Chassiers, Nuits des Etoiles 2010

Lever ses yeux vers le ciel,

des yeux nus et un ciel le plus pur possible,

et voir - parce qu'il n'y a (presque) rien à entendre, sentir, toucher, goûter -

un spectacle que les humains contemplent depuis la nuit des temps

Avec les premiers instruments mécaniques et optiques - télescopie, photographie - et même avec le vol spatial, l'œil a augmenté ses capacités de résolution angulaire et de sensibilité (donc de mesure et d'analyse), tout en conservant une vision en "vraies images" (œil "géométrique" et "photographique" de l'astronomie classique)

Avec la décomposition et l'analyse de la lumière - spectroscopie, spectrographie, spectrométrie - et les télescopes IR, UV, X, Γ, l'œil a été mis encore plus en retrait, derrière les écrans affichant des "fausses images" ou des simulations et l'homme va jusqu'à redescendre dans les cavernes de la Terre (œil "analytique" de l'astrophysique et de la cosmologie)

L'essentiel est essentiel au yeux. Il faut voir avec… son intelligence ;-)

# Porter son regard vers le ciel !

http://antwrp.gsfc.nasa.gov/apod/ap070718.html

Planets over Pony Express Lake

Credit & Copyright: Dan Bush (Missouri Skies)

Explanation: Beautiful sunset sky colors are reflected in Pony Express Lake in this twilight skyview from northern Missouri, USA, planet Earth. Recorded on Monday, a two day old crescent Moon and brilliant planet Venus shine through thin clouds. Joining the conjunction on the right of the Moon's sunlit crescent is fellow wanderer Saturn, with Regulus, alpha star of the constellation Leo, above and right of Venus. Moonlight and Venus light streak the almost-calm lake waters.

# En voir les merveilles...

http://homepage.ntlworld.com/mjpowell/Astro/Naked-Eye-Planets/Naked-Eye-Planets.htm

Jupiter, Libra & Scorpius At First Light

Jupiter was in the constellation of Libra when this photo was taken at dawn in late January 2006. Jupiter - the bright white 'star' visible towards the upper right - then shone at magnitude -2.0, outshining all of the stars in its vicinity. Near the horizon, the clouds glow orange, reflecting the streetlights of a distant town

http://apod.nasa.gov/apod/ap100412.html

Mercury and Venus Over Paris

Credit & Copyright: Josselin Desmars

Explanation: Go outside tonight and see one of the more interesting planetary conjunctions of recent years. Just after sunset, the planets Mercury and Venus are visible quite near each other. Now Venus, being commonly discernible as one of the brightest objects in the sky, is frequently mistaken for an airplane. (Venus will set quite slowly, though.) Mercury, however, is dimmer and usually harder to find. Recently, though, Mercury can be found just to the right of Venus, appearing increasingly below the brighter planet over the next week. Pictured above, Venus and Mercury were imaged next to the famous Notre Dame Cathedral in Paris, France. A careful inspection of the image will further reveal that the bright object nearly below Venus is iconic Eiffel Tower.

Montbéliard

http://www.telescope-amateur.net/?/500-Le-ciel/Des-panneaux-d-infirmation-contre-la-pollution-lumineuse

http://www.anpcen.fr/

# Que voit-on dans le ciel?

les “astres”: corps célestes lumineux

– les fixes, les “vagabonds”, les “visiteurs”

– les petits et les grands (diamètre, éclat)

– les ponctuels et les “nébuleux”

Définition: Corps célestes, incluant les étoiles, les planètes et les comètes. Il s'agit de tout objet céleste naturel visible.

http://fr.wikipedia.org/wiki/Objet_c%C3%A9leste

# Etoiles et Planètes

http://antwrp.gsfc.nasa.gov/apod/ap100710.html

Four bright celestial beacons and a faint triangle of light follow the plane of the ecliptic as it arcs high through this southern hemisphere night skyscape. Seen on a July winter night from Lake Taupo on New Zealand's North Island, the line-up features Venus, Regulus (alpha star of Leo), Mars, and Saturn from lower left to upper right. Just put your cursor over the picture to identify the planets and constellations. The delicate luminous glow of Zodiacal Light, sunlight scattered by dust along the ecliptic, also rises above the horizon from the lower left. Of course, defined by the path of the Sun through planet Earth's sky, the ecliptic plane rides low during July nights in the northern hemisphere's summer skies.

N.B. Tomorrow, the Moon and Sun will meet on the ecliptic. Along a track across the southern Pacific Ocean, the daytime sky will feature a total solar eclipse.

# combien de planètes ?

http://www.utahskies.org/report/20020503/20020503weekly.html

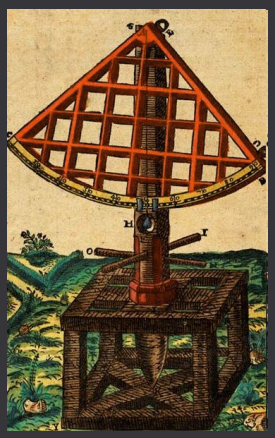
2002/05/03

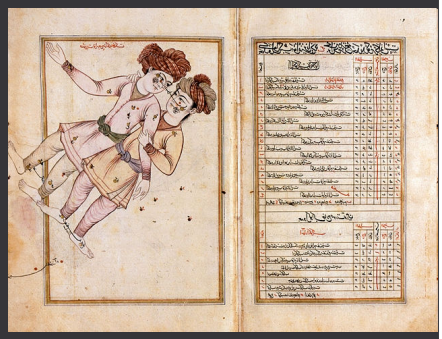
There is a  beautiful planetary alignment in the western sky taking shape after sundown. All the "classical" planets (those which have been known since antiquity) will be lined up from west to east. Mercury has finally joined the lineup...low and to the west. Venus continues to blaze in the west as it creeps higher and higher in the sky. Mars a fraction of it's former self shines next to the Pleiades star cluster. Saturn has faded significantly, but still outshines most of the stars in the sky. Saturn seems to be fading fastest at this point. Look for it to make the largest moves west. This is especially pronounced given that Mercury, Venus, Mars and Jupiter are all moving east. And then finally we have Jupiter... the king of the planets. It shines brightly just west of overhead after sunset. Jupiter is only outshined by Venus in the evening sky.

… This event will continue for a couple more weeks. In fact, the tightest grouping of the planets will occur on May 14th  when all five planets will be within a 33° span. So... don't feel rushed to get out there and see it. On the other hand... the next time this will happen is in 2040...

I took the accompanying image on May 1st from my home in Park City with a 28mm lens operating at f/3.5

# repérer, mesurer, cataloguer





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

# Mais comment se rapprocher du ciel?

http://apod.nasa.gov/apod/ap080503.html

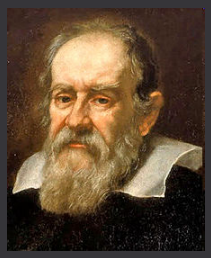
Alborz Mountain Milky Way

Credit & Copyright: Babak Tafreshi (TWAN)

Explanation: Snow-capped stratovolcano Mt. Damavand climbs to 5,670 meters (18,598 feet) near the left edge in this panoramic view of the world at night. In the sky to the left of Damavand's peak are the stars of the Big Dipper in Ursa Major. Pan to the right and your gaze will sweep across the arch of our Milky Way Galaxy above the Alborz Mountain Range bordering the Caspian Sea. Near the center of the panorama, recorded in the predawn hours of April 4th, bright stars Deneb and Altair lie close to the curve of the Milky Way, above the glow of the Haraz valley. Farther right, brilliant Jupiter dominates the sky near the stars, nebulae, and dark dust clouds toward the bulging galactic center. Finally, the horizon glow at the right edge, below bright yellowish giant star Antares, is from the city of Damavand, named for the legendary mountain peak.

# Vision télescopique

- Pays-Bas avant 1608
- première observations astronomiques, Galilée, 1609



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

http://fr.wikipedia.org/wiki/Galil%C3%A9e_%28savant%29

# vues rapprochées

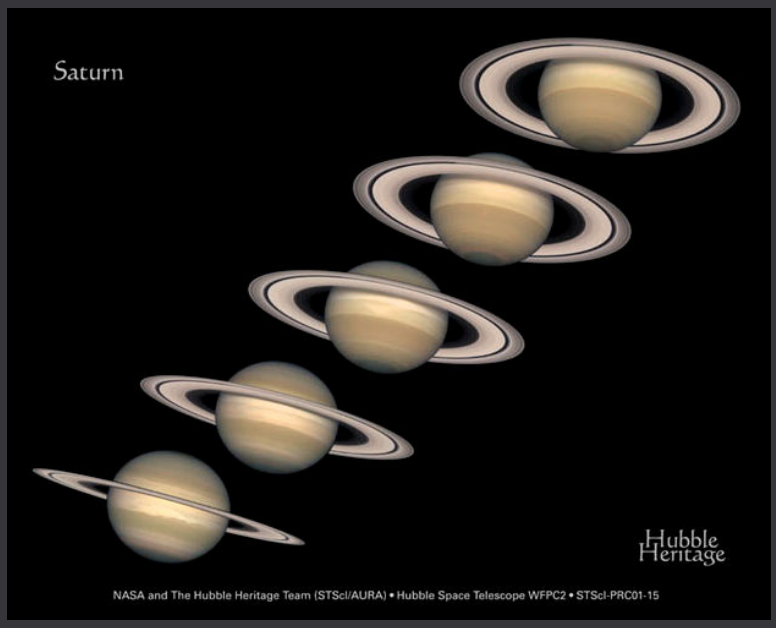
http://antwrp.gsfc.nasa.gov/apod/ap060629.html

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.

Juvisy, 2 mars 2007
http://astrosurf.com/saf/news/SAF2007/ECL_JUVISY.html

photo Raymond SOL

# grande télescopie




http://antwrp.gsfc.nasa.gov/apod/ap030405.html

Since Saturn's axis is tilted as it orbits the Sun, Saturn has seasons, like those of planet Earth ... but Saturn's seasons last for over seven years. So what season is it on Saturn now? Orbiting the equator, the tilt of the rings of Saturn provides quite a graphic seasonal display. In fact, this month, Saturn's rings will reach their most "open" angle after appearing nearly edge on in the mid-1990s. The ringed planet is also well placed in evening skies providing a grand view as summer comes to Saturn's southern hemisphere and winter to the north. The Hubble Space Telescope took the above sequence of images about a year apart, starting on the left in 1996 and ending on the right in 2000. Although they look solid, Saturn's Rings are likely less than 50 meters thick and consist of individually orbiting bits of ice and rock ranging in size from grains of sand to barn-sized boulders.

http://www.nirgal.net/canaux.html

Schiaparelli publie en 1888 sa grande carte des canaux. Lors de l'opposition de 1892, on découvre que ces derniers traversent impunément les océans ! Pour William Pickering (1858 - 1938), c'est un paradoxe inacceptable. Pour lui régler son compte, il remplace alors les océans par des forêts. Certainement influencé par les hypothèses avancées des années auparavant par Fontana, Herschel et Cassini (pour qui Mars pouvait être, comme la Terre, une planète habitée), Pickering ouvre la porte à une foule de théories sur la vie martienne. Ces théories auront beaucoup d'influence sur Camille Flammarion et bien sûr, Percival Lowell (1855 - 1916).

Percival Lowell est un millionnaire passionné et excentrique. Electrifié par les observations de Schiaparelli, ce diplomate décide d'abandonner une carrière prometteuse pour se consacrer exclusivement à l'étude de la planète rouge. Il fonde en 1894 l'observatoire de Flagstaff dans l'Arizona, avec sa fortune personnelle. En 1900, il a référencé plus de 400 canaux. Pour lui, il n'y a aucun doute. Ces canaux sont bien trop rectilignes pour ne pas être artificiels. Ce sont en fait les composants d'un vaste système d'irrigation mis en place par les Martiens à la surface de Mars, pour lutter contre une sécheresse grandissante !

# Vision photographique

- Nicéphore Niépce et Daguerre, 1839
- première photo de la Lune, Draper, 1840
- films sensibles ou longues poses
- photographie numérique, CCD, 1969
- traitement d'images

http://fr.wikipedia.org/wiki/Astrophotographie
http://fr.wikipedia.org/wiki/Photographie_argentique
http://fr.wikipedia.org/wiki/Image_num%C3%A9rique
http://fr.wikipedia.org/wiki/Charge-Coupled_Device#Les_capteurs_CCD
http://fr.wikipedia.org/wiki/Traitement_d%27images

# Comme si c’était un nouveau ciel

http://apod.nasa.gov/apod/ap090912.html

Summer Night in Astronomy Town

Credit & Copyright: Babak Tafreshi (TWAN)

Explanation: This serene view records a late summer night sky over the rolling, green hills of planet Earth. It was taken near the rural village of Saadat Shahr, Fars province, in southern Iran. Saadat Shahr is also known as Astronomy Town, as the inhabitants have demonstrated a remarkable passion for sky gazing. Fittingly, this Astronomy Town sky view finds a lovely part of the Milky Way near picture center. The three brightest stars are the stars of the Summer Triangle, Deneb in Cygnus (top), Altair in Aquila (left), and Vega in Lyra (right). The foreground landscape, illuminated by Astronomy Town lights, includes a kind of wild pistachio tree common in the region. To identify the stars and constellations, just slide your cursor over the image.

Stéphane Guisard : *http://astrosurf.com/sguisard/*

http://www.twanight.org/newtwan/galleries.asp?Sort=Photographer&Value=Stephane%20Guisard&page=1

Stéphane Guisard, astrophotographe de renommée internationale qui est également ingénieur de l'ESO. Ses images bénéficient de la qualité exceptionnelle du ciel de Paranal, un des ciels les plus « purs » de la planète, là où se trouve justement le très grand télescope (VLT) de l'ESO.

De plus, Stéphane Guisard est ingénieur opticien spécialisé dans les télescopes, une expertise rare dans le monde des astrophotographes. Stéphane Guisard, en tant que chef de l'équipe d'ingénierie optique de l'Observatoire Paranal, a la responsabilité d'assurer la meilleure performance optique du VLT.

(d'après http://www.eso.org/public/france/news/eso0934/)

# Les yeux des nouveaux voyageurs

- photographie spatiale, Luna 3, 1959
- Missions Apollo 8-17, déc1968-1972
- Exploration de Mars, depuis 1976 (Viking 1)
- Astéroïdes et comètes (1986, Halley, Giotto)
- Cassini-Huygens, 2004(Saturne)-2005(Titan)
- Neptune (1989, Voyager 2)
- … et au delà (2015, Pluton, New Horizon)

http://fr.wikipedia.org/wiki/Luna_3
http://fr.wikipedia.org/wiki/Programme_Apollo
http://fr.wikipedia.org/wiki/Viking_1
http://fr.wikipedia.org/wiki/Giotto_%28sonde_spatiale%29
http://fr.wikipedia.org/wiki/Cassini-Huygens_%28sonde_spatiale%29
http://fr.wikipedia.org/wiki/Neptune_%28plan%C3%A8te%29
http://fr.wikipedia.org/wiki/New_Horizons

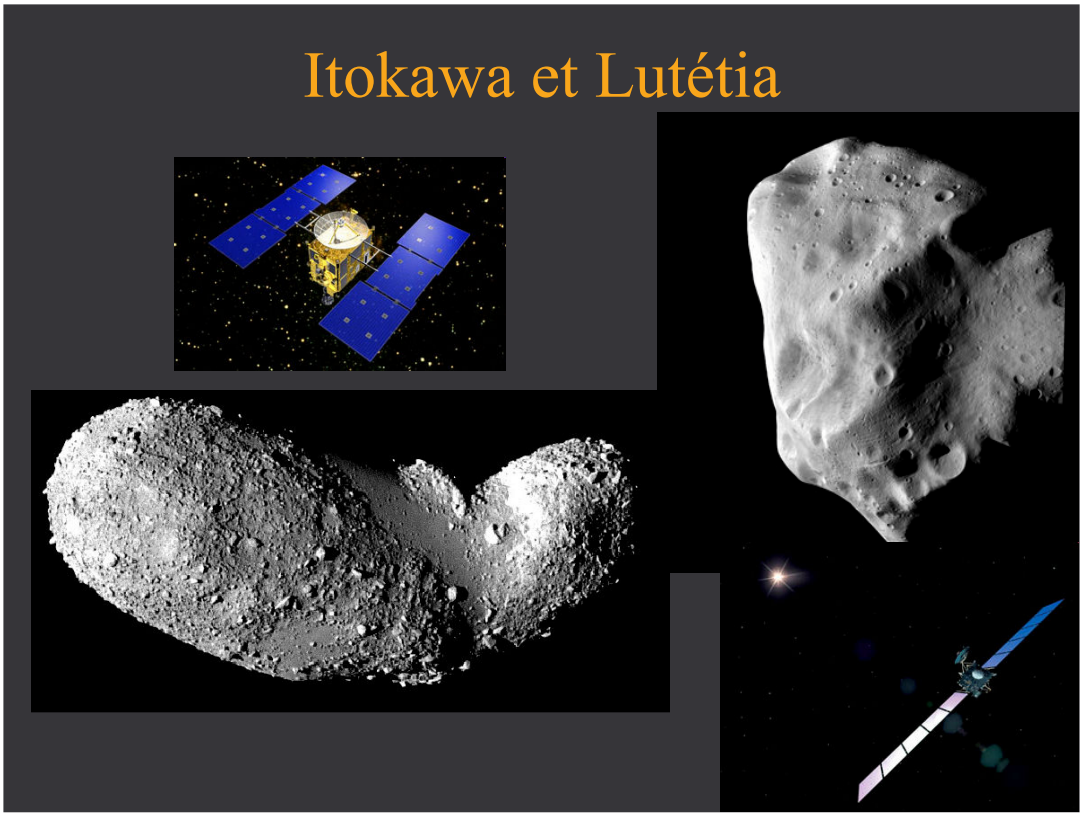
Apollo 17 - Lunar Module Pilot Jack Schmitt is running towards the Lunar Rover

http://antwrp.gsfc.nasa.gov/apod/ap061210.html

What would it be like to explore the surface of another world? In 1972 during the Apollo 17 mission, astronaut Harrison Schmitt found out first hand. In this case, the world was Earth's own Moon. In this recently compiled panorama of lunar photographs originally taken by astronaut Eugene Cernan, the magnificent desolation of the barren Moon is apparent. Visible above and by scrolling right are lunar rocks in the foreground, lunar mountains in the background, some small craters, a lunar rover, and astronaut Schmidt on his way back to the rover. A few days after this image was taken, humanity left the Moon and has yet to return.

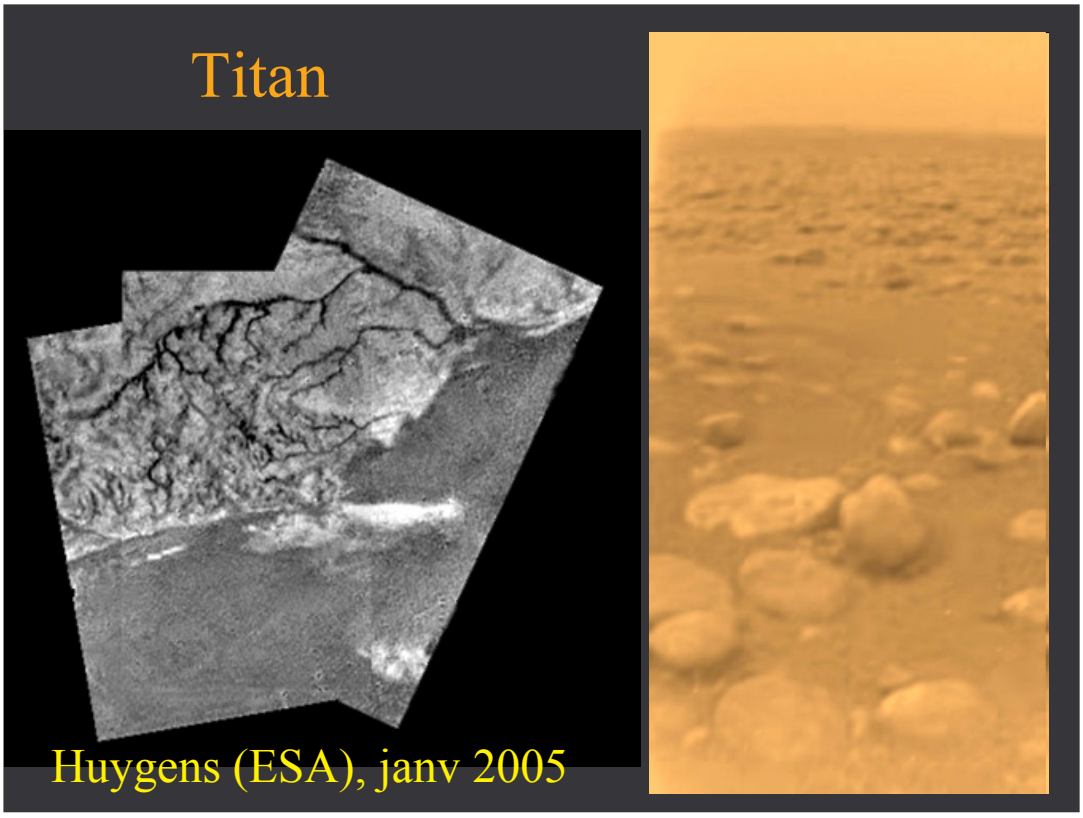
# Sur Mars...

http://antwrp.gsfc.nasa.gov/apod/ap050502.html




Le retour discret de Hayabusa et le "triomphe" de Rosetta

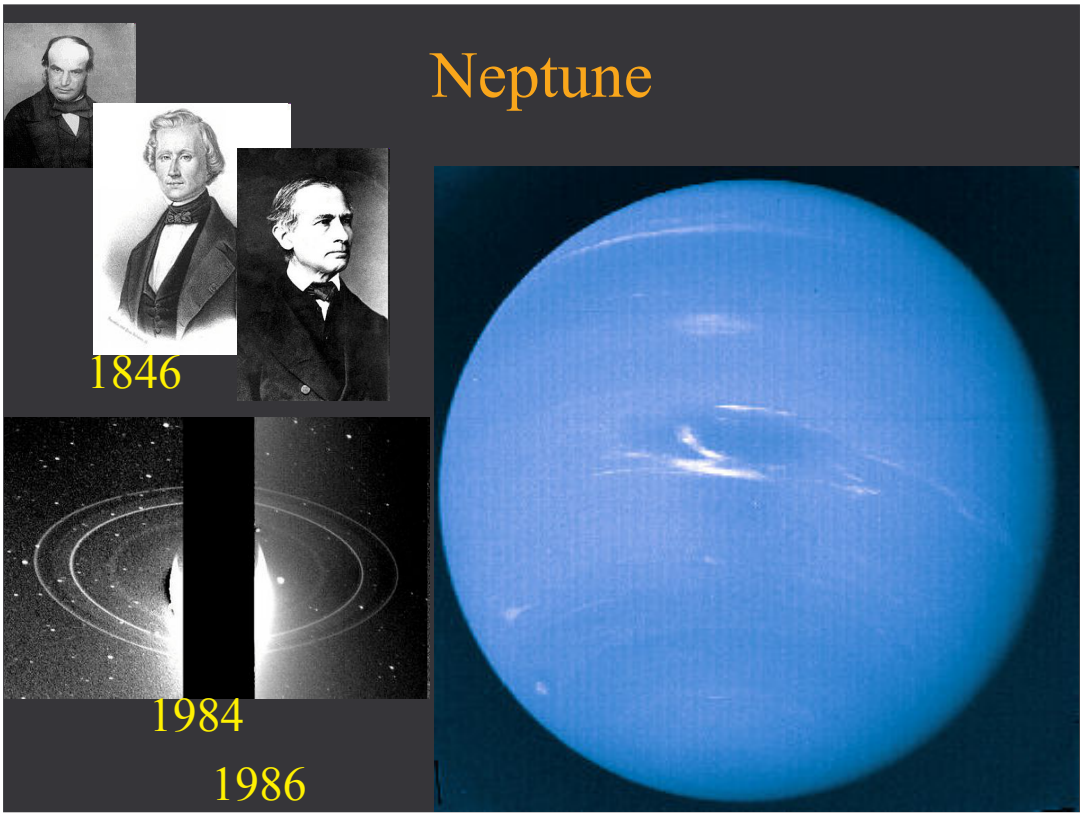
http://alborak-alburaq.blogspot.com/2010/07/le-retour-discret-de-hayabusa-et-le.html




http://fr.wikipedia.org/wiki/Cassini-Huygens_%28sonde_spatiale%29

http://jmm45.free.fr/sondes/huygens/huygens.htm

http://www.esa.int/SPECIALS/Cassini-Huygens/index.html

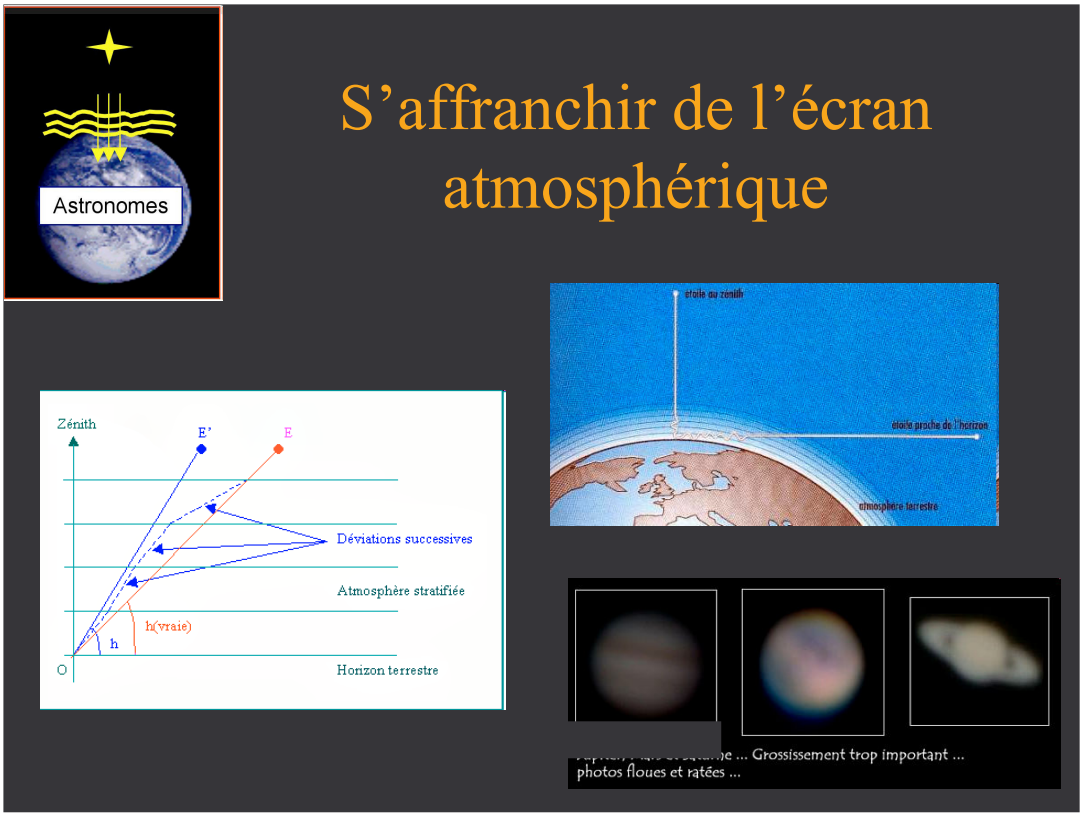



APOD: August 17, 1995 - Neptune: Big Blue Giant

This picture was taken by the Voyager 2 spacecraft in 1986 - the only spacecraft ever to visit Neptune. Neptune will be the furthest planet from the Sun until 1999, when the elliptical orbit of Pluto will cause it to once again resume this status. Neptune, like Uranus, is composed mostly of liquid water, methane and ammonia, is surrounded by a thick gas atmosphere of mostly hydrogen and helium, and has many moons and rings. Neptune's moon Triton is unlike any other and has active volcanoes. The nature of Triton's unusual orbit around Neptune is the focus of much discussion and speculation.

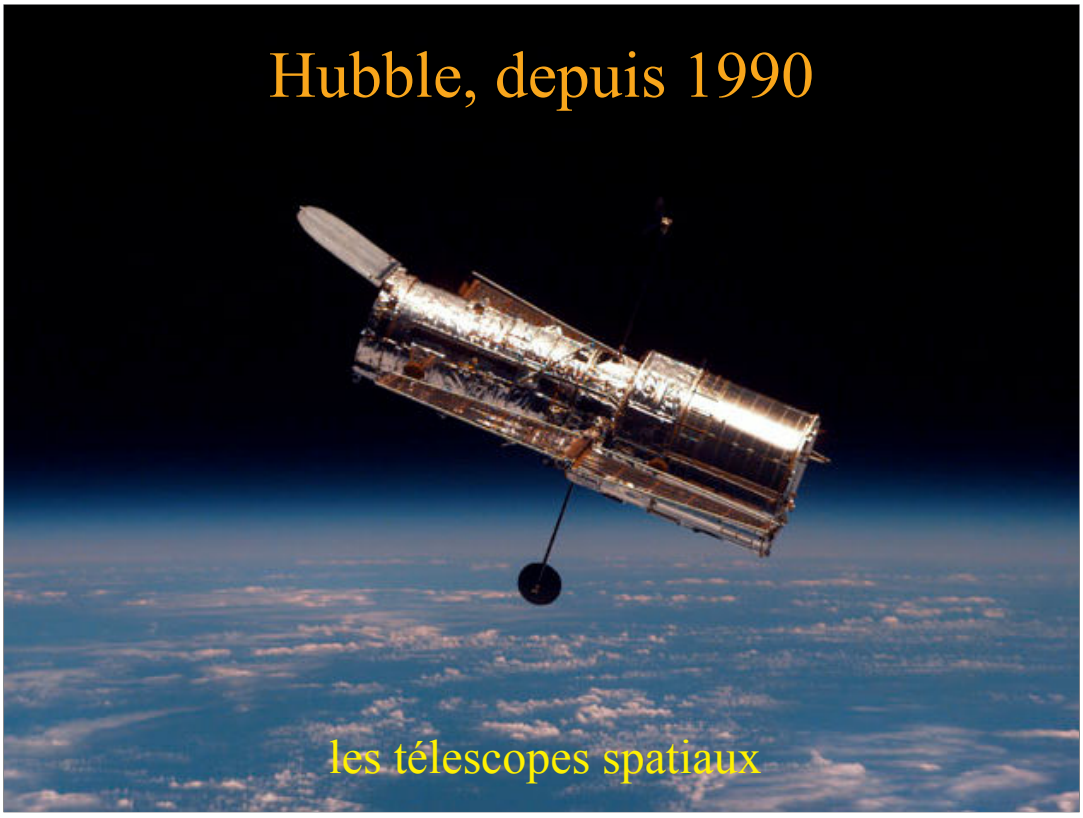
http://fr.wikipedia.org/wiki/Neptune_%28plan%C3%A8te%29

Les astronomes britannique John Couch Adams en 1843 et français Urbain Le Verrier en 1846 calculèrent chacun de leur côté et par des méthodes différentes la position prévisible de cette hypothétique planète, qui fut observée le 23 septembre 1846 par l'astronome allemand Johann Gottfried Galle à 1° de la position alors calculée par Le Verrier, et à 12° de celle calculée par Adams.



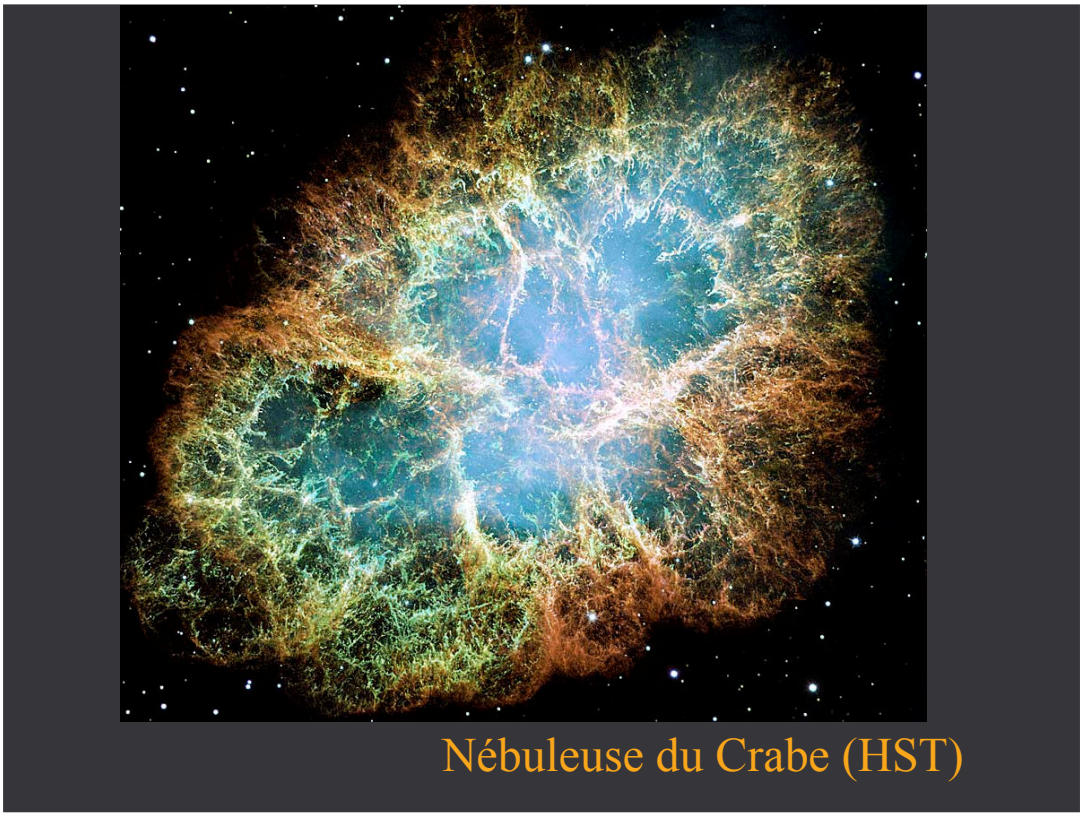

Les effets de l'atmosphère :

- atténuation
- réfraction
- turbulence
- diffusion différentielle (bleu plus que rouge)



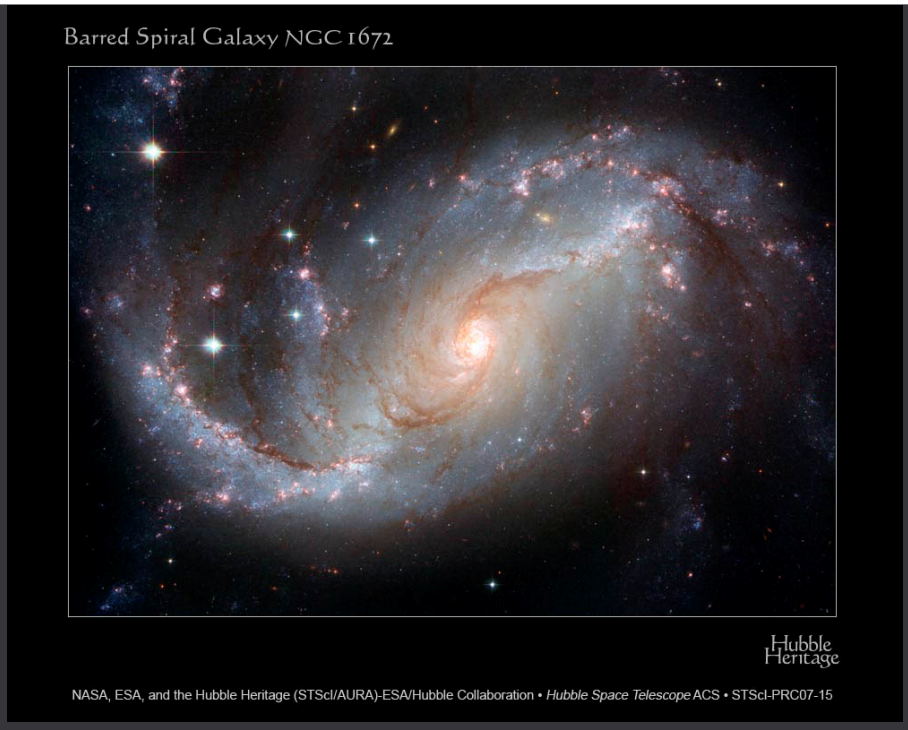

http://fr.wikipedia.org/wiki/T%C3%A9lescope_spatial

http://fr.wikipedia.org/wiki/T%C3%A9lescope_spatial_Hubble




APOD: 2009 October 25 -M1: The Crab Nebula from Hubble

This is the mess that is left when a star explodes. The Crab Nebula, the result of a supernova seen in 1054 AD, is filled with mysterious filaments. The filaments are not only tremendously complex, but appear to have less mass than expelled in the original supernova and a higher speed than expected from a free explosion. The above image, taken by the Hubble Space Telescope, is presented in three colors chosen for scientific interest. The Crab Nebula spans about 10 light-years. In the nebula's very center lies a pulsar: a neutron star as massive as the Sun but with only the size of a small town. The Crab Pulsar rotates about 30 times each second.




Galaxie NGC1672 (HST)

http://heritage.stsci.edu/gallery/gallery.html

http://heritage.stsci.edu/2007/15/index.html

Object Name: NGC 1672

Object Description: Barred Spiral Galaxy

Position (J2000): R.A. 04h 45m 42s.10  Dec. -59° 14' 56 "

Constellation: Dorado

Distance: Approximately 60 million light-years (18 Megaparsecs) away.

Dimensions: This image is 4.4 arcminutes (75,000 light-years or 23 kiloparsecs) wide.

## Voir “avec ses yeux”

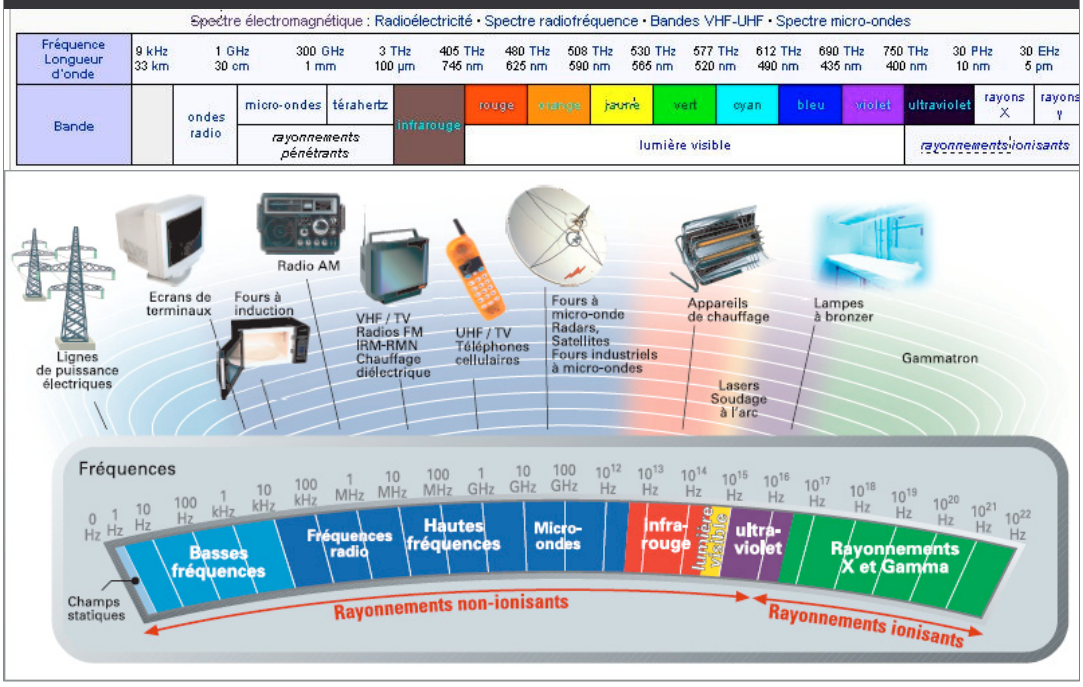
- l’œil géomètre
- l’œil photographe
- l’œil voyageur

donne toujours une vision (quasi) “naturelle”
et (peut être trop) le sentiment de l’évidence!

il donne de “vraies” images…
avec de “vraies” couleurs :)

… en effet n’oublions pas que
l’œil est l’organe de perception le plus proche du cerveau

# tout le spectre des rayonnements




Sources: Wikipedia et Ministère de la Santé

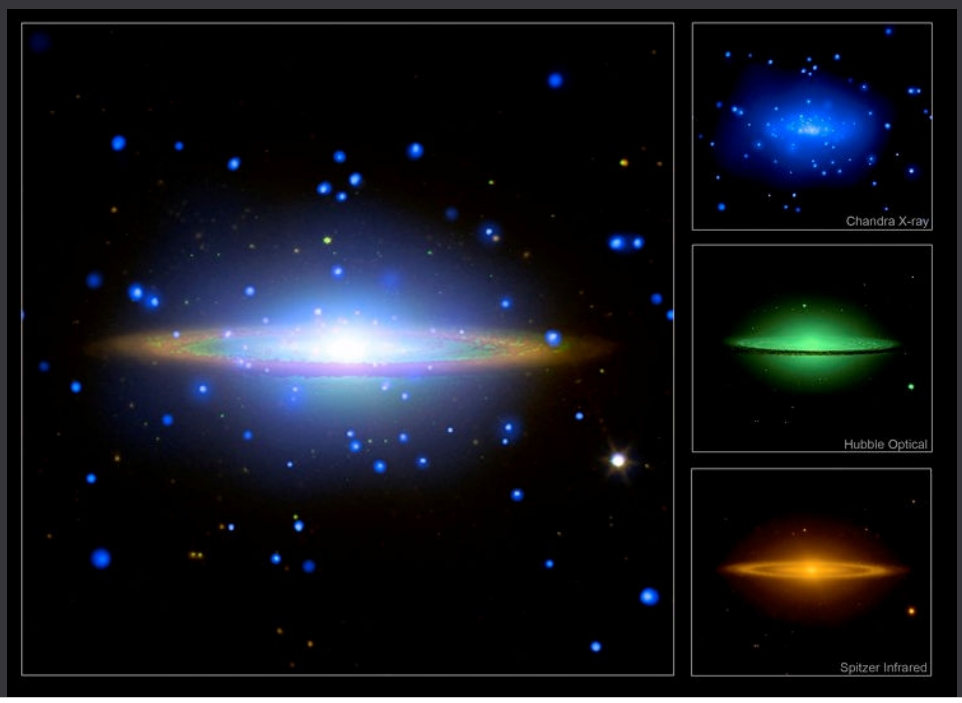
# “Voir” dans tout le spectre ?

Dessin INSU

http://antwrp.gsfc.nasa.gov/apod/ap041008.html

Light from the stellar explosion that created this energized cosmic cloud was first seen on planet Earth in October 1604, a mere four hundred years ago. The supernova produced a bright new star in early 17th century skies within the constellation Ophiuchus. It was studied by astronomer Johannes Kepler and his contemporaries, with out the benefit of a telescope, as they searched for an explanation of the heavenly apparition. Armed with a modern understanding of stellar evolution, early 21st century astronomers continue to explore the expanding debris cloud, but can now use orbiting space telescopes to survey Kepler's supernova remnant (SNR) across the spectrum. In this tantalizing composite image, x-rays, visible light, and infrared radiation recorded by NASA's astrophysical observatories - the Chandra X-Ray Observatory, Hubble and Spitzer space telescopes - are combined to give a more comprehensive view of the still enigmatic supernova remnant. About 13,000 light years away, Kepler's supernova represents the most recent stellar explosion seen to occur within our Milky Way galaxy.

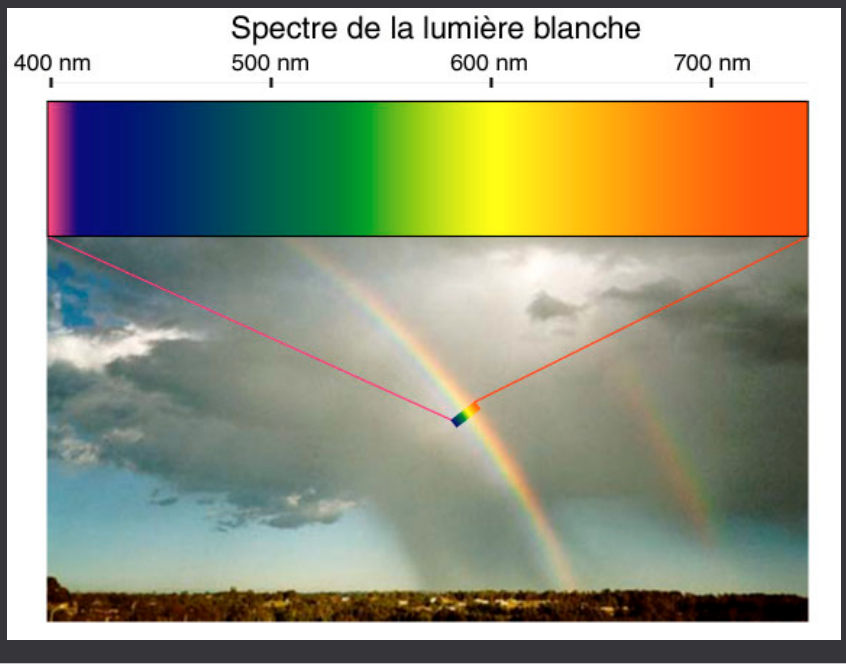
# photo composite (suite)




http://antwrp.gsfc.nasa.gov/apod/ap070505.html

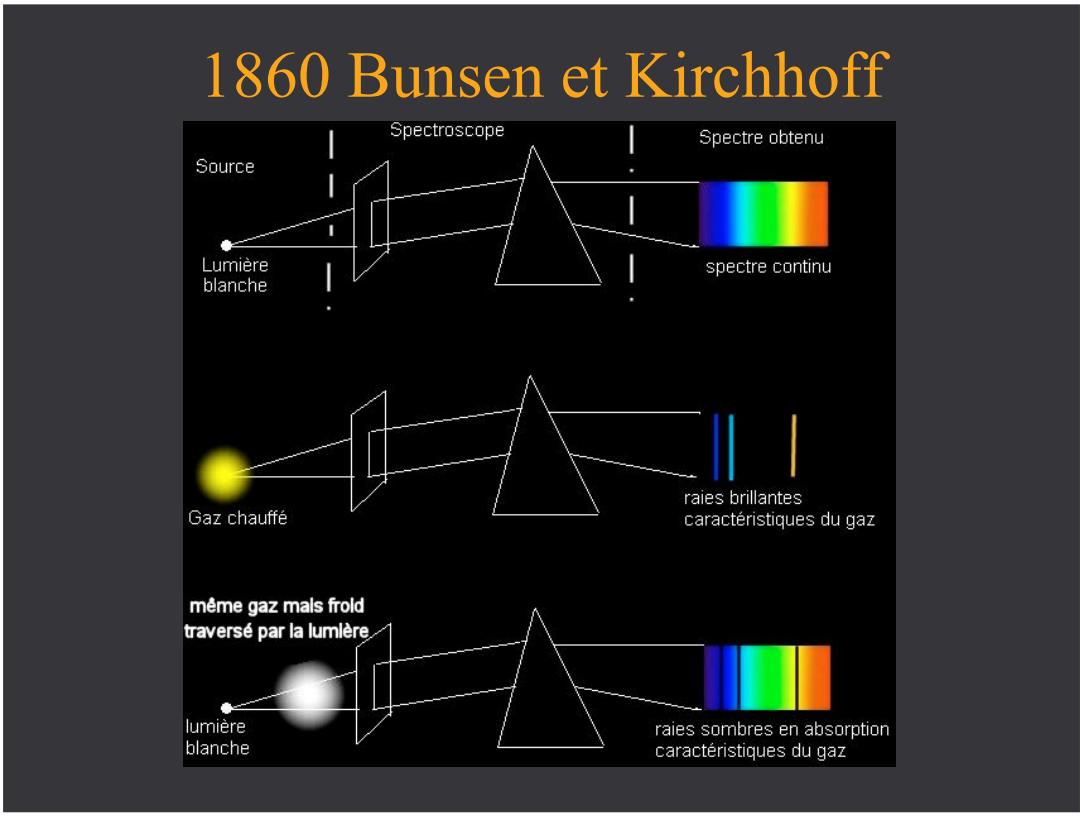
Appropriately famous for its broad ring of obscuring dust and hat-like appearance, the Sombrero Galaxy (aka spiral galaxy M104) is featured in this unique composite view that spans the electromagnetic spectrum, from three major space-based observatories. Exploring the Sombrero's high-energy x-ray emission (blue), the Chandra contribution highlights the pervasive, tenuous, hot gas that extends some 60,000 light-years from the galaxy's center. Hubble's optical view (green) shows the more familiar emission from the Sombrero's population of stars, seen from a nearly edge-on perspective and noticeably bulging at the galaxy's bright core. The broad ring of dust that blocks light in other bands, glows in the infrared contribution (red) from the Spitzer Space Telescope. The Sombrero Galaxy is about 28 million light-years away, near the southern edge of the extensive Virgo cluster of galaxies.

# La vision spectroscopique




Violet, (Bleu)Indigo, Bleu(Cyan)

Vert, Jaune, Orange et Rouge




http://besnier.m.pagesperso-orange.fr/couleuretoiles.htm

http://media4.obspm.fr/public/amc/pages_19e/ha-experiences-bunsen-kirchhoff.html

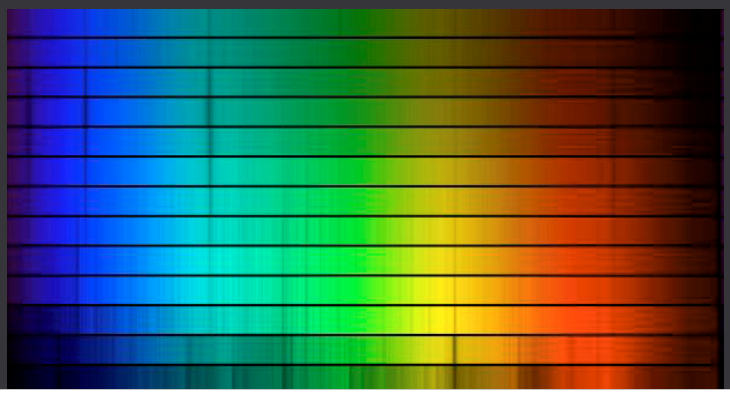
Kirchhoff compare le spectre du soleil avec le spectre des éléments qui sont présents sur Terre. Il montre ainsi que le sodium, le calcium, le baryum, le nickel, le magnésium, le fer et le cuivre existent dans l'atmosphère solaire. Il parvient à identifier 463 raies sur les 476. Les 13 autres raies correspondent en fait à l'hélium, qui sera découvert indépendamment par Jules Janssen et Norman Lockyer en 1868.

Il s'agit là d'une découverte dont la portée dépasse le cadre de la seule astronomie ; la physique connaît alors une mutation majeure dans ses questionnements.

# Les messages de la lumière

*l'invention de l'astrophysique*

- composition physique des corps célestes
- luminosité / température
- classification des étoiles

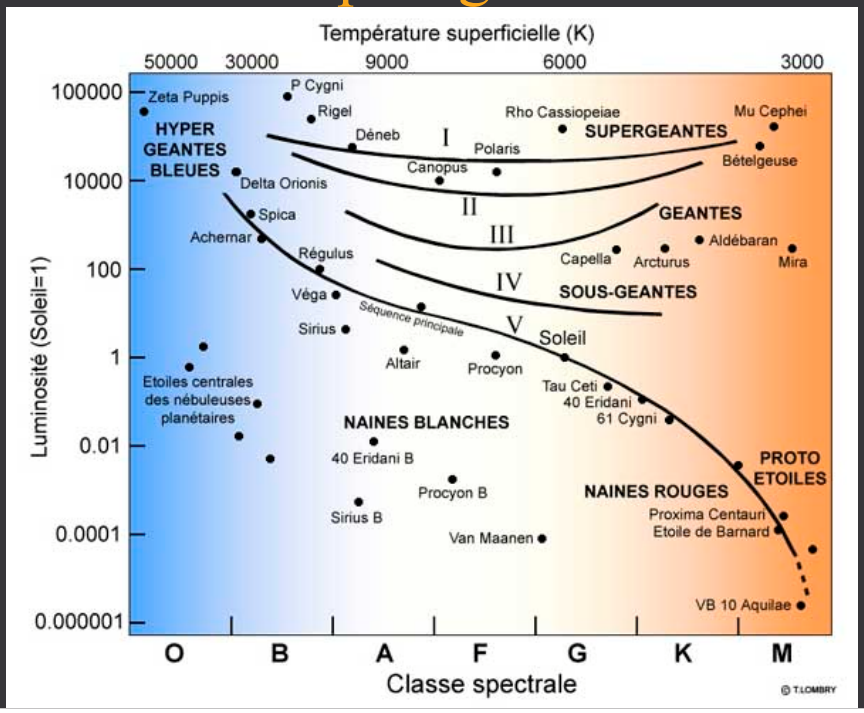


APOD: 2004 April 18 - Stellar Spectral Types: OBAFGKM

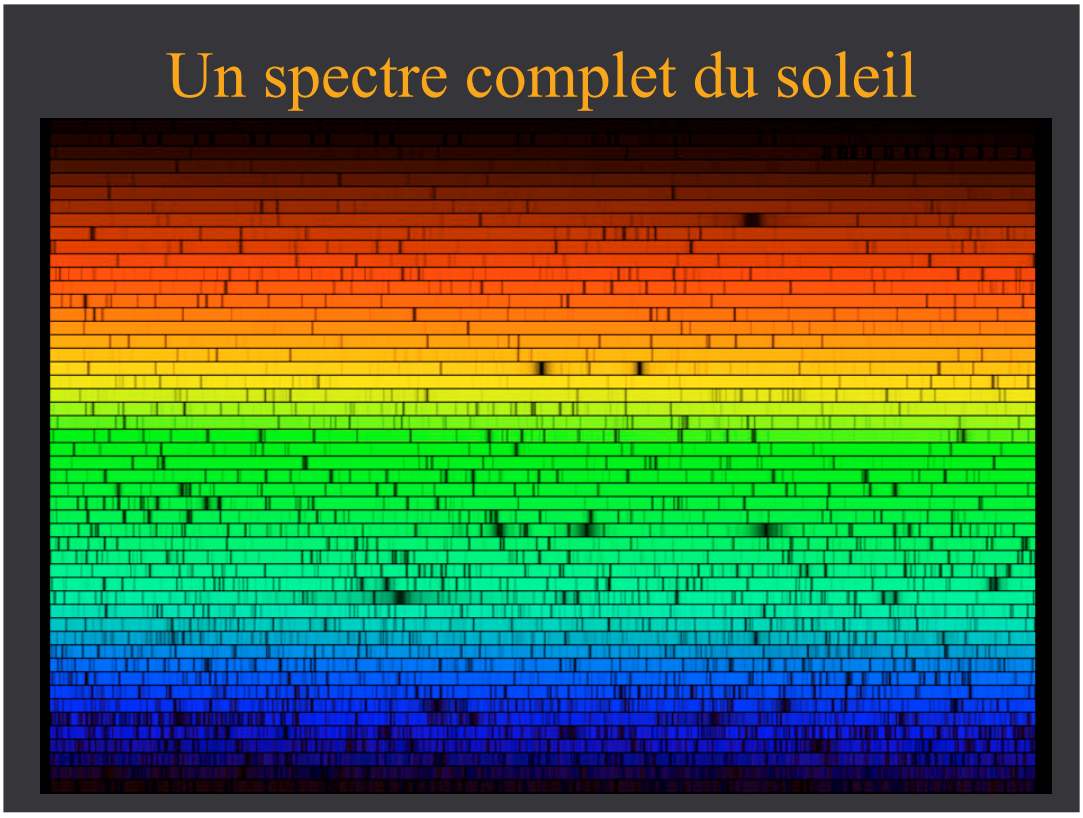
Astronomers divide stars into different spectral types. First started in the 1800s, the spectral type was originally meant to classify the strength of hydrogen absorption lines. A few types that best describe the temperature of the star remain in use today. The seven main spectral types OBAFGKM are shown above with the spectrum of a single "O" star at the top followed by two spectra each from the progressively cooler designations, respectively. Historically, these letters have been remembered with the mnemonic "Oh Be A Fine Girl/Guy Kiss Me." Frequent classroom contests, however, have come up with other more/less politically correct mnemonics such as "Oven Baked Apples From Grandpa's/Grandma's Kitchen. Mmmm." Our Sun has spectral type "G".

http://www.astrosurf.com/luxorion/corpsnoir-etoiles.htm

# Hertzsprung-Russel



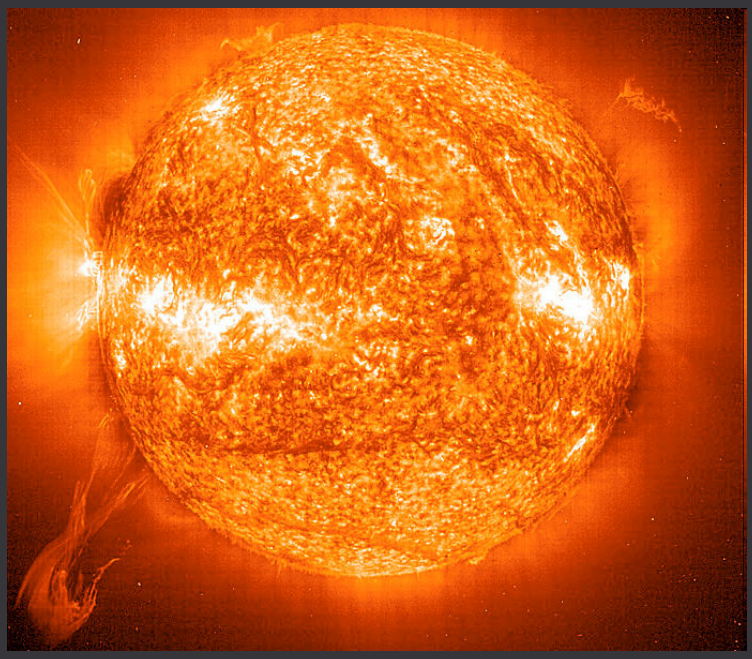

http://fr.wikipedia.org/wiki/Diagramme_de_Hertzsprung-Russell




http://antwrp.gsfc.nasa.gov/apod/ap100627.html

It is still not known why the Sun's light is missing some colors. Shown above are all the visible colors of the Sun, produced by passing the Sun's light through a prism-like device. The above spectrum was created at the McMath-Pierce Solar Observatory and shows, first off, that although our white-appearing Sun emits light of nearly every color, it does indeed appear brightest in yellow-green light. The dark patches in the above spectrum arise from gas at or above the Sun's surface absorbing sunlight emitted below. Since different types of gas absorb different colors of light, it is possible to determine what gasses compose the Sun. Helium, for example, was first discovered in 1870 on a solar spectrum and only later found here on Earth. Today, the majority of spectral absorption lines have been identified - but not all.

# Le soleil à la température Hα



Amateurs:

http://l656.28.ift.fr/
http://www.cieletespace.fr/challenge/portfolio/420

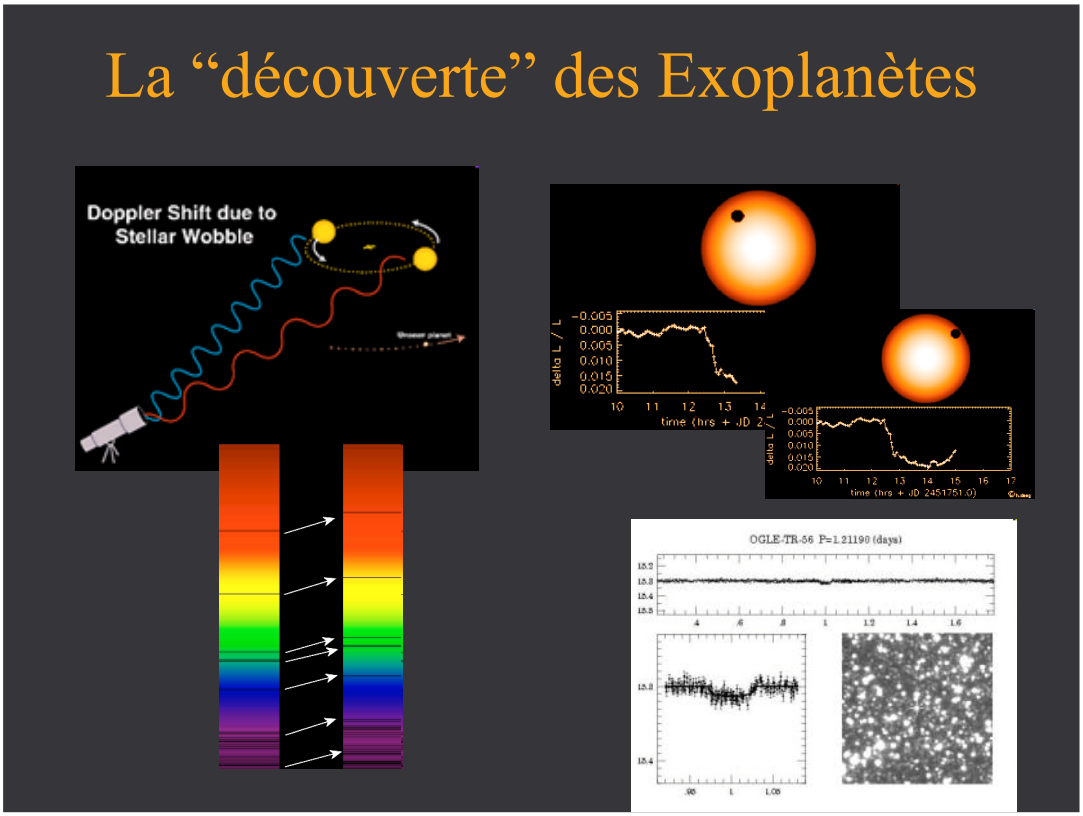
Astrophysiciens:

http://www.lesia.obspm.fr/perso/jean-marie-malherbe/Soleil/films/index.html

## images et « vision »

- analyse (mesures de petits mouvements, de décalages dans les spectres, de variations de ces décalages au fil du temps..)
- interprétation (théories, calculs, simulations..)
- imagination (visualisation en “fausses images”)

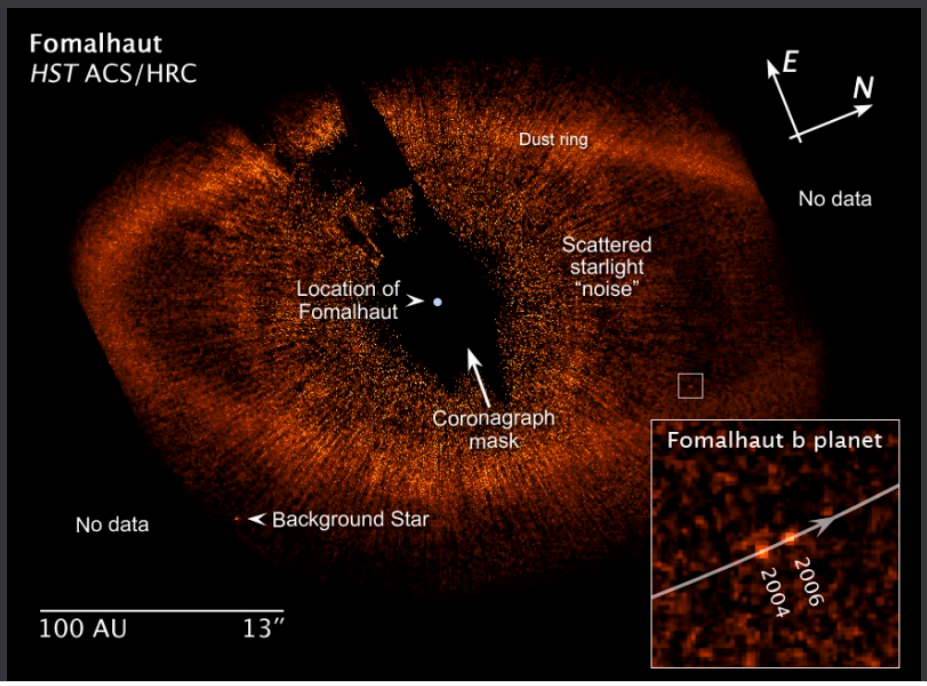
vision « artificielle », guidée par l ’interprétation




http://fr.wikipedia.org/wiki/M%C3%A9thodes_de_d%C3%A9tection_des_exoplan%C3%A8tes

http://media4.obspm.fr/public/AMC/pages_methodes-detection/bb-methode-transits.html

# voir une exoplanète ?




http://antwrp.gsfc.nasa.gov/apod/ap081114.html

Fomalhaut (sounds like "foam-a-lot") is a bright, young, star, a short 25 light-years from planet Earth in the direction of the constellation Piscis Austrinus. In this sharp composite from the Hubble Space Telescope, Fomalhaut's surrounding ring of dusty debris is imaged in detail, with overwhelming glare from the star masked by an occulting disk in the camera's coronagraph. Astronomers now identify, the tiny point of light in the small box at the right as a planet about 3 times the mass of Jupiter orbiting 10.7 billion miles from the star (almost 23 times the Sun-Jupiter distance). Designated Fomalhaut b, the massive planet probably shapes and maintains the ring's relatively sharp inner edge, while the ring itself is likely a larger, younger analog of our own Kuiper Belt - the solar system's outer reservoir of icy bodies. The Hubble data represent the first visible-light image of a planet circling another star.

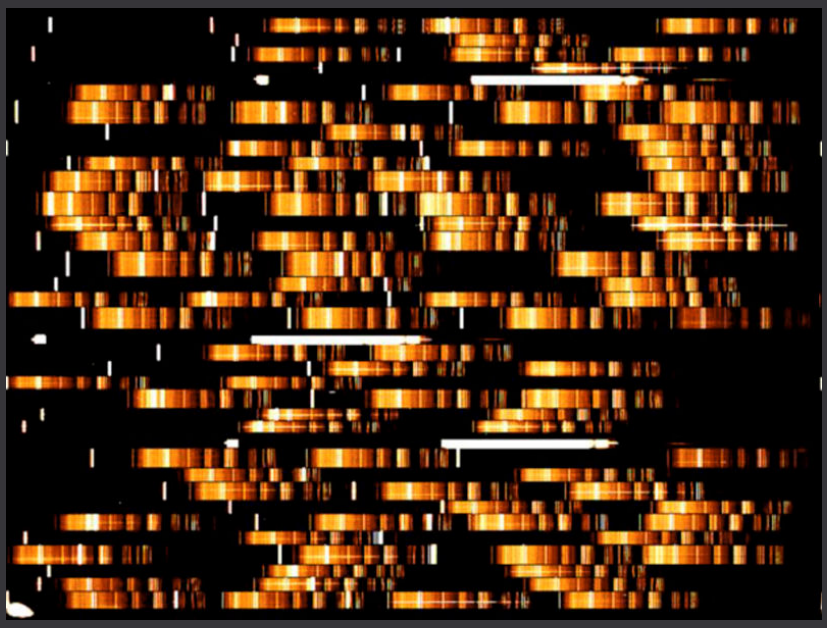
APOD: 2009 September 23 - CoRoT Satellite Discovers Rocky Planet

How similar is exoplanet CoRoT-7b to Earth? The newly discovered extra-solar planet is the closest physical match yet, with a mass about five Earths and a radius of about 1.7 Earths. Also, the home star to CoRoT-7b, although 500 light years distant, is very similar to our Sun. Unfortunately, the similarities likely end there, as CoRoT-7b orbits its home star well inside the orbit of Mercury, making its year last only 20 hours, and making its peak temperature much hotter than humans might find comfortable. CoRoT-7b was discovered in February by noting a predictable slight decrease in the brightness of its parent star. Pictured above, an artist's depiction shows how CoRoT-7b might appear in front of its parent star. The composition of CoRoT-7b remains unknown, but given its size and mass, it cannot be a gas giant like Jupiter, and is very likely composed predominantly of rock. Future observations will likely narrow the composition of one of the first known rocky planets discovered outside of our Solar System.

Au delà de la « sphère des fixes »

HST

# Mesures sur les galaxies



http://antwrp.gsfc.nasa.gov/apod/ap090104.html

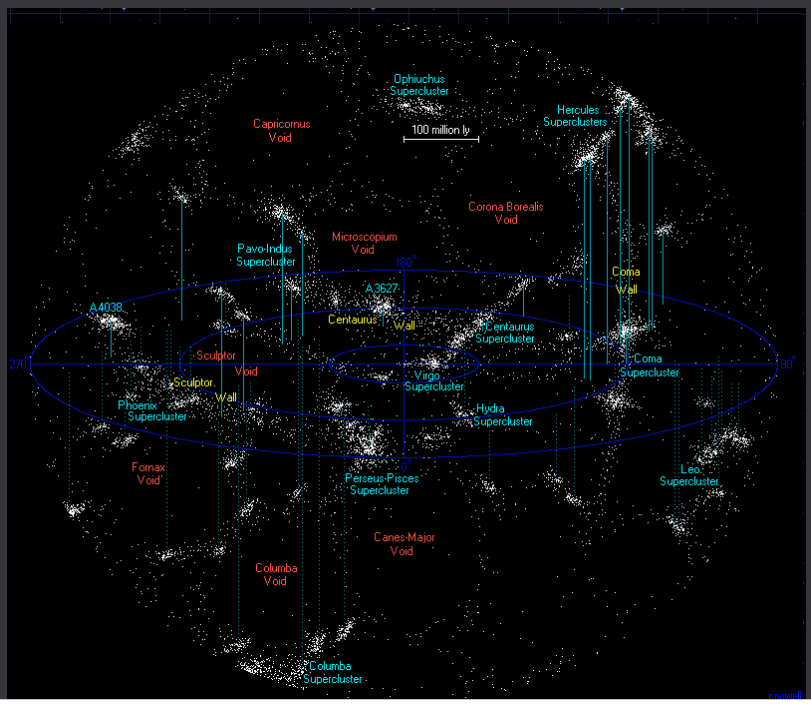
In the distant universe, time appears to run slowly. Since time-dilated light appears shifted toward the red end of the spectrum (redshifted), astronomers are able to use cosmological time-slowing to help measure vast distances in the universe. Above, the light from distant galaxies has been broken up into its constituent colors (spectra), allowing astronomers to measure the redshift of known spectral lines. The novelty of the above image is that the distance to hundreds of galaxies can now be measured on a single frame using the Visible MultiObject Spectrograph operating at the Very Large Telescope array in Chile. Analyzing the space distribution of distant objects will allow insight into when and how stars, galaxies, and quasars formed, clustered, and evolved in the early universe.

# Les grandes masses dévient la lumière !

APOD: 2010 June 20 - Abell 2218: A Galaxy Cluster Lens

What are those strange filaments? Background galaxies. Gravity can bend light, allowing huge clusters of galaxies to act as telescopes, and distorting images of background galaxies into elongated strands. Almost all of the bright objects in this Hubble Space Telescope image are galaxies in the cluster known as Abell 2218. The cluster is so massive and so compact that its gravity bends and focuses the light from galaxies that lie behind it. As a result, multiple images of these background galaxies are distorted into long faint arcs -- a simple lensing effect analogous to viewing distant street lamps through a glass of wine. The cluster of galaxies Abell 2218 is itself about three billion light-years away in the northern constellation of the Dragon (Draco). The power of this massive cluster telescope has allowed astronomers to detect a galaxy at the distant redshift of 5.58.

# les grandes structures de l'univers



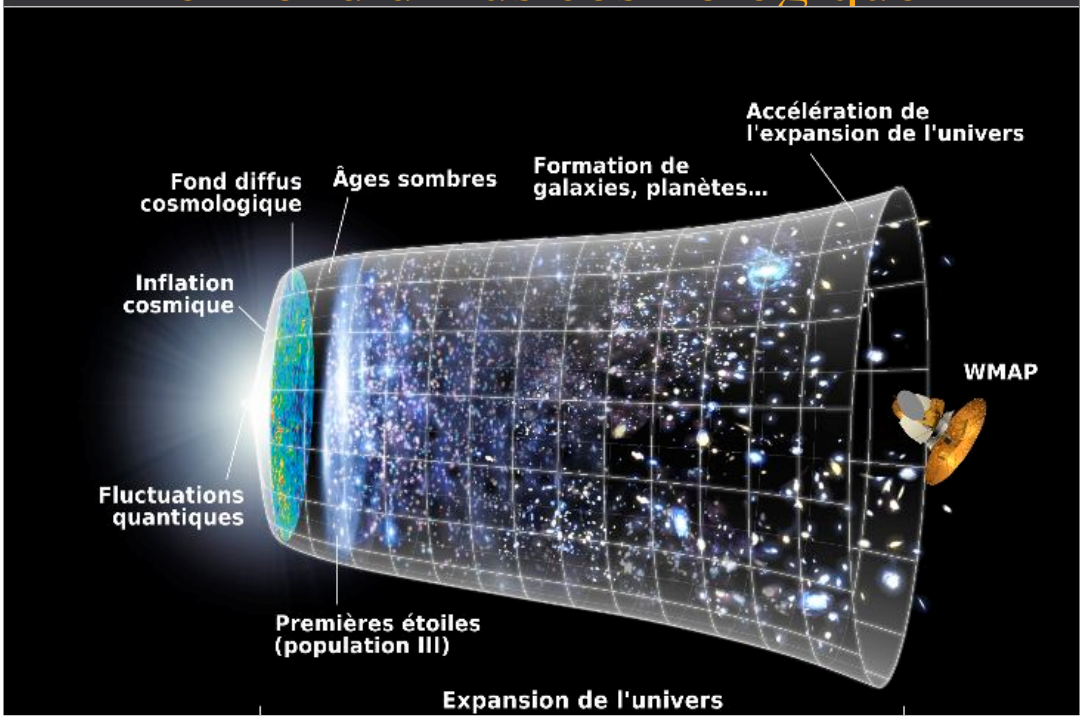

*Il se confirme donc que l'univers est bien constitué d 'un « filet » à 3D occupé par du gaz chaud et des (amas de) galaxies*

Susy Collin-Zahn (l 'Astronomie, juillet 2010)

Ce gaz, très peu dense mais constituant la moitié (10%) des 20% baryoniques de la matière totale de l'univers, est à environ 1 million de °K; il émet ou absorbe du rayonnement X; la raie de l 'oxygène sept fois ionisé a été observée en absorption par le super amas Sculptor ( 400 millions al) sur le spectre d'un quasar dans la ligne de visée à 2 milliards d 'al.

http://aramis.obspm.fr/~combes/Astro04/LSS.html

# Le “fond diffus cosmologique”




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

Fond Diffus Cosmologique / Cosmic Microwave Background Radiation (CMB)

Bien qu'issu d'une époque très chaude, ce rayonnement a été dilué et refroidi par l'expansion de l'Univers et possède désormais une température très basse de 2,726 K (-270,424°C).

« Rayonnement fossile »

…/...

"Dieu est une sphère infinie, dont le centre est partout, et la circonférence nulle part." (Deus est sphaera infinita, cuius centrum est ubique, circumferentia nusquam.) Maître Eckhart (1260-1327)

http://www.synaptic.ch/MuseumHermeticum/MaitreEckhart/hermes.htm

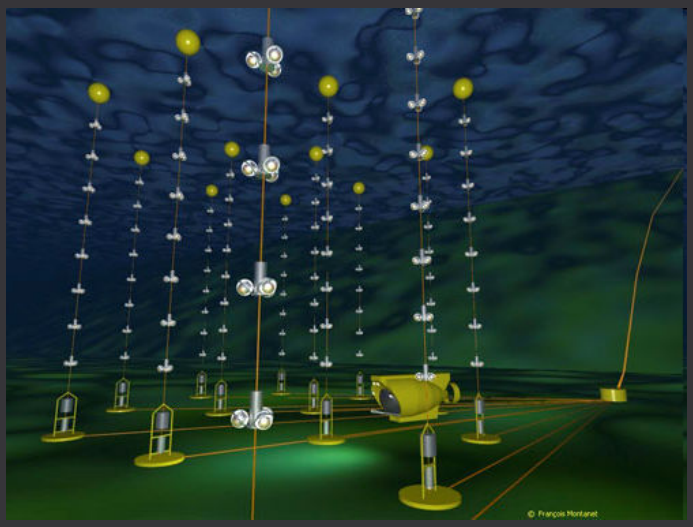
http://www.cnes.fr/web/CNES-fr/7553-lancement-de-planck-et-herschel.php

http://alborak-alburaq.blogspot.com/2009/06/planck-planque-lombre-de-la-terre.html

http://www.eso.org/sci/facilities/alma/

http://www.eso.org/public/teles-instr/vlt.html

# … ou sous la mer!

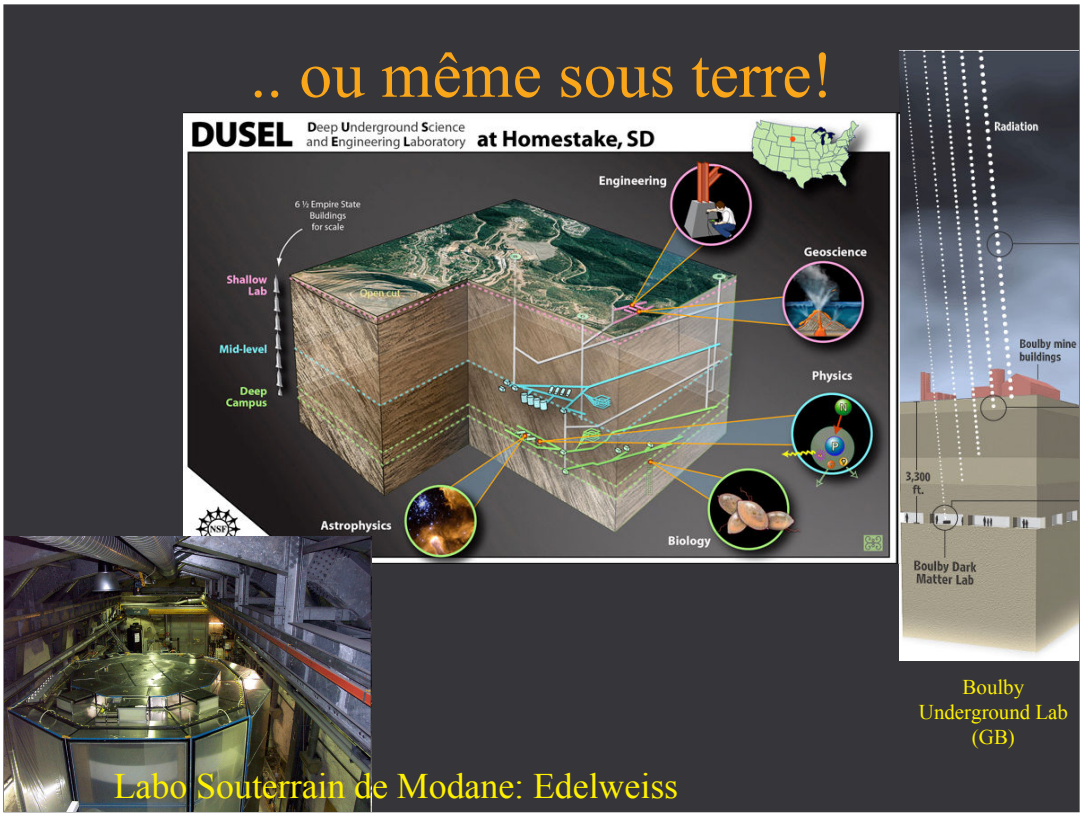


Antarès IN2P3: "télescope à neutrinos européen"

© CNRS Photothèque/IN2P3

http://antares.in2p3.fr/Gallery/index.html

Représentation en images virtuelles du détecteur sous-marin "Antares". Ce télescope à neutrinos européen est installé par 2400 mètres de fond à 10 miles nautiques au sud de l'île de Porquerolles. Douze lignes de 400 mètres de long portant chacune 75 capteurs spéciaux (photomultiplicateurs) traqueront l'infime trace lumineuse laissée dans l'eau  par un "muon", particule chargée, issue de la rencontre rarissisme d'un atome  de matière et d'un neutrino. Les chercheurs espèrent par ce procédé déduire la direction d'où proviennent les neutrinos. Une information qui permettrait d'en identifier la source : cataclysme cosmique ou matière nouvelle inconnue.




http://fr.wikipedia.org/wiki/Weakly_interacting_massive_particles#Exp.C3.A9riences_actuelles (WIMPs)

http://edelweiss2.in2p3.fr/Presentation/index.php?language=fr

A la recherche de la « matière sombre », faiblement interactive, mais représentant pourtant *une abondance au moins cinq fois plus importante que la matière baryonique*, pour constituer de 83 % à 90 % de la densité totale de l'Univers observable, selon les modèles de formation et d'évolution des galaxies, ainsi que les modèles cosmologiques.

*Conclusion:*

## les progrès de l'Astronomie

sont dûs au développement conjoint

- des outils d'observation, de mesure, de détection , d'analyse..
- de l'interprétation rationnelle, scientifique des données collectées par ces outils

Notre "vision" en est transformée par l'un comme par l'autre !

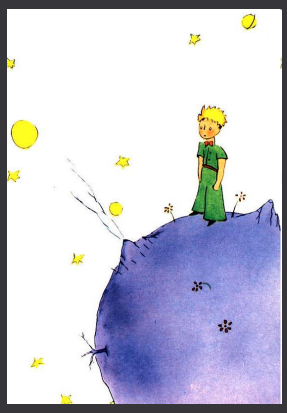
"L'essentiel est invisible aux yeux"

Il faut voir avec … *l 'intelligence!*

capito?

… Search for Extra Terrestrial Intelligence ?

## (à suivre)



**Webographie:**

**Wikipedia :** *http://fr.wikipedia.org/wiki/Astronomie*

**NASA/APOD :** *http://apod.nasa.gov/apod/*

**Hubble Heritage :** *http://heritage.stsci.edu/*

**Obs de Paris-Meudon:** *http://media4.obspm.fr/public/AMC/*

*http://aramis.obspm.fr/~combes/Astro04/LSS.html*

**SAF :** *http://www2.saf-lastronomie.com/accueil.html*

etc...