peut théoriquement mener à l'allumage explosif des réactions de fusion nucléaire dans la naine blanche, ou à son effondrement en étoile à neutrons⁸². L'accrétion fournit le mécanisme actuellement favori, le « modèle à dégénérescence simple » pour les supernovæ de type Ia. Dans ce modèle, une naine blanche à carbone-oxygène accréte de la matière de son compagnon⁸³ stellaire, en augmentant sa masse et en comprimant son cœur. Le chauffage serait dû à la compression du cœur qui mène à l'allumage de la fusion du carbone lorsque la masse se rapproche de la limite de Chandrasekhar⁸³.



The Universe Nearby

Credit: 2MASS, T. H. Jarrett, J. Carpenter, & R. Hurt

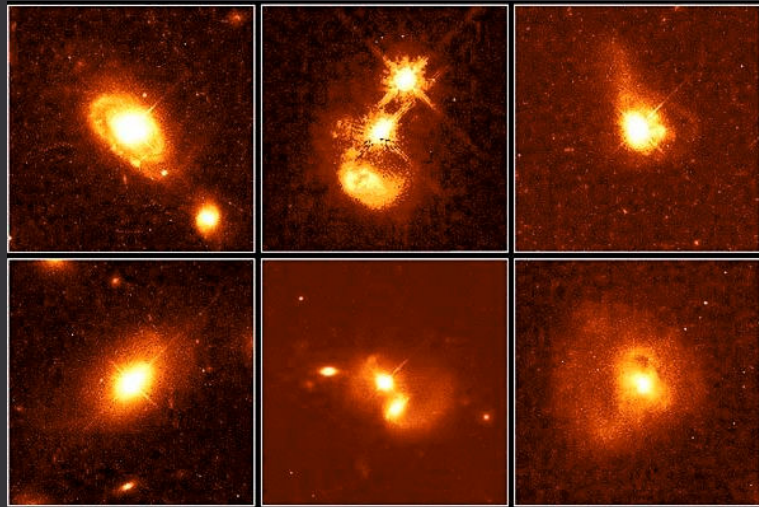
What does the universe nearby look like? This plot shows nearly 50,000 galaxies in the nearby universe detected by the Two Micron All Sky Survey (2MASS) in infrared light. The resulting image is an incredible tapestry of galaxies that provides limits on how the universe formed and evolved.

The dark band across the image center is blocked by dust in the plane of our own Milky Way Galaxy.

Away from the Galactic plane, however, each dot represents a galaxy, color coded to indicate distance. Bluer dots represent the nearer galaxies in the 2MASS survey, while redder dots indicating **the more distant survey galaxies that lie at a redshift near 0.1**.

Named structures are annotated around the edges. Many galaxies are gravitationally bound together to form clusters, which themselves are loosely bound into superclusters, which in turn are sometimes seen to align over even larger scale structures.

http://fr.wikipedia.org/wiki/Structures_%C3%A0_grande_%C3%A9chelle_de_l%27univers



APOD 09/03/2002

A Quasar Portrait Gallery

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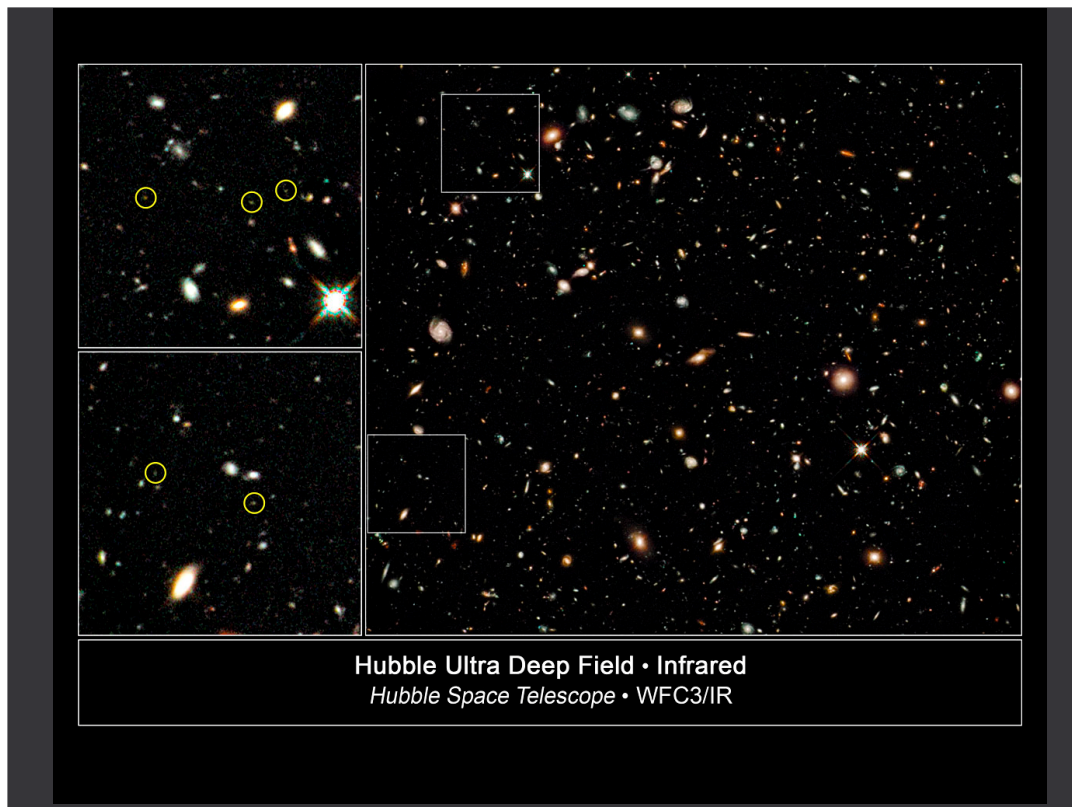
A Quasar Portrait Gallery

Credit J. Bahcall (IAS, Princeton), M. Disney (Univ. Wales), NASA

Quasars (QUASi-stellar objects) lie near the edge of the observable Universe.

Discovered in 1963, astronomers were astounded that such objects could be visible across **billions of light-years**, as this implies they must emit prodigious amounts of energy. Where does the energy come from? Many believe the quasar's central engine is a giant black hole fueled by tremendous amounts of infalling gas, dust, and stars.

This gallery of quasar portraits from the Hubble Space Telescope offers a look at their local neighborhoods: the quasars themselves appear as the bright star-like objects with diffraction spikes. The images in the center and right hand columns reveal quasars associated with disrupted colliding and merging galaxies which should provide plenty of debris to feed a hungry black hole.



The Hercules Cluster of Galaxies Credit & Copyright: Tony Hallas

These are galaxies of the Hercules Cluster, an archipelago of island universes a mere 500 million light-years away.

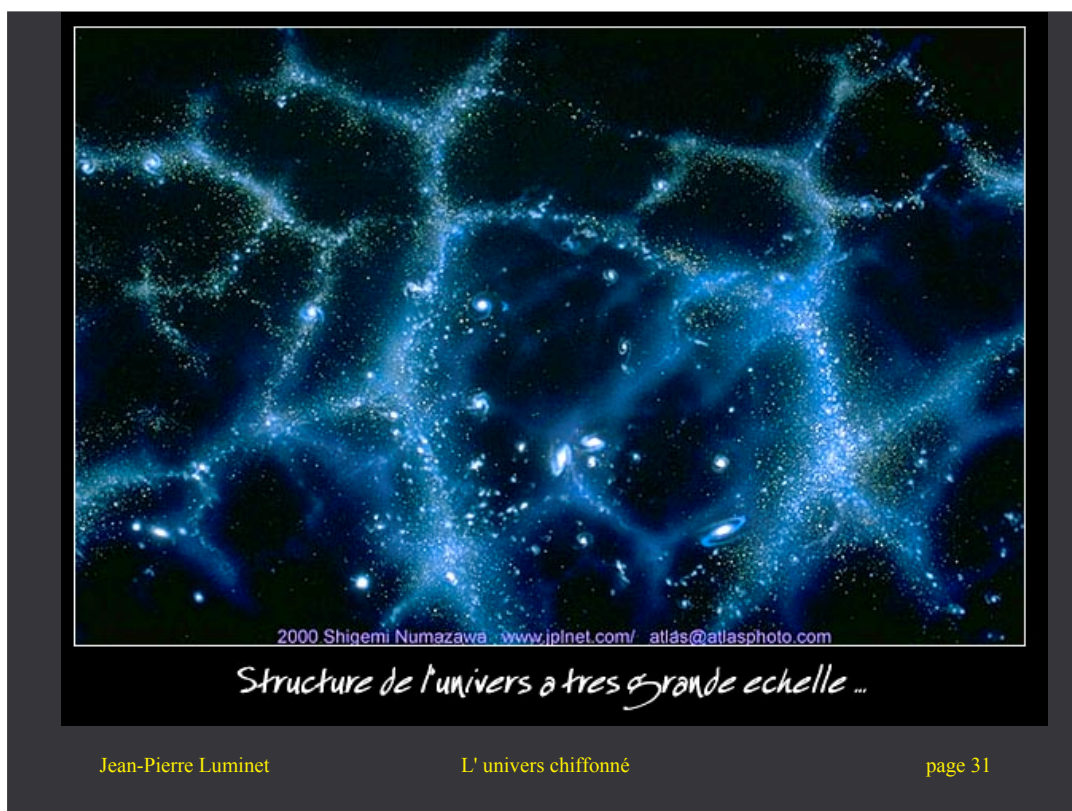
Also known as Abell 2151, this cluster is loaded with gas and dust rich, star-forming spiral galaxies but has relatively few elliptical galaxies, which lack gas and dust and the associated newborn stars. The colors in this remarkably deep composite image clearly show the star forming galaxies with a blue tint and galaxies with older stellar populations with a yellowish cast.

The sharp picture spans about 3/4 degree across the cluster center, corresponding to over 6 million light-years at the cluster's estimated distance. In the cosmic vista many galaxies seem to be colliding or merging while others seem distorted - clear evidence that cluster galaxies commonly interact.

In fact, the Hercules Cluster itself may be seen as the result of ongoing mergers of smaller galaxy clusters and is thought to be similar to young galaxy clusters in the much more distant, early Universe.

Futura-sciences 21 oct 2010

C'est confirmé ! La galaxie **UDFy-38135539** découverte initialement par Hubble, et dont on pensait qu'elle pouvait être l'une des plus lointaines connues à ce jour, détient bien le record de décalage spectral. Les mesures conduites au VLT prouvent que les images que l'on observe datent du temps où l'univers était âgé de moins de 600 millions d'années.



Quelle géométrie pour l'Univers?

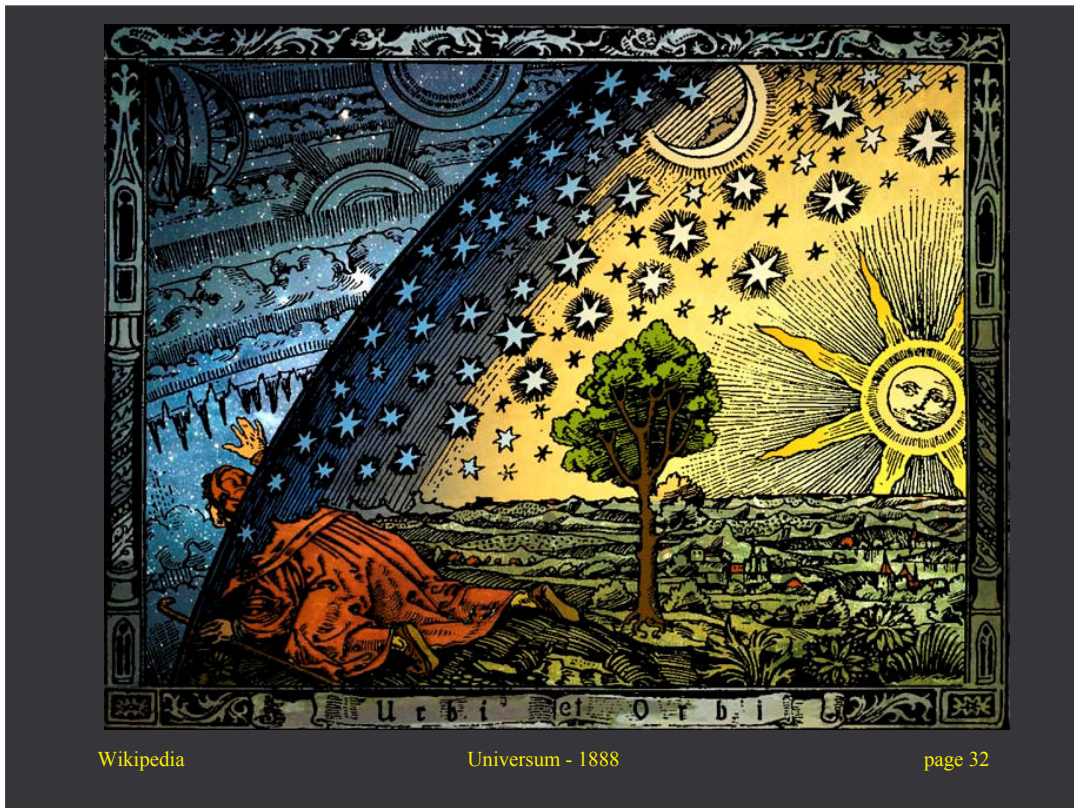
L'Univers chiffonné

par Jean-Pierre LUMINET

Directeur de recherches au CNRS, Observatoire de Paris

Dès la fin des années 2000, Jean-Pierre LUMINET propose pour notre Univers une structure géométrique originale, à l'antipode de l'espace euclidien. Selon lui, l'espace serait doté d'une "topologie" plus complexe correspondant à celle d'un Espace Dodécaédrique étudiée par Poincaré (dénoté en anglais sous le sigle DPS). L'image ci-dessus illustre l'allure que peut prendre un tel espace, et l'idée que seule de ces cellules, tout en observant des images multiples des galaxies reproduites par une sorte de jeux de miroirs. De quoi faire rêver, ce qui est une des spécialités de Jean-Pierre Luminet, auteur par ailleurs de romans, de livres de poésie et d'histoire des sciences ...

Réservée de prime abord aux spécialistes de la cosmologie - et d'ailleurs accueillie par certains avec scepticisme - cette hypothèse audacieuse semble confortée depuis quelques années par les observations dues à la sonde WMAP (Wilkinson Microwave Anisotropy Probe) étudiant les anisotropies du rayonnement en micro-ondes du fond du ciel, la fameuse émission à 3 degrés Kelvin découverte en 1965 par Pensias et Wilson.



Au delà de l'horizon?

Universum - C. Flammarion, Holzschnitt, Paris 1888,

Kolorit : Heikenwaelder Hugo, Wien 1998 <http://www.heikenwaelder.at>

OÙ SE SITUE L'HORIZON DE NOTRE UNIVERS ?

Notre Univers est en expansion. Sa partie visible est bornée par un horizon au-delà duquel les galaxies sont invisibles, leur lumière n'ayant pas encore eu le temps de parvenir jusqu'à nous. Mais où se situe la frontière fatidique ?

Les formules qui décrivent le cheminement d'une fourmi sur un élastique que l'on étire s'appliquent aussi à la course entre la lumière et l'expansion cosmique ! Elles permettent de calculer au passage le décalage spectral cosmologique de la lumière d'une galaxie et la relation entre décalage et distance...

Christian Magnan, <http://www.lacosmo.com/horizon.fr.html>



Les Lois de Kepler mises en défaut!

Grand Spiral Galaxy NGC 1232

Galaxies are fascinating not only for what is visible, but for what is invisible. Grand spiral galaxy NGC 1232, captured in detail by one of the new Very Large Telescopes, is a good example.

The visible is dominated by millions of bright stars and dark dust, caught up in a gravitational swirl of spiral arms revolving about the center. Open clusters containing bright blue stars can be seen sprinkled along these spiral arms, while dark lanes of dense interstellar dust can be seen sprinkled between them.

Less visible, but detectable, are billions of dim normal stars and vast tracts of interstellar gas, together wielding such high mass that they dominate the dynamics of the inner galaxy.

Invisible are even greater amounts of matter in a form we don't yet know - pervasive dark matter needed to explain the motions of the visible in the outer galaxy.

M106. Modern deep telescopic views reveal it to be an island universe: a spiral galaxy around 30 thousand light-years across located only about 21 million light-years beyond the stars of the Milky Way. Along with prominent dust lanes and a bright central core, this colorful composite image highlights youthful blue star clusters and reddish stellar nurseries that trace the galaxy's spiral arms. The high resolution galaxy portrait is a mosaic of data from Hubble's sharp ACS camera combined with groundbased color image data. M106 (aka NGC 4258) is a nearby example of the Seyfert class of active galaxies, seen across the spectrum from radio to X-rays. Energetic active galaxies are powered by matter falling into a massive central black hole.



D'étranges phénomènes optiques: lentilles gravitationnelles

Wikipedia

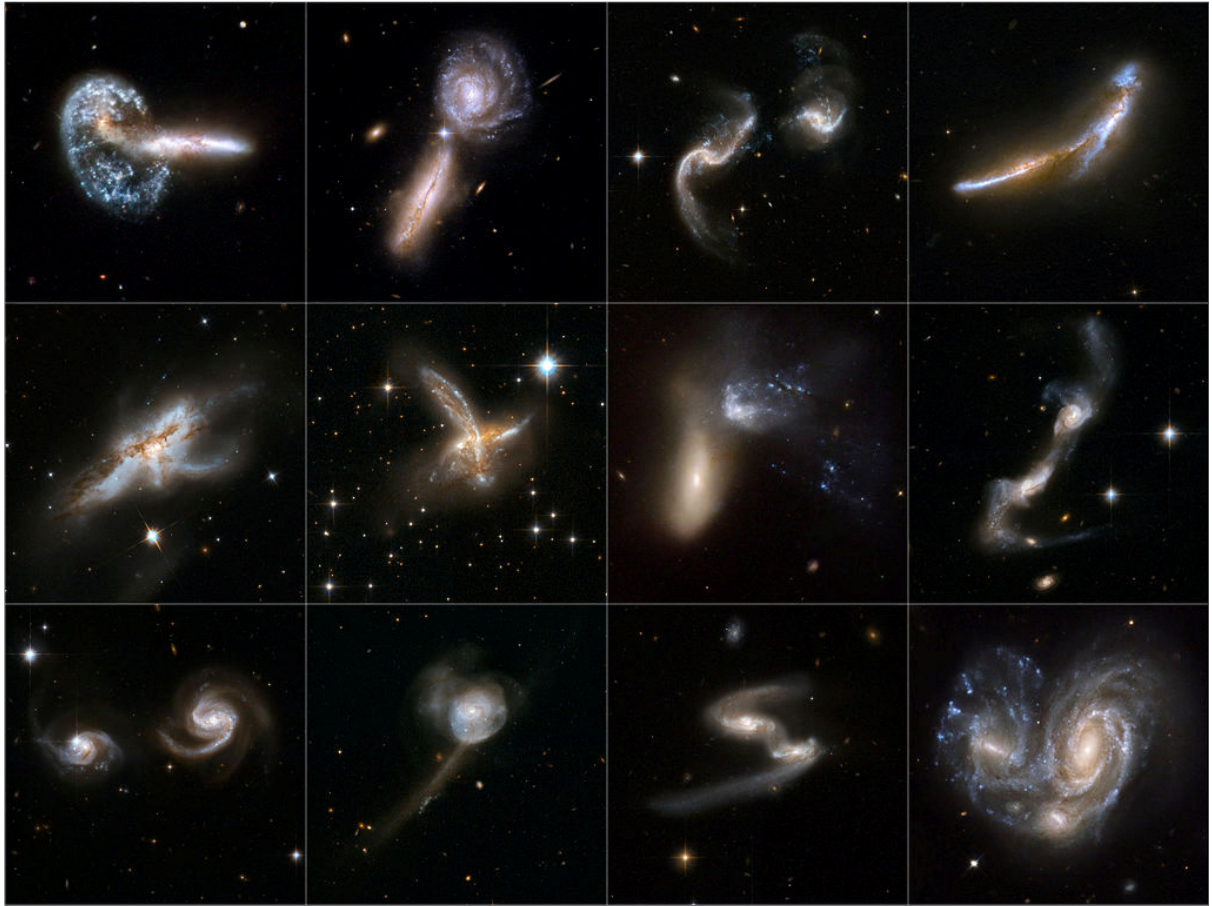
A massive cluster of yellowish galaxies, seemingly caught in a red and blue spider web of eerily distorted background galaxies, makes for a spellbinding picture from the new Advanced Camera for Surveys aboard NASA's Hubble Space Telescope. To make this unprecedented image of the cosmos, Hubble peered straight through the center of one of the most massive galaxy clusters known, called Abell 1689. The gravity of the cluster's trillion stars — plus dark matter — acts as a 2-million-light-year-wide lens in space. This gravitational lens bends and magnifies the light of the galaxies located far behind it. Some of the faintest objects in the picture are probably over 13 billion light-years away (redshift value 6).

Date published on 2003-01-07 (taken in 2002-06)

Source

<http://hubblesite.org/newscenter/newsdesk/archive/releases/2003/01/image/a>

Auteur NASA, N. Benitez (JHU), T. Broadhurst (Racah Institute of Physics/The Hebrew University), H. Ford (JHU), M. Clampin (STScI), G. Hartig (STScI), G. Illingworth (UCO/Lick Observatory), the ACS Science Team and ESA



Rapprochements et collisions, de quelles masses ?

Stephan's Quintet *Image Data: Hubble Legacy Archive, ESA, NASA; Processing: Al Kelly*

The first identified compact galaxy group, Stephan's Quintet is featured in this eye-catching image constructed with data drawn from the extensive Hubble Legacy Archive.

About **300 million light-years away**, only four of these five galaxies are actually locked in a cosmic dance of repeated close encounters. The odd man out is easy to spot, though. The interacting galaxies, NGC 7319, 7318A, 7318B, and 7317 have an overall yellowish cast. They also tend to have distorted loops and tails, grown under the influence of disruptive gravitational tides.

But the predominantly bluish galaxy, NGC 7320, is closer, just 40 million light-years distant, and isn't part of the interacting group. Stephan's Quintet lies within the boundaries of the high flying constellation Pegasus. At the estimated distance of the quartet of interacting galaxies, this field of view spans about 500,000 light-years. However, moving just beyond this field, above and to the left, astronomers can identify another galaxy, NGC 7320C, that is also 300 million light-years distant.

Of course, including it would bring the interacting quartet back up to quintet status.

Hubble Gallery: **galaxies en collision**,
http://fr.wikipedia.org/wiki/Galaxie_en_interaction

La poésie est sans réponse - océan sans fin elle se noie dans un coquillage

Anise Koltz, 2008

10/08/2012

Nuit des étoiles - Chassiers

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Galilée (1564-1642)

La nature n'a aucune obligation envers les hommes.

Elle n'a passé aucun contrat avec eux.

Pascal, Pensées, 1670

Que l'homme contemple donc la nature entière dans sa haute et pleine majesté, qu'il éloigne sa vue des objets bas qui l'environnent. Qu'il regarde cette éclatante lumière, mise comme une lampe éternelle pour éclairer l'univers, que la terre lui paraisse comme un point au prix du vaste tour que cet astre décrit et qu'il s'étonne de ce que ce vaste tour lui-même n'est qu'une pointe très délicate à l'égard de celui que les astres qui roulent dans le firmament embrassent. Mais si notre vue s'arrête là, que l'imagination passe outre; elle se lassera plutôt de concevoir, que la nature de fournir. Tout ce monde visible n'est qu'un trait imperceptible dans l'ample sein de la nature. Nulle idée n'en approche [...]. **C'est une sphère dont le centre est partout, la circonférence nulle part** [...]. Que l'homme, étant revenu à soi, considère ce qu'il est au prix de ce qui est; qu'il se regarde comme égaré dans ce canton détourné de la nature; et que de ce petit cachot où il se trouve logé, j'entends l'univers, il apprenne à estimer la terre, les royaumes, les villes et soi-même son juste prix. **Qu'est-ce qu'un homme dans l'infini ?**

Luce Irigaray, Sexes et parenté, 1987

Entre l'Univers et nous, mais aussi en nous et entre nous,
un autre monde est à penser.

webographie

- NASA - Astronomy Picture of the Day <http://apod.nasa.gov>
- Puits gravitationnel et missions spatiales -
<http://expliquenoustout.blogspot.fr/2011/05/puits-gravitationnel-et-missions.html>
- IMCCE - Qu'est ce que la lumière ?
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- Wikipedia
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- The Scale of the Universe <http://htwins.net/scale2/>
- Observatoire de Paris-Meudon - Cours AMC
http://media4.obspm.fr/public/AMC/pages_visite-univers/bb-distances-astronomie.html

10/08/2012

Nuit des étoiles - Chassiers

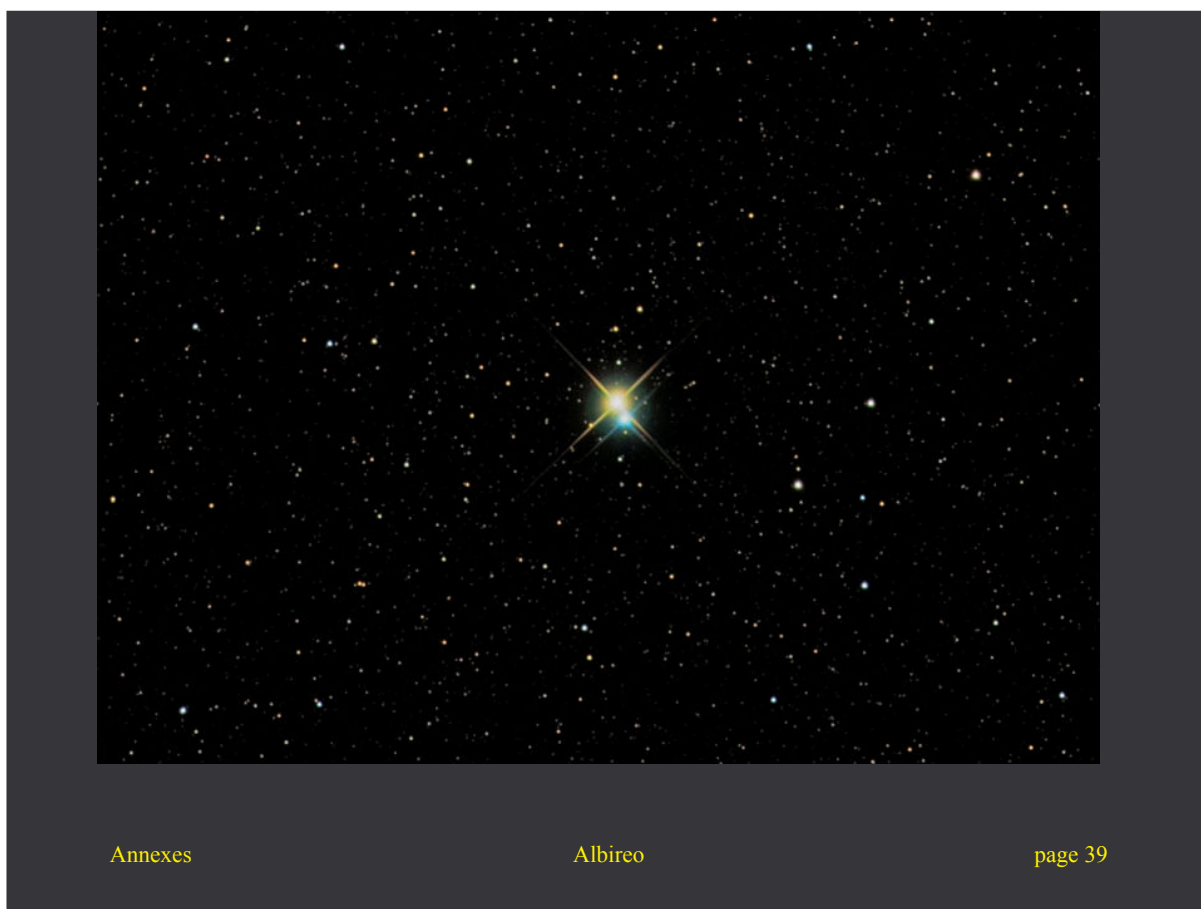
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Récapitulons les distances à partir de la Terre :

Lune	1,3 seconde-lumière
Soleil	8 minutes-lumière
Neptune	4,2 heures-lumière
Proxima Centauri	4,2 années-lumière
Exoplanètes détectées	200 années-lumière au plus
Centre de la Voie Lactée	26 000 années-lumière
Galaxie d'Andromède (Messier 31)	2,6 millions d'années-lumière
Amas de galaxies constellation Hercule	500 millions d'années-lumière
Quasar 3C 273	2,44 milliards d'années-lumière
Quasar Ulas J1120+0641	12,9 milliards d'années-lumière
UDFy-38135539	13,1 milliards d'années-lumière
Age de l'univers observable	13,7 milliards d'années

Bibliographie

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- Christian Magnan, “Le théorème du jardin”, 2011, et <http://www.lacosmo.com/>



Annexes

Albireo

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Vue d'en bas, vue d'en haut!

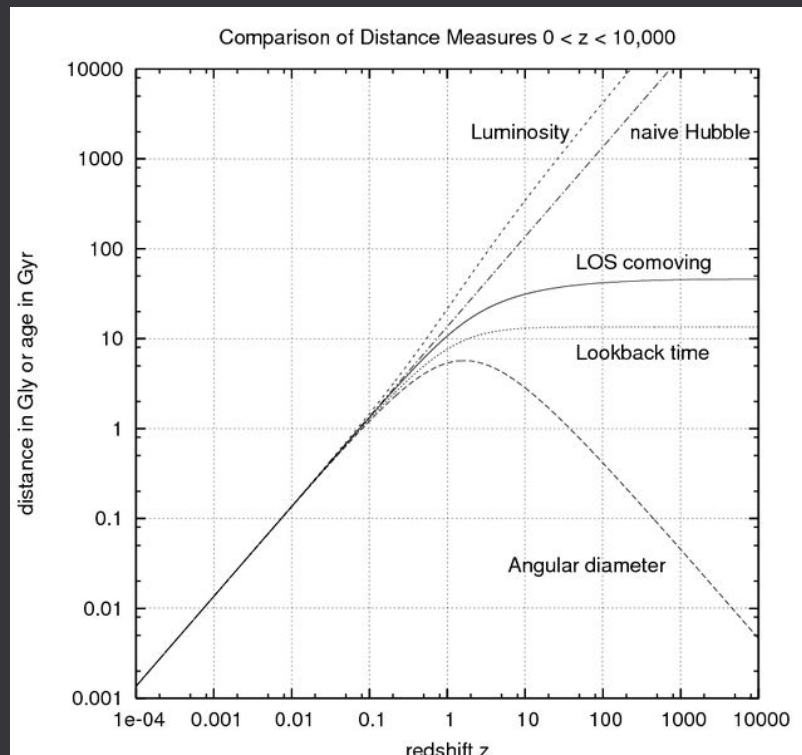
Jupiter and the Moons of Earth

Image Credit & Copyright: Stefan Seip (TWAN)

Planet Earth has many moons. Its largest artificial moon, the **International Space Station**, streaks through this lovely skyview with clouds in silhouette against the fading light of a sunset.

Captured from Stuttgart, Germany last Sunday, the frame also includes Earth's largest natural satellite 1.5 days after its New Moon phase. Just below and left of the young crescent is Jupiter, another bright celestial beacon hovering near the western horizon in early evening skies. Only briefly, as seen from the photographer's location, Jupiter and these moons of Earth formed the remarkably close triple conjunction.

Of course, Jupiter has many moons too. In fact, close inspection of the photo will reveal tiny pin pricks of light near the bright planet, large natural satellites of Jupiter known as Galilean moons.



Annexes

Redshift v. années-lumière

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Rapprochements et collisions, de quelles masses ?

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