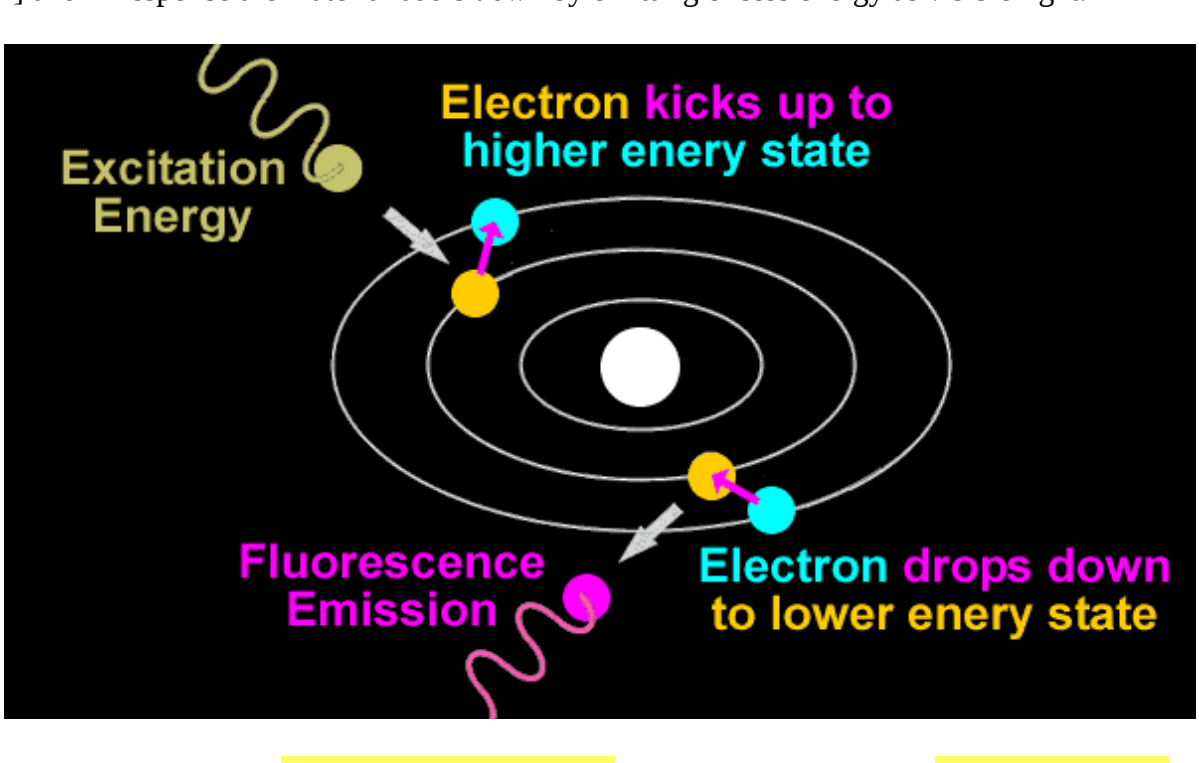
8th March 2024

The wonder of fluorescence occurs when a material absorbs energy [such as ultraviolet light or an electron] and in response the material *cools down* by emitting excess energy as visible light.



Fluorescence occurs when an excited molecule, atom, or nanostructure, relaxes to a lower energy state through emission of a photon without a change in electron spin.

In **1819**, E.D. Clarke and in 1822 René Just Haüy described **fluorescence** in **fluorites**, Sir David Brewster described the phenomenon for chlorophyll in 1833 and Sir John Herschel did the same for quinine in 1845.

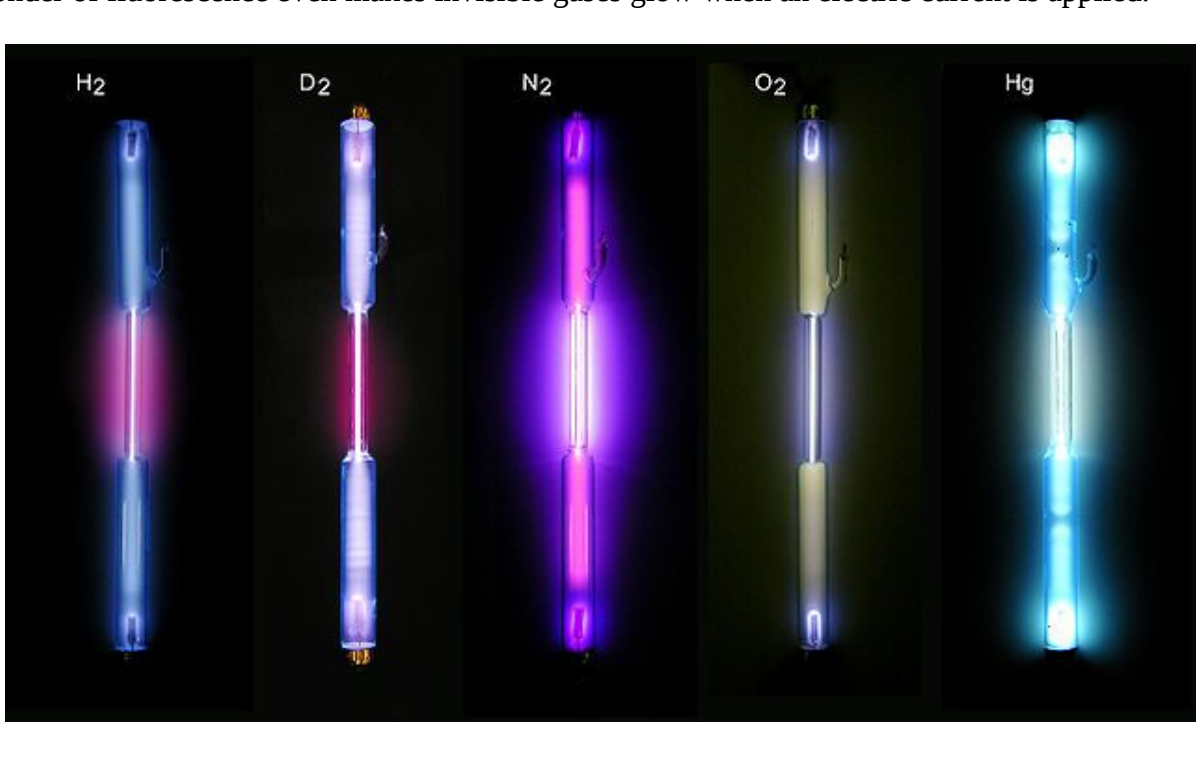
In … **1852** … George Gabriel Stokes described the ability of **fluorspar** and **uranium glass** to change invisible light beyond the violet end of the visible spectrum into blue light.
He **named** this phenomenon **fluorescence** …

Wikipedia - Fluorescence
https://en.wikipedia.org/wiki/Fluorescence

Animations showing energy absorption and light emission
Hydrogen gaining energy from a collision
https://malagabay.files.wordpress.com/2013/04/spectra-1_03.gif
Hydrogen gaining energy from a photon
https://malagabay.files.wordpress.com/2013/04/lab5cllision.gif

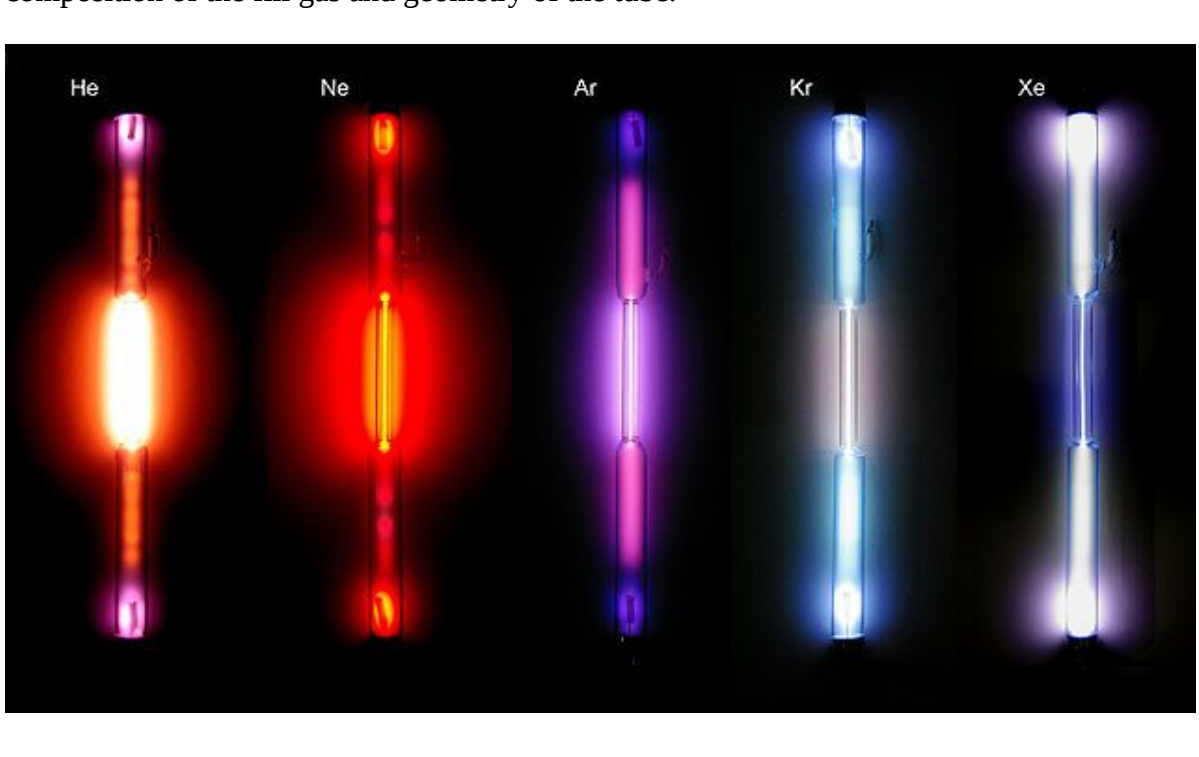
See: Why The Sky is Blue
https://malagabay.wordpress.com/2013/04/15/why-the-sky-is-blue/

The wonder of fluorescence even makes invisible gases glow when an electric current is applied.



Gas-filled tubes exploit phenomena related to electric discharge in gases, and operate by ionizing the gas with an applied voltage sufficient to cause electrical conduction by the underlying phenomena of the **Townsend discharge**.

A **gas-discharge lamp** is an electric light using a gas-filled tube; these include fluorescent lamps, metal-halide lamps, sodium-vapor lamps, and neon lights.
…
The voltage required to initiate and sustain discharge is dependent on the pressure and composition of the fill gas and geometry of the tube.

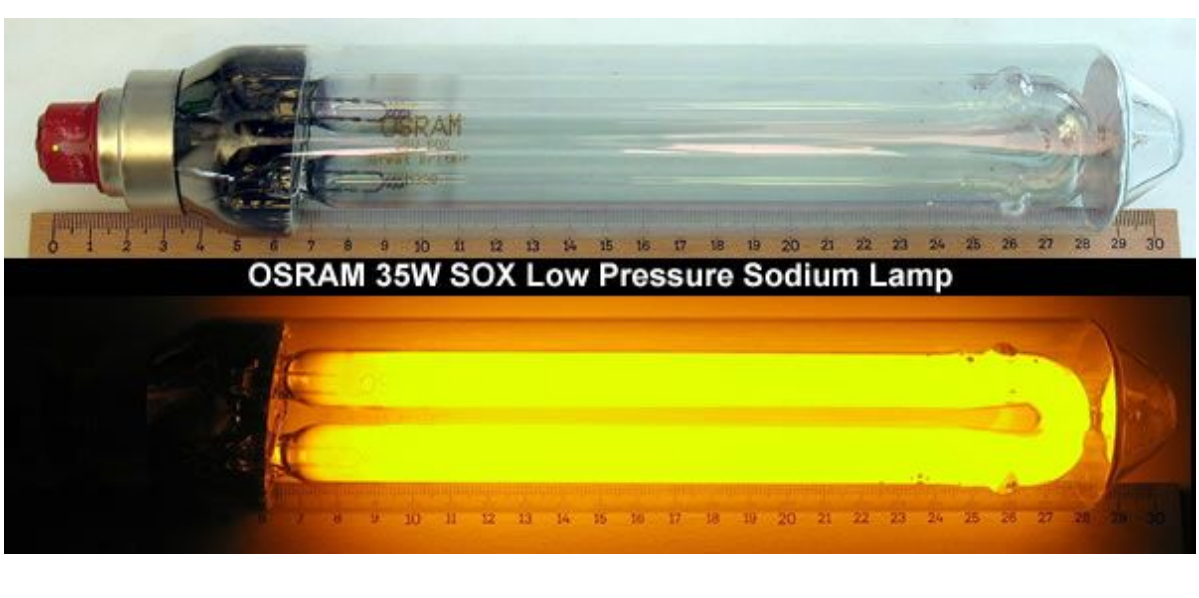


The father of the **low-pressure gas discharge tube** was German glassblower Heinrich Geissler, who beginning in **1857** constructed colorful artistic cold cathode tubes with different gases in them which glowed with many different colors, called Geissler tubes.

It was found that inert gases such as the noble gases neon, argon, krypton or xenon, as well as carbon dioxide worked well in tubes. This technology was commercialized by the French engineer Georges Claude in **1910** and became **neon lighting**, used in neon signs.

Wikipedia - Gas-Filled Tube
https://en.wikipedia.org/wiki/Gas-filled_tube

The **most familiar** source of orange yellow fluorescence is probably the **sodium street lamp.**



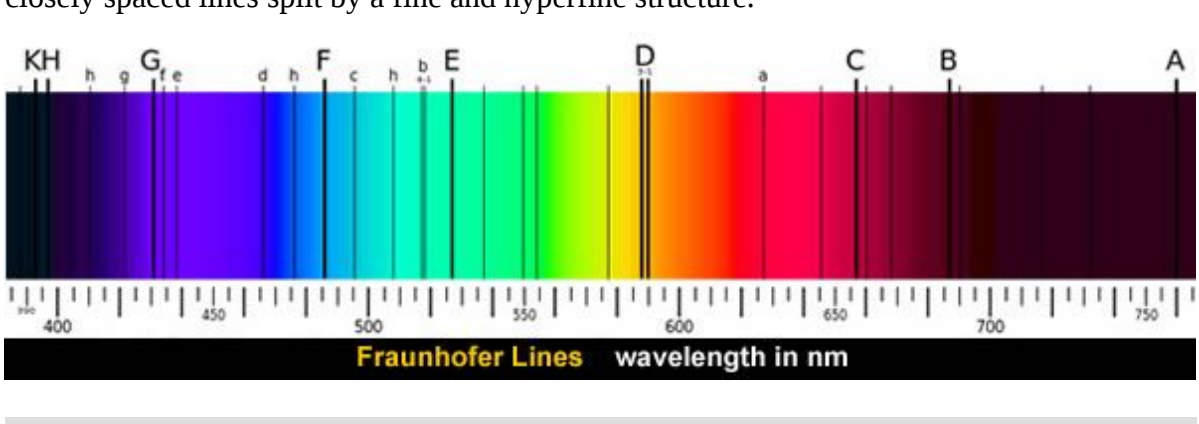
A **sodium-vapor lamp** is a gas-discharge lamp that uses sodium in an excited state to produce light at a characteristic wavelength near 589 nm.

Two varieties of such lamps exist: low pressure and high pressure. **Low-pressure sodium lamps are highly efficient** electrical light sources, but their **yellow light** restricts applications to outdoor lighting, such as **street lamps**, where they are widely used.
…
First LPS commercial lamps were **marketed since 1932**, conceived respectively both in Germany and Nederland by Osram and Philips.

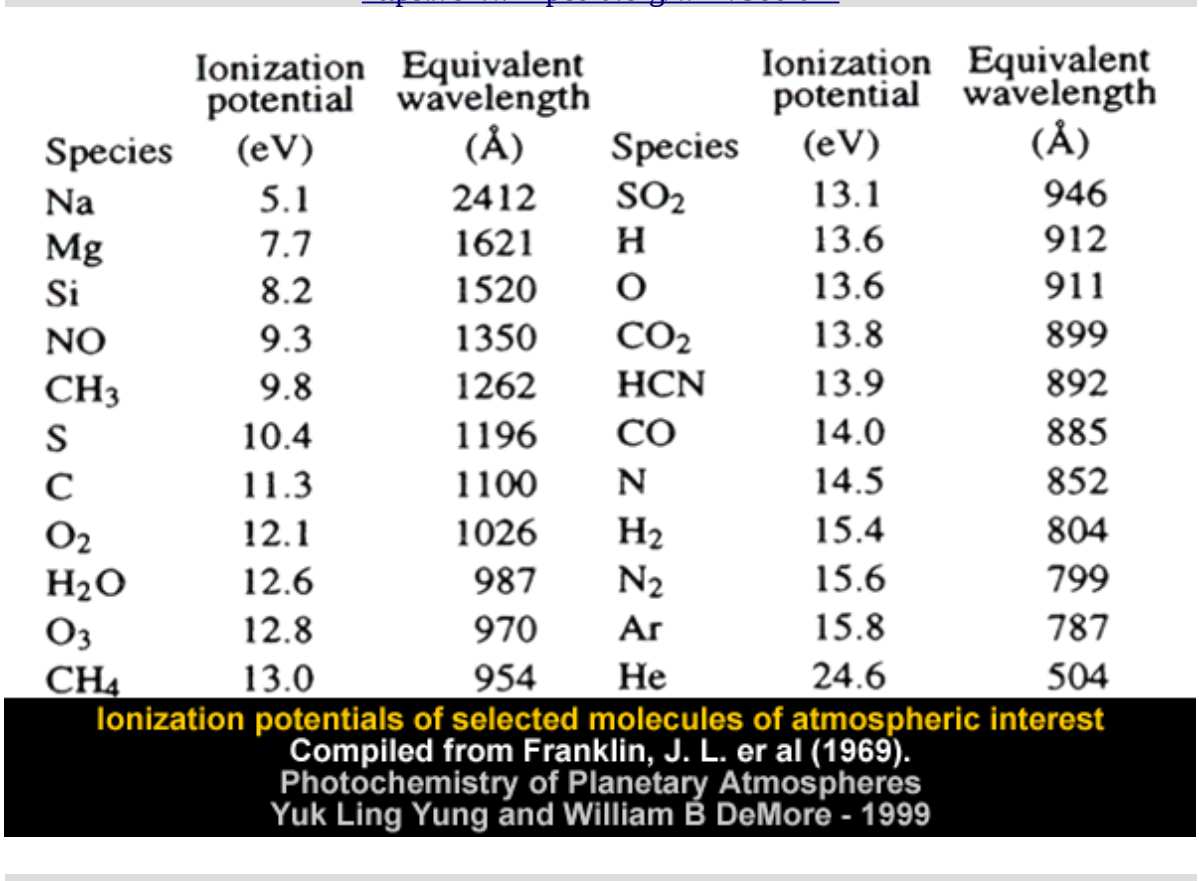
Wikipedia - Sodium-Vapor Lamp
https://en.wikipedia.org/wiki/Sodium-vapor_lamp

Sodium is a chemical element; it has symbol **Na** and atomic number 11.
It is a soft, **silvery-white**, **highly reactive metal** …
The free metal does not occur in nature and must be prepared from compounds …
Sodium imparts an intense yellow color to flames.

Atomic sodium has a **very strong spectral line** in the **yellow-orange** part of the spectrum (the same line as is used in sodium-vapour street lights).
This appears as an absorption line in many types of stars, including the Sun.
…
Fraunhofer named it the **"D" line**, although it is now known to actually be a group of closely spaced lines split by a fine and hyperfine structure.



Wikipedia - Sodium
https://en.wikipedia.org/wiki/Sodium



Species	Ionization potential (eV)	Equivalent wavelength (Å)	Species	Ionization potential (eV)	Equivalent wavelength (Å)
Na	5.1	2412	SO_2	13.1	946
Mg	7.7	1621	H	13.6	912
Si	8.2	1520	O	13.6	911
NO	9.3	1350	CO_2	13.8	899
CH_3	9.8	1262	HCN	13.9	892
S	10.4	1196	CO	14.0	885
C	11.3	1100	N	14.5	852
O_2	12.1	1026	H_2	15.4	804
H_2O	12.6	987	N_2	15.6	799
O_3	12.8	970	Ar	15.8	787
CH_4	13.0	954	He	24.6	504

Ionization potentials of selected molecules of atmospheric interest
Compiled from Franklin, J. L. er al (1969).
Photochemistry of Planetary Atmospheres
Yuk Ling Yung and William B DeMore - 1999

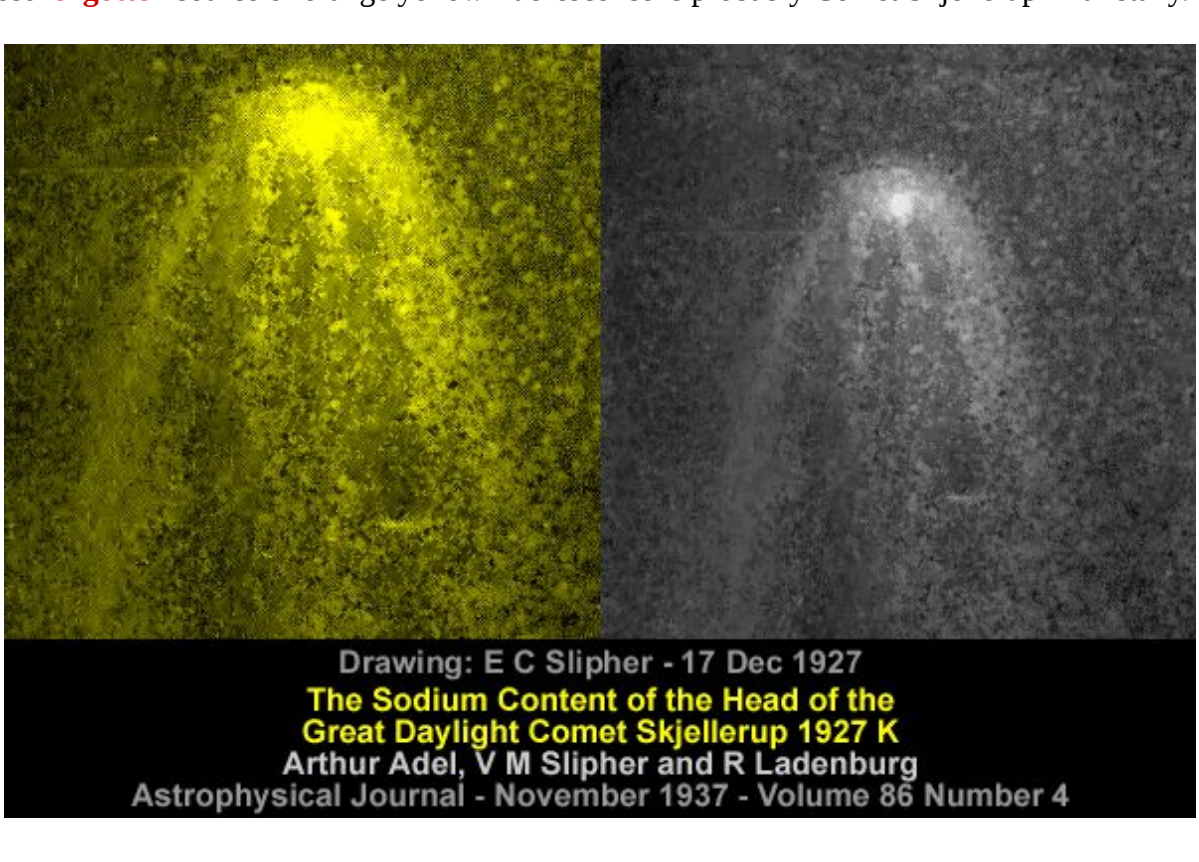
Photochemistry of Planetary Atmospheres
Yuk Ling Yung and William B DeMore - 1999
https://archive.org/details/photochemistryof0000yung/page/28/mode/1up

Ionization Potentials, Appearance Potentials, and Heats of Formation of Gaseous Ions
J L Franklin, J G Dillard, H M Rosenstock, J T Herron, K Draxl and F H Field
National Bureau of Standards - NSRDS-NBS 26 - June 1969
https://archive.org/details/ionizationpotent26fran

Malaga Bay - Atmospheric Layers
https://malagabay.wordpress.com/2015/05/27/atmospheric-layers/

And

The **most forgotten** source of orange yellow fluorescence is probably Comet Skjellerup–Maristany.



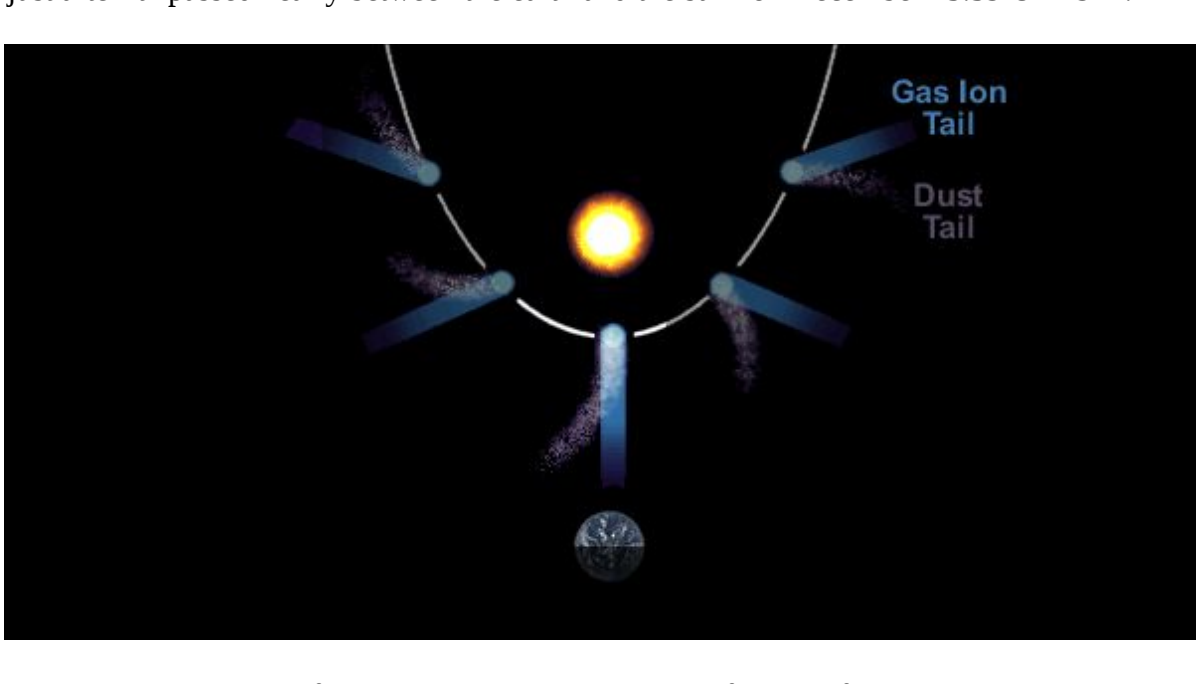
The Sodium Content of the Head of the Great Daylight Comet Skjellerup 1927 K
Arthur Adel, V M Slipher and R Ladenburg
Astrophysical Journal - November 1937 - Volume 86 Number 4

Comet Skjellerup–Maristany, formally designated C/1927 X1, 1927 IX, and 1927k, was a long-period comet which became very bright in 1927.

This **great comet** was observable to the naked eye for about 32 days … and noted for its **strong yellow appearance**, caused by emission **from sodium** atoms.

Wikipedia - Comet Skjellerup–Maristany
https://en.wikipedia.org/wiki/Comet_Skjellerup%E2%80%93Maristany

The orange yellow fluorescence of Comet Skjellerup–Maristany is frequently and fortuitously **forgotten** about because it unexpectedly burst into daylight visibility [many times the brightness of Venus] just after it “passed nearly between the earth and the sun” on December 15.39 UT 1927.



Carl Lampland was the first to observe a comet in the infrared, a feat little known today because he failed to formally publish his data. I have retrieved the radiometry of this comet, **C/1927 X1 (Skjellerup-Maristany)**, taken in broad daylight, from Lampland’s logbook in the Lowell Observatory archives, and present a preliminary reduction of it here.
…
Several weeks after its discovery, **the comet unexpectedly burst into daylight visibility on Dec. 15**, taking Lowell Observatory astronomers and the rest of the world by surprise.

It reached perihelion on 1927 Dec. 18.18 Universal Time (UT) at q = 0.176 astronomical units (AU), having **passed nearly between the earth and the sun on Dec. 15.39 UT** …

Another Unsung Lowell Observatory Achievement:
The First Infrared Observation of a Comet
J N Marcus
Origins of the Expanding Universe: 1912-1932 - Published: April 2013
https://arxiv.org/pdf/1301.7269.pdf

On the evening of **December 15**, Mr. E. W. Slade reported **an object closely following the sun as it set**.

Mr. E. C. Slipher, the next morning, found the comet to be an easy object to the naked eye.

The experienced observer saw it readily during that day by merely extending the hand to shadow the eyes from the sun, which was only about five degrees southwest of the comet. Venus, to the west of the comet, was available for comparison.

Early in the day of December 16, the comet was many times the brightness of Venus, and relatively a conspicuous object by reason of its brightness and tail.

The nucleus was of an **orange yellow color** and small but not quite stellar in form or sharpness. At times it appeared distinctly elongated. The nucleus was enveloped by the arching hoods commonly seen of bright comets. The tail was broad and about 45’ long.

One could not avoid thinking of the splendid display the comet would have made if it could have been seen against a night sky.

By early afternoon (December 16) the comet had faded and the tail had also changed in appearance.

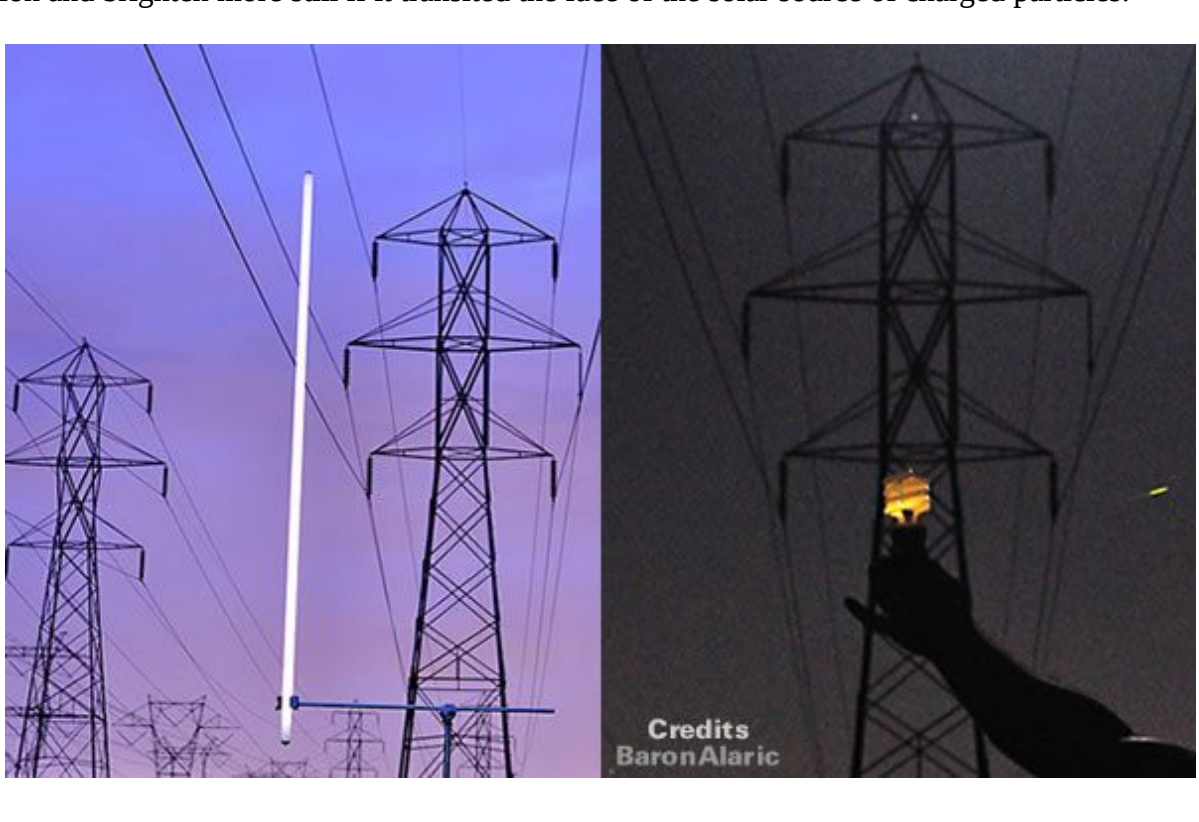
Daylight Observations of Skjellerup's Comet at the Lowell Observatory
V M Slipher and E C Slipher
Popular Astronomy - 1928-05 - Volume 36 Issue 5
https://archive.org/details/sim_popular-astronomy_1928-05_36_5/page/300/mode/2up

After Saturday, **December 17**, the comet was seen, during the day, **only with the aid of the telescope.** It was last observed late in theafternoon of December 19.
Attempts to direct the telescope on it the next day in full daylight were unsuccessful.

The Sodium Content of The Head of The Great Daylight Comet Skjellerup 1927 K
Arthur Adel, V M Slipher, and R Ladenburg
The Astrophysical Journal - November 1937 - Volume 86 Number 4
https://articles.adsabs.harvard.edu/pdf/1937ApJ....86..345A

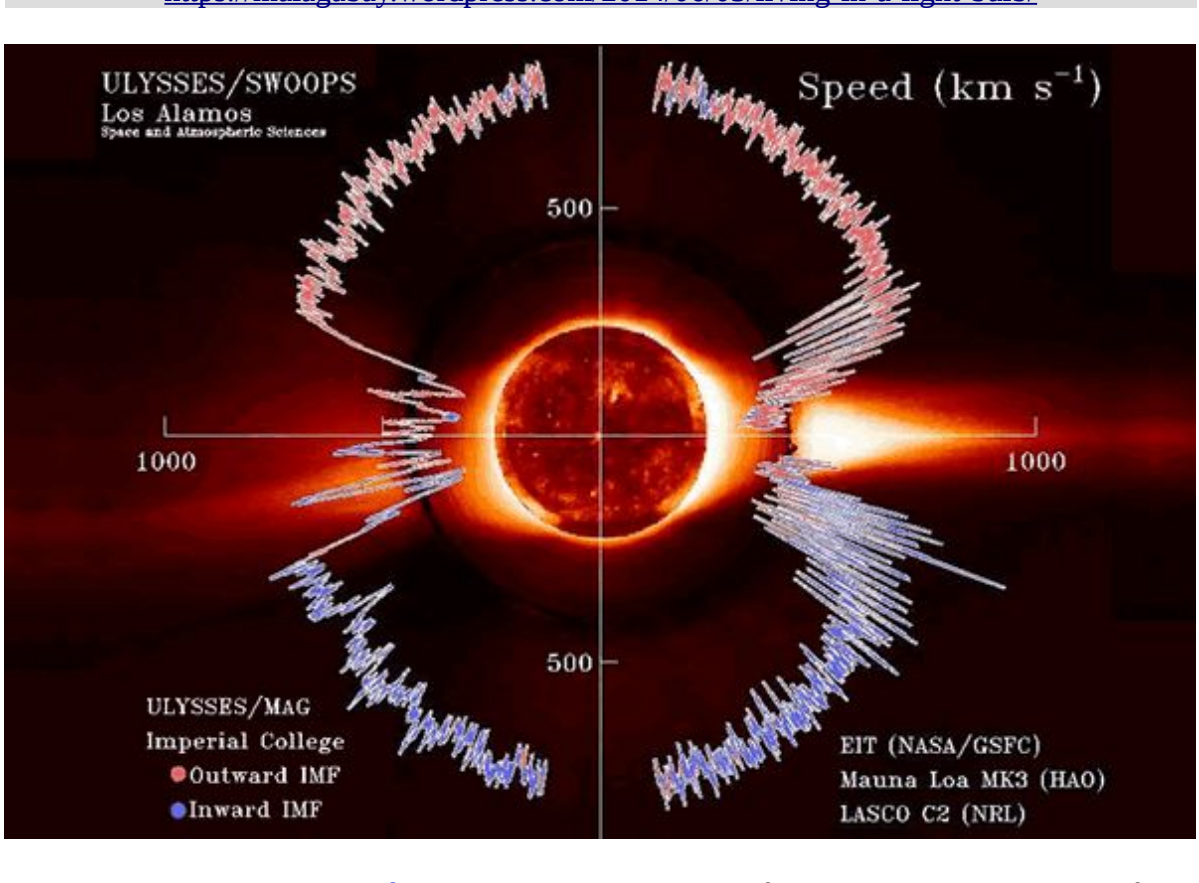
More specifically:

The orange yellow fluoresce of Comet Skjellerup–Maristany is fervently and fortuitously **forgotten** because it's a ***no-brainer*** the fluorescing cloud surrounding a comet would brighten as it approaches perihelion and brighten more still if it transited the face of the solar source of charged particles.



Any independent thinker who questions *Settled Solar Science* can expect to be labelled a *fruitcake*, especially if they hypothesise **the Earth is spinning inside a fluorescing cloud of gas – just as if they were living inside a fluorescent light bulb.**

Malaga Bay - Living in a Light Bulb
https://malagabay.wordpress.com/2014/06/03/living-in-a-light-bulb/

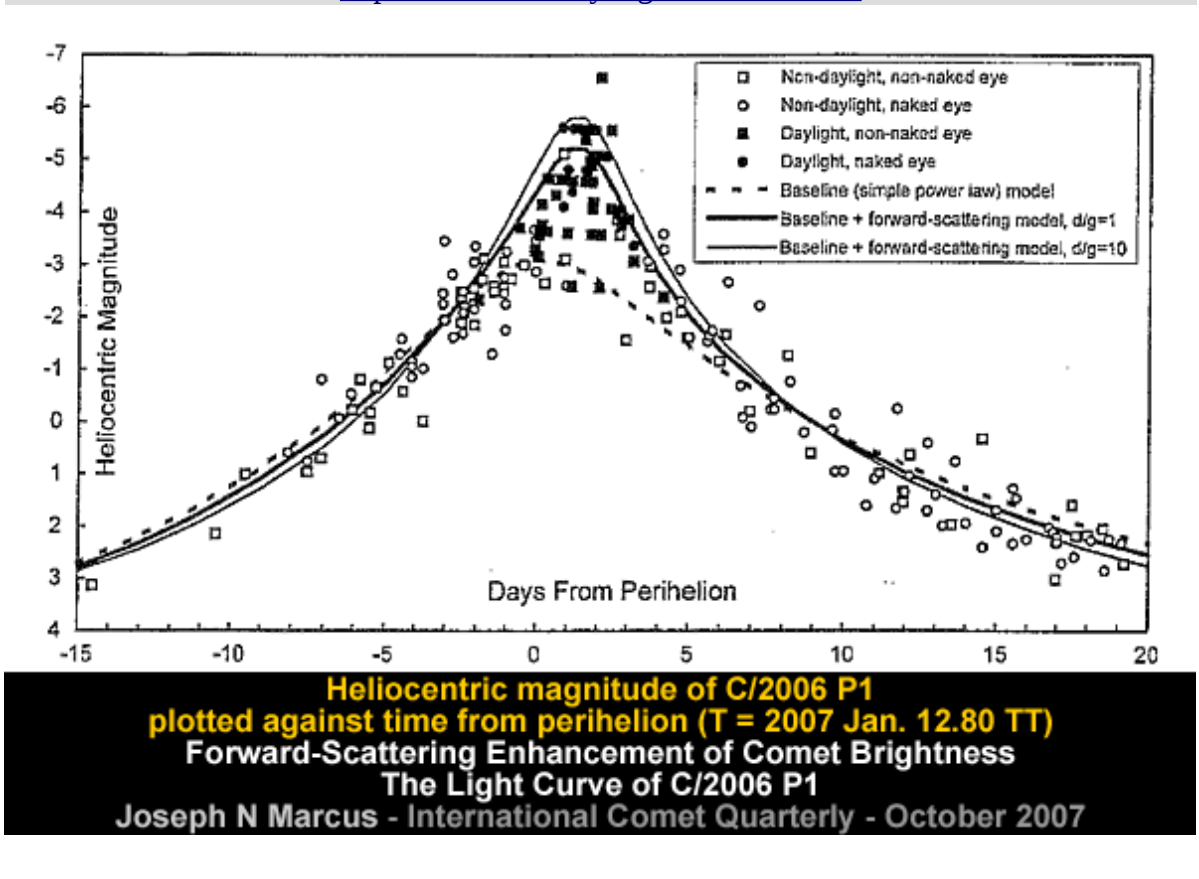


The **solar wind is a stream of charged particles** released from the upper atmosphere of the Sun, called the corona. This plasma mostly consists of electrons, protons and alpha particles with kinetic energy between 0.5 and 10 keV. The composition of the solar wind plasma also includes a mixture of materials found in the solar plasma: trace amounts of heavy ions and atomic nuclei of elements such as C, N, O, Ne, Mg, Si, S, and Fe. There are also rarer traces of some other nuclei and isotopes such as P, Ti, Cr, and 58Ni, 60Ni, and 62Ni
…
The existence of **particles flowing outward from the Sun** to the Earth was first **suggested** by British astronomer **Richard C. Carrington**. In **1859**, Carrington and Richard Hodgson independently made the first observations of what would later be called a solar flare.
…
The idea that **the ejected material consisted of both ions and electrons** was first **suggested** by Norwegian scientist **Kristian Birkeland**. … He proposed in **1916** that, "From a physical point of view it is most probable that solar rays are neither exclusively negative nor positive rays, but of both kinds"; in other words, the solar wind consists of both negative electrons and positive ions.

Wikipedia - Solar Wind
https://en.wikipedia.org/wiki/Solar_wind#History

no-brainer …
An easy or obvious conclusion, decision, solution, task, etc.;
something requiring little or no thought.

Wiktionary - no-brainer
https://en.wiktionary.org/wiki/no-brainer



Heliocentric magnitude of C/2006 P1
plotted against time from perihelion (T = 2007 Jan. 12.80 TT)
Forward-Scattering Enhancement of Comet Brightness
The Light Curve of C/2006 P1
Joseph N Marcus - International Comet Quarterly - October 2007

In many respects comet C/2006 P1 is remarkably similar to the great daylight comet C/1927 X1 (Skjellerup-Maristany), which also … experienced … brightness enhancement …

Forward-Scattering Enhancement of Comet Brightness - The Light Curve of C/2006 P1
Joseph N Marcus - International Comet Quarterly - October 2007
http://www.icq.eps.harvard.edu/marcus_icq29_119.pdf

Nevertheless:

Fluorescence was forcefully **forgotten** because astronomers adopted ***forward scattering***.

Forward scattering of light on 15–16 December 1927 **allowed the comet to be seen during daylight** if the observer blocked the Sun.

Wikipedia - Comet Skjellerup–Maristany
https://en.wikipedia.org/wiki/Comet_Skjellerup%E2%80%93Maristany

Forward scattering can make a back-lit comet appear significantly brighter because the dust and ice crystals are reflecting and enhancing the apparent brightness of the comet **by scattering** that **light towards the observer**.

Comets studied forward-scattering in visible-thermal photometry include

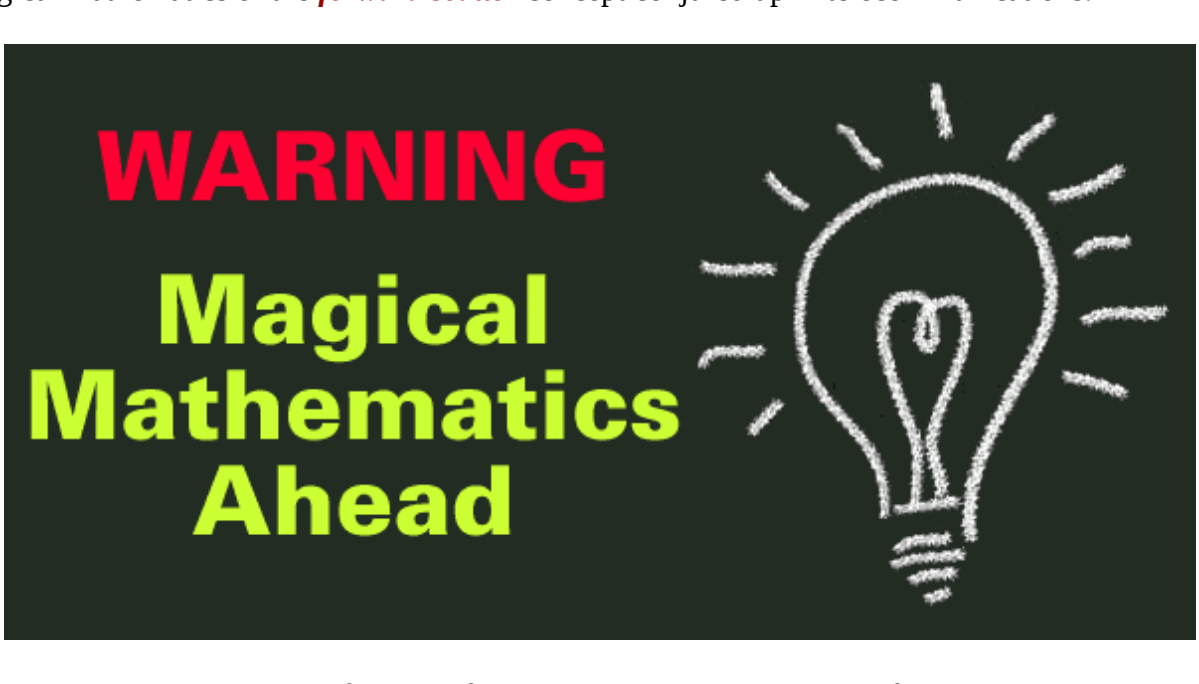
> **C/1927 X1 (Skjellerup–Maristany),**
> C/1975 V1 (West), and
> C/1980 Y1 (Bradfield).

Comets studied forward-scattering in SOHO non-thermal C3 coronograph photometry include 96P/Machholz and C/2004 F4 (Bradfield). The brightness of the great comets C/2006 P1 (McNaught) and Comet Skjellerup–Maristany near perihelion were enhanced by forward scattering.

Wikipedia - Forward Scatter
https://en.wikipedia.org/w/index.php?title=Forward_scatter&oldid=1210035735

More specifically:

After decades wondering in the wilderness it appears astronomers finally decided to adopt and adapt the magical mathematics of the ***forward scatter*** concept conjured up in telecommunications.



Forward scatter is the deflection of waves in general (or more specifically, electromagnetic waves) in a way that they headed against direction from which they came[clarification needed][dubious – discuss].

This **might** be caused by diffraction, nonhomogeneous refraction, or nonspecular reflection by particulate matter that are large with respect to the wavelength in question but small with respect to the beam diameter.

The forward scattering process may be sensitive to polarization of the wave.

Forward scatter is essentially the reverse of backscatter.

Wikipedia - Forward Scatter
https://en.wikipedia.org/w/index.php?title=Forward_scatter&oldid=1210035735

In telecommunication, forward scatter is the deflection--by diffraction, nonhomogeneous refraction, or nonspecular reflection by particulate matter of dimensions that are large with respect to the wavelength in question but small with respect to the beam diameter--of a portion of an incident electromagnetic wave, in such a manner that the energy so deflected propagates in a direction that is within 90° of the direction of propagation of the incident wave.

Wikipedia - Forward Scatter - 11:28, 10 June 2006
https://en.wikipedia.org/w/index.php?title=Forward_scatter&oldid=57859026

In the first paper, I reviewed forward-scattering in comets and developed a model to forecast and analyze it, based upon five comets that have been well-characterized photometrically in forward-scattering geometry (Marcus 2007a). The model, utilizing a compound Henyey-Greenstein function for dust scattering, derives from equations 8, 14, and 15 of Paper I. In full form it is given by

$$\Phi(\theta) = \frac{\delta_{90}}{1+\delta_{90}}\left[k\left(\frac{1+g_f^2}{1+g_f^2-2g_f\cos\theta}\right)^{3/2} + (1-k)\left(\frac{1+g_b^2}{1+g_b^2-2g_b\cos\theta}\right)^{3/2} + \frac{1}{\delta_{90}}\right], \quad (1)$$

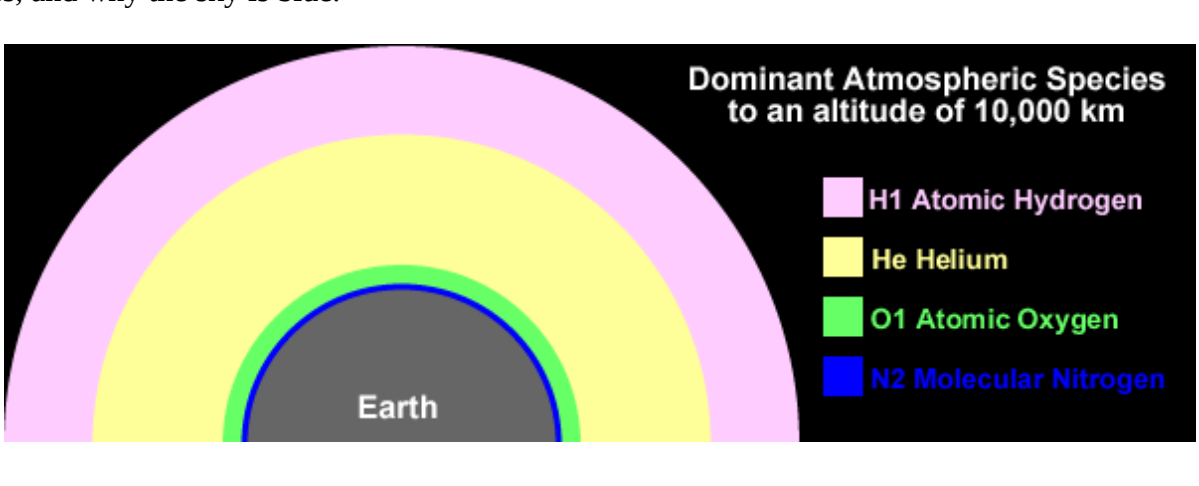
where $\Phi(\theta)$ is the scattering (or "phase") function of comet brightness, θ (= 180° – phase angle) is the scattering angle, $0 \leq g_f < 1$ and $-1 < g_b \leq 0$ are the forward-scattering and back-scattering asymmetry factors, $0 \leq k \leq 1$ is the partitioning coefficient between forward and backward scattering, and δ_{90} is the dust-to-gas light ratio in the coma as viewed at θ = 90°. The model is applicable for all θ (0° ≤ θ ≤ 180°) and is "normalized" — that is, $\Phi(\theta)$ = 1, at 90°.

Forward-Scattering Enhancement of Comet Brightness
The Light Curve of C/2006 P1
Joseph N Marcus - International Comet Quarterly - October 2007

Forward-Scattering Enhancement of Comet Brightness - The Light Curve of C/2006 P1
Joseph N Marcus - International Comet Quarterly - October 2007
http://www.icq.eps.harvard.edu/marcus_icq29_119.pdf

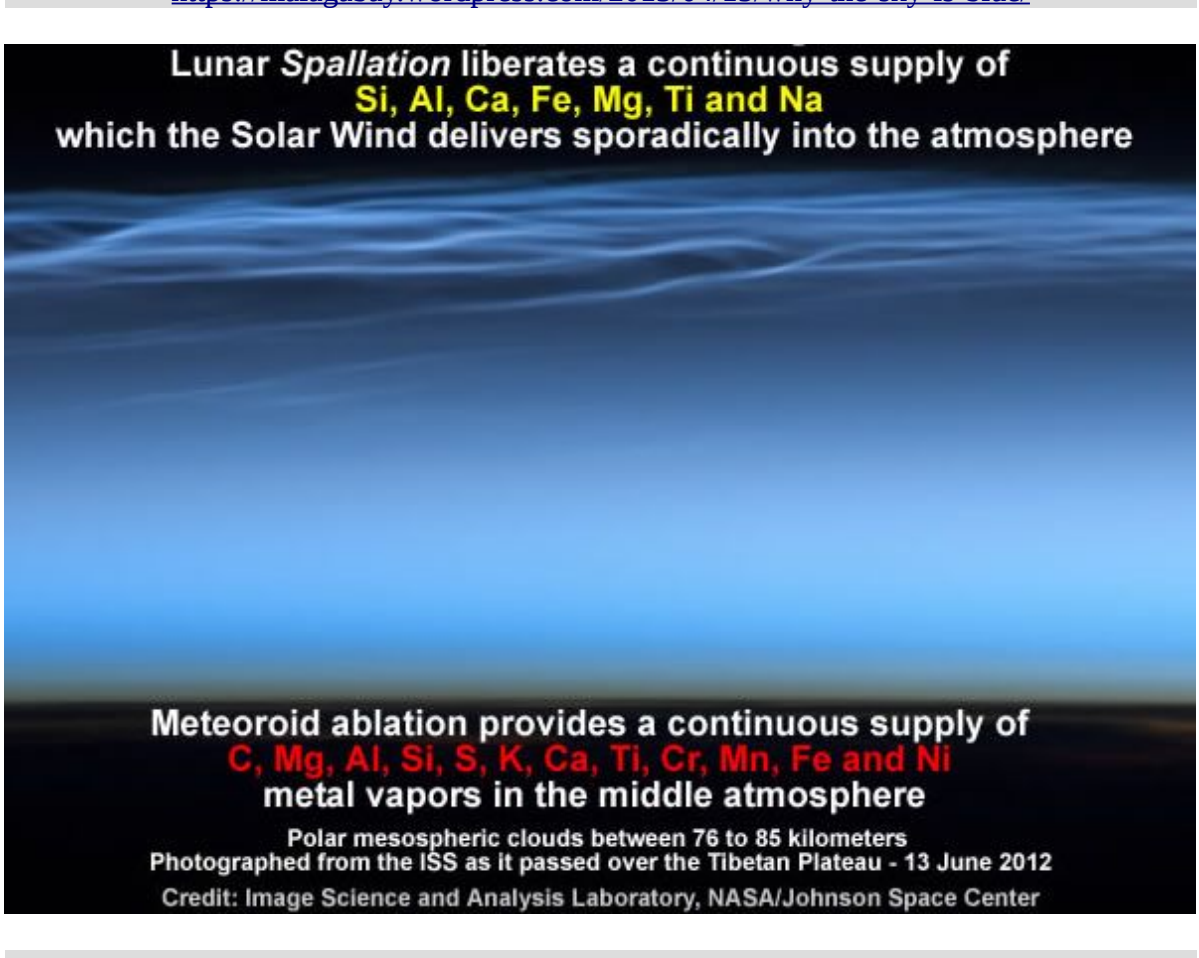
Therefore:

The orange yellow fluorescence of Comet Skjellerup–Maristany continues to be frequently and fortuitously **forgotten** because fluorescing clouds of gas powered by streams of charged particles emanating from distant objects **undermines** many mainstream money making memes such as: light years, blue shift, red shift, solar corona, solar irradiance, terrestrial spectrography of stars and galaxies, and why the sky is blue.



The key to understanding our blue skies was articulated by the late [and great] Ralph Rene when he realised that **the Earth's atmosphere fluoresces.**

Malaga Bay - Why The Sky Is Blue
https://malagabay.wordpress.com/2013/04/15/why-the-sky-is-blue/

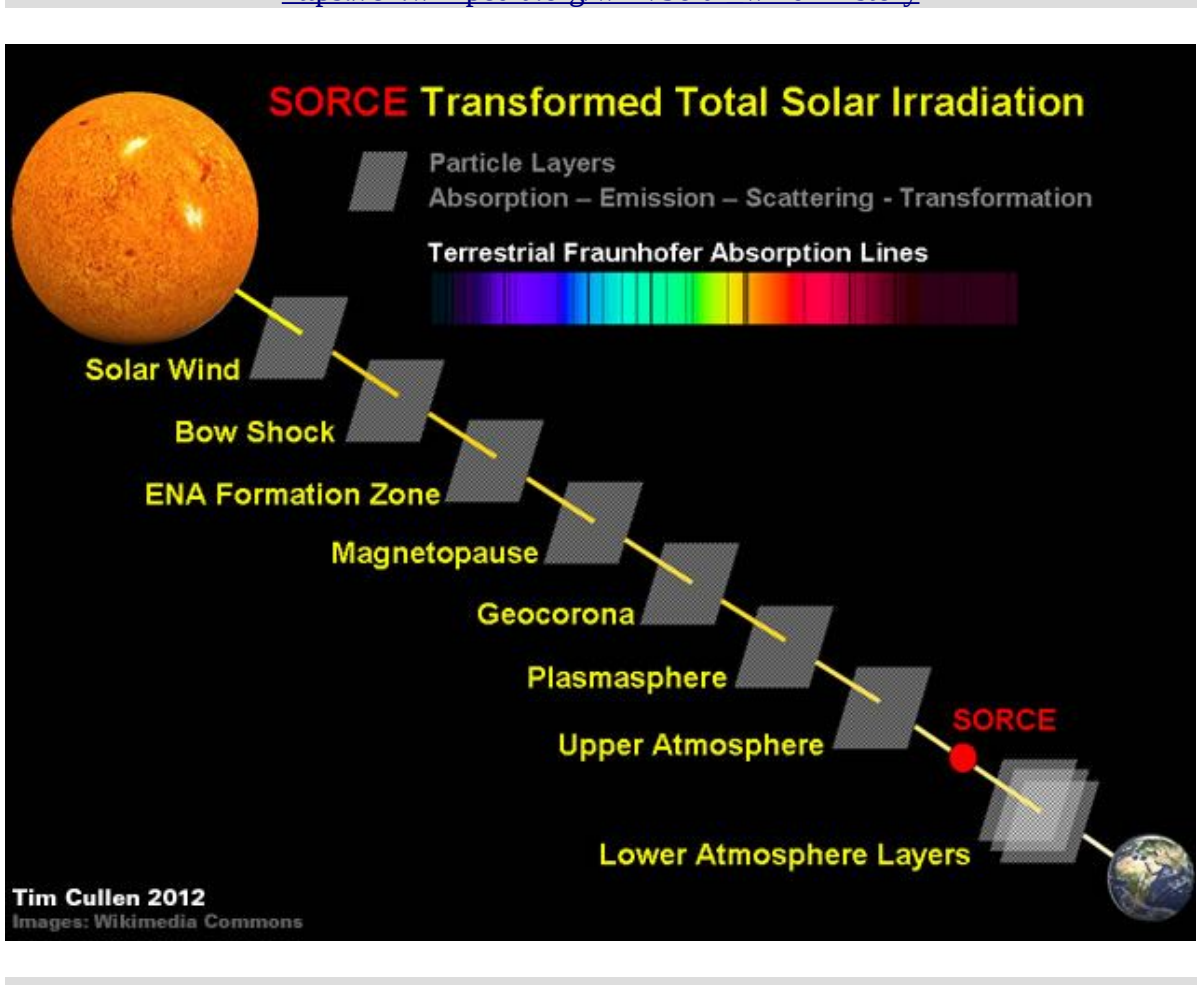


Polar mesospheric clouds between 76 to 85 kilometers
Photographed from the ISS as it passed over the Tibetan Plateau - 13 June 2012
Credit: Image Science and Analysis Laboratory, NASA/Johnson Space Center

Malaga Bay - Atmospheric Layers
https://malagabay.wordpress.com/2015/05/27/atmospheric-layers/

Around the **1930s**, scientists had concluded that the temperature of **the solar corona must be a million degrees Celsius because of the way it extended into space (as seen during a total solar eclipse)**. Later spectroscopic work confirmed this extraordinary temperature to be the case. In the mid-1950s, British mathematician Sydney Chapman calculated the properties of a gas at such a temperature and determined that the corona being such a superb conductor of heat, it must extend way out into space, beyond the orbit of Earth.

Wikipedia - Solar Wind
https://en.wikipedia.org/wiki/Solar_wind#History



Malaga Bay - Total Solar Irradiance
https://malagabay.wordpress.com/2012/11/26/inventions-and-deceptions-total-solar-irradiance/

Thus the fluctuating pitch/colour has nothing to do with the *Doppler Effect* and everything to do with **attenuation of high frequency** sound/light waves.

The attenuation of high frequency wave energy was well understood by Robert Foulis when he invented "first automated steam-powered foghorn" which produced low frequency sound.

Malaga Bay - The Soporific Sound of Settled Science
https://malagabay.wordpress.com/2015/06/04/the-soporific-sound-of-settled-science/

Carl Lampland was the first to observe a comet **in the infrared**, a feat little known today because **he failed to formally publish his data**.

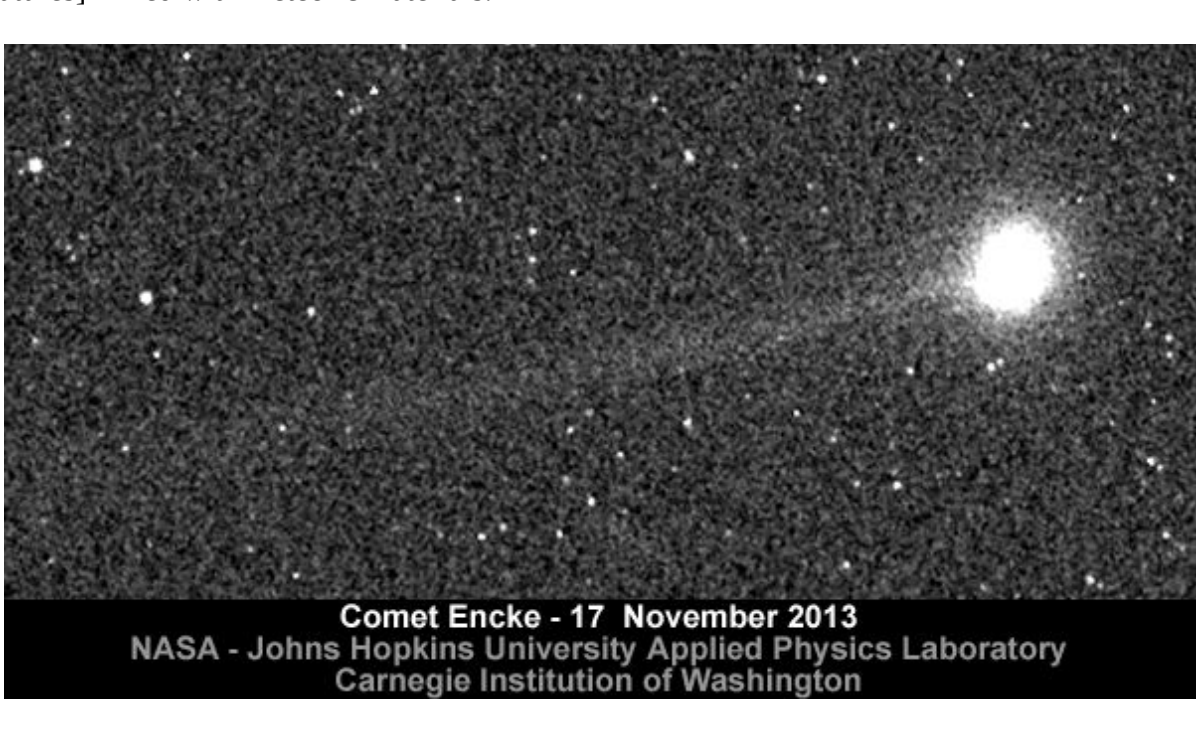
I have retrieved the radiometry of this comet, **C/1927 X1 (Skjellerup-Maristany)**, taken in broad daylight, from Lampland's logbook in the Lowell Observatory archives, and present a preliminary reduction of it here.

There are similarities between Lampland's pioneering achievement and V. M. Slipher's **discovery of the redshifts** of the spiral nebulae (and thus, arguably, **the expansion of the Universe**).

Another Unsung Lowell Observatory Achievement:
The First Infrared Observation of a Comet
J N Marcus
Origins of the Expanding Universe: 1912-1932 - Published: April 2013
https://arxiv.org/pdf/1301.7269.pdf

For example:

The orange yellow **sodium** fluorescence of Comet Skjellerup–Maristany was fortuitously **forgotten** by Fred Whipple when he **visualized comets** as **conglomerates of ices** [at extremely low temperatures] mixed with meteoric materials.



Comet Encke - 17 November 2013
NASA - Johns Hopkins University Applied Physics Laboratory
Carnegie Institution of Washington

A **new comet model** is presented that resolves the chief problems of abnormal cometary motions and accounts for a number of other cometary phenomena.

The nucleus is **visualized** as a **conglomerate of ices, such as H_2O, NH_3, CH_4, CO_2, or CO, (C_2N_2?)**, and other possible materials volatile at room temperature, combined in a conglomerate with meteoric materials, all initially at **extremely low temperatures (<50° K).**

A Comet Model. I. The Acceleration of Comet Encke
Fred L Whipple - Harvard College Observatory
The Astrophysical Journal - March 1950
https://ui.adsabs.harvard.edu/abs/1950ApJ...111..375W/abstract

It became obvious to me in the late 1940s that comets must carry a large reservoir of these parent molecules to keep some comets active for hundreds, or even possibly thousands, of revolutions about the Sun.

In addition, some comets must be big enough and solid enough to graze the Sun without experiencing total destruction.

The answer was clear: The nucleus of a comet must be a great mass of ices embedded with dust or meteoric particles — **in other words, it must be a huge, dirty snowball.**

The Mystery of Comets - Fred Lawrence Whipple and Daniel W E Green - 1985
https://archive.org/details/mysteryofcomets00whip/page/146/mode/2up
Amazon US: https://www.amazon.com/dp/0521324408
Amazon UK: https://www.amazon.co.uk/dp/0521324408

The *Great Snowball of 1950* was "visualized" by Fred Whipple to be Comet containing a "conglomerate of ices" covered by "insulating meteoric material."

The imaginative nature of the *Great Snowball of 1950* was highlighted by Fred Whipple when he noted that **many of these "visualized" frozen substances were "unobserved".**

Malaga Bay - The Atomic Comet: The Great Snowball of 1950
https://malagabay.wordpress.com/2017/09/20/the-atomic-comet-the-great-snowball-of-1950/

The total lack of evidence to support the "dirty snowball" theory has caused the theory to morph [in recent years] into the "icy dirtball" hypothesis.

Malaga Bay - Inventions and Deceptions – Dirty Snowballs
https://malagabay.wordpress.com/2012/10/10/inventions-and-deceptions-dirty-snowballs/

If Fred Whipple had remembered the orange yellow fluorescence of Comet Skjellerup–Maristany then his imaginary ***dirty-snowballs*** would morph into **fluorescing *salt encrusted snowballs*.**

As ice melts, the liquid water collects in depressions on the surface and deepens them, forming these melt ponds in the Arctic. These **fresh water ponds** are separated from the **salty sea below** and around it, until breaks in the ice merge the two.
…
In the freezing process, much of the **salt in ocean water is squeezed out** of the frozen crystal formations, though some remains frozen in the ice.

Wikipedia - Sea Ice
https://en.wikipedia.org/wiki/Sea_ice

… **salt** is a mineral composed **primarily of sodium** chloride (NaCl) …
… **oceans** are a virtually **inexhaustible source of salt** …

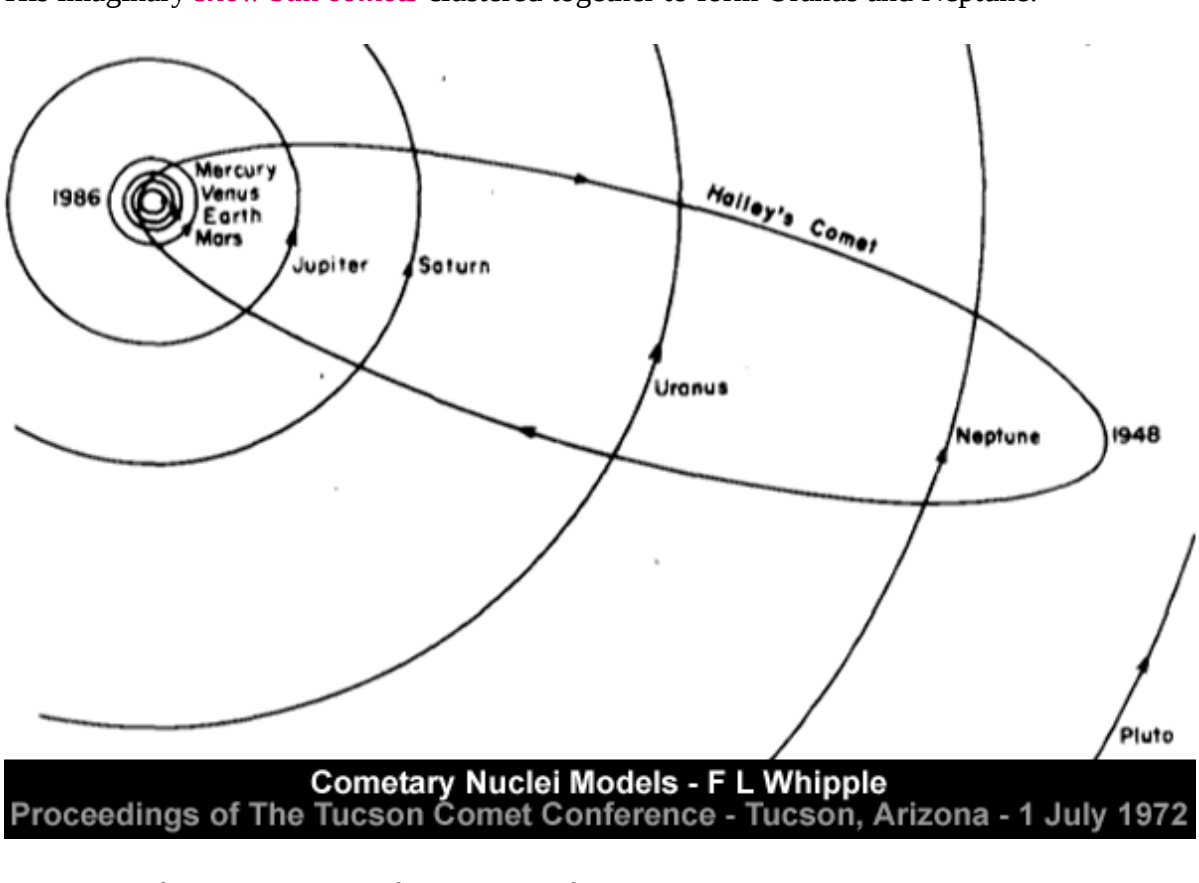
Wikipedia - Salt
https://en.wikipedia.org/wiki/Salt

Because Fred Whipple had fortuitously **forgotten** fluorescing Comet Skjellerup–Maristany he could clairvoyantly conclude:

► His imaginary ***snow ball comets*** congealed in the vicinity of Uranus and Neptune

then

► His imaginary ***snow ball comets*** clustered together to form Uranus and Neptune.



Cometary Nuclei Models - F L Whipple
Proceedings of The Tucson Comet Conference - Tucson, Arizona - 1 July 1972

Arguments for the existence of some kind of **icy-conglomerate cometary nucleus** are put forward, and the role of clathrates in the condensation of comets from the solar nebula is discussed.

The division of cosmic materials into three types is described, and it is suggested that whereas Jupiter, and to a large extent Saturn, condensed directly from gas and the terrestrial planets and asteroids collected from planetesimals of earthy material, **the comets were formed as snow balls in the vicinity of Uranus and Neptune**, with these two planets themselves representing accumulations of comets.

Cometary Nuclei Models - F L Whipple
Proceedings of The Tucson Comet Conference - Tucson, Arizona - 1 July 1972
Edited By G P Kuiper and E Roemer
https://ntrs.nasa.gov/api/citations/19730003106/downloads/19730003106.pdf

Uranus - Voyager 2
January 1986
NASA

Neptune - Voyager 2
August 1989
NASA

An ice giant is a giant planet composed mainly of elements heavier than hydrogen and helium, such as oxygen, carbon, nitrogen, and sulfur.
There are two **ice giants** in the Solar System: **Uranus** and **Neptune**.

Wikipedia - Ice Giant
https://en.wikipedia.org/wiki/Ice_giant

Unsurprisingly:

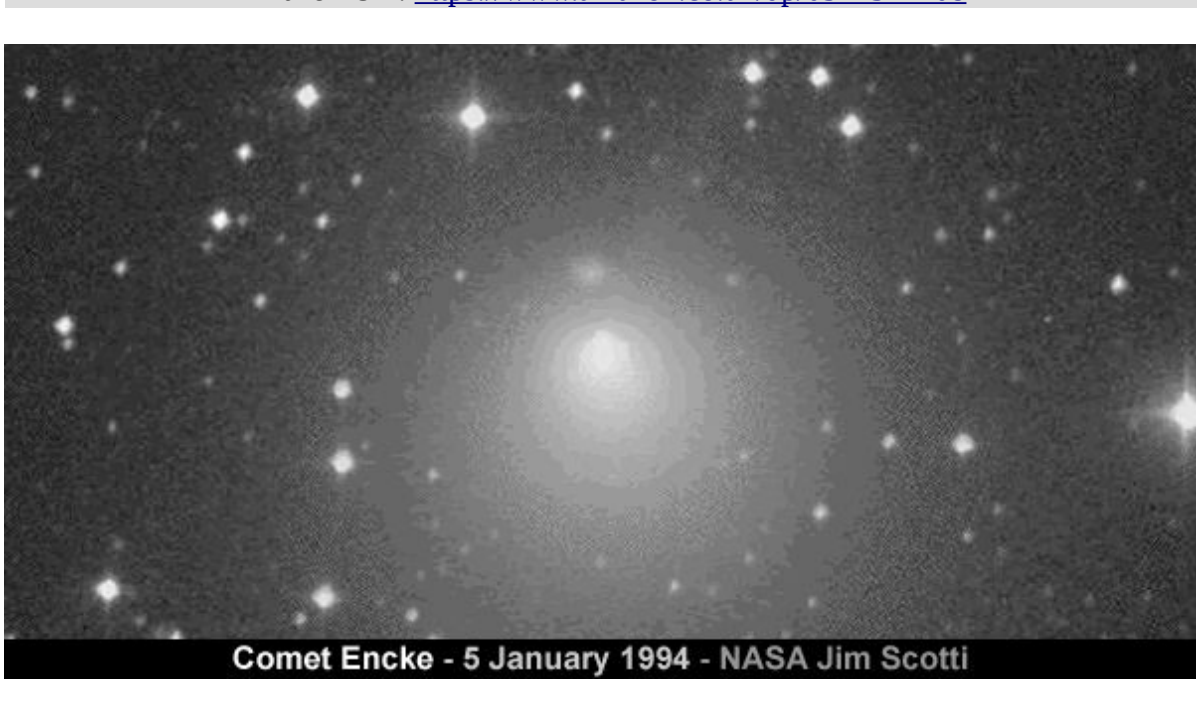
Fred Whipple also fortuitously **forgot** to mention **how** exactly his **conglomerate dirty snowballs** were combined and compacted to create **sunlight powered jet engines.**

Such a snowball would remain dormant at great distances from the Sun, becoming active only when near enough for **sunlight to vaporize the ices**.

Actually, in a vacuum, ices do not melt to form a liquid. They simply evaporate at the surface; technically they sublimate. The sublimation of snow is quite obvious in cold climates on Earth, where a thin layer will disappear in a day or two at temperatures well below freezing.

On a comet, the sublimating ices would lose molecules to space at a speed of more than 300 meters per second, according to the kinetic theory of gases. Their pressure would be quite adequate to carry away any embedded rocky grains. Thus the dirty snowball could produce both the gas and the grains observed to come from comets.
…
Suddenly I realized that the gases sublimating from **a dirty snowball** act in identical fashion. A snowball **in sunlight is really a small jet engine**. As the ice sublimates on the sunny side and the molecules leave the snowball at high speed into the vacuum of space, each molecule kicks back on the surface of the snowball. This is the basic principle of jet propulsion, or Newton's principle of action and reaction.

The Mystery of Comets - Fred Lawrence Whipple and Daniel W E Green - 1985
https://archive.org/details/mysteryofcomets00whip/page/146/mode/2up
Amazon US: https://www.amazon.com/dp/0521324408
Amazon UK: https://www.amazon.co.uk/dp/0521324408



Comet Encke - 5 January 1994 - NASA Jim Scotti

Vaporization of the ices by externally applied solar radiation leaves an outer matrix of non-volatile insulating meteoric material.

Quantitative and qualitative study shows that heat transfer through thin meteoric layers in a vacuum is chiefly by radiation, that the heat transfer is inversely proportional to the effective number of layers, and that an appreciable time lag in heat transfer can occur for a rotating cometary nucleus.

Because of the time lag, such a cometary nucleus rotating in the "forward" sense will emit its vaporized ices with a component toward the antapex of motion.

The momentum transfer from the kinetic velocity of **the emitted gas will propel the nucleus in the forward sense**, reduce the mean motion, and increase the eccentricity of the orbit. Such orbital effects occur for Comet D'Arrest; the mean daily motion of Comet Wolf I also appears to be decreasing.

Retrograde rotation can produce an acceleration in mean motion and a decrease in eccentricity, as observed for Comet Encke.

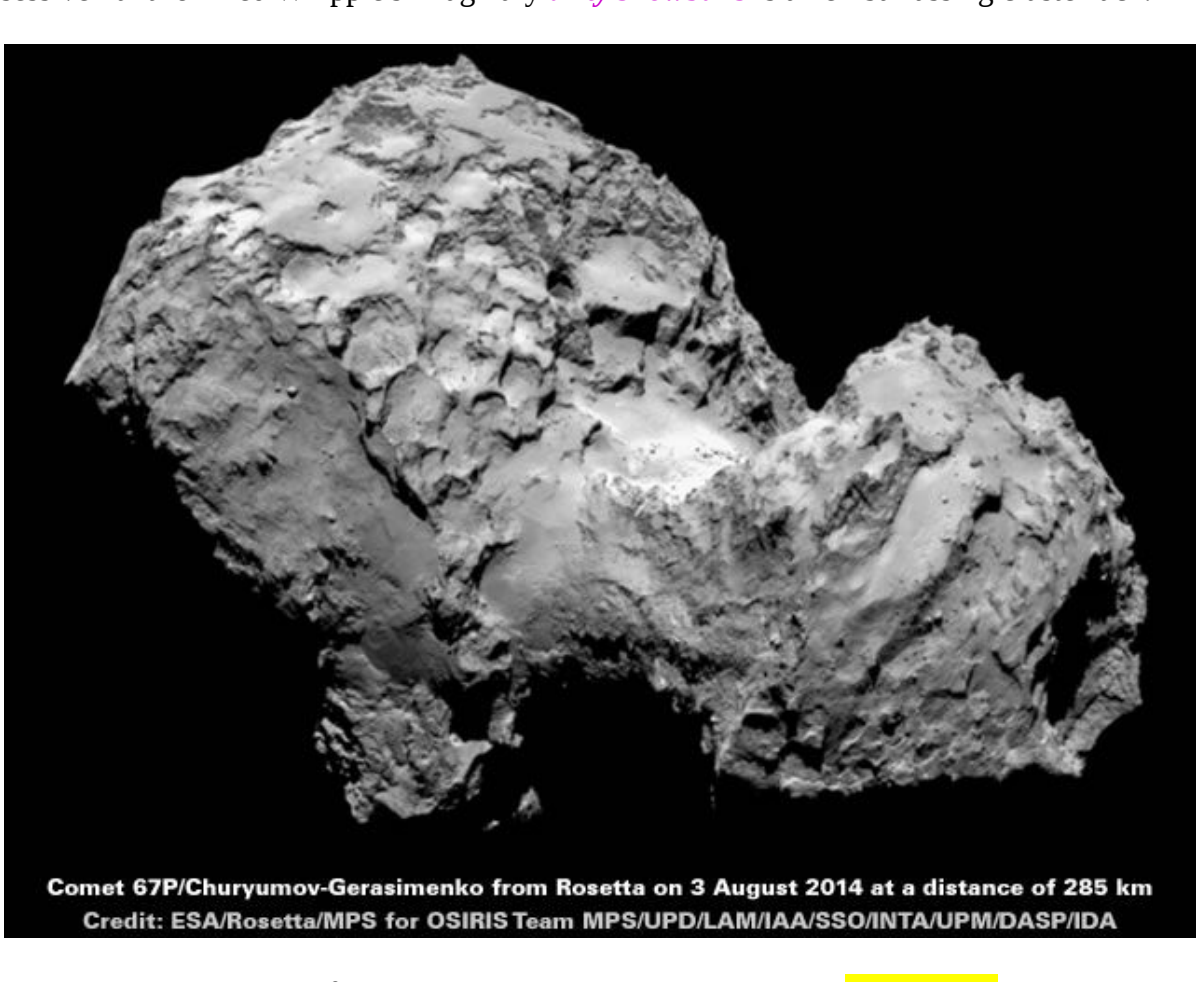
If the decelerating force component is taken as its maximum theoretical value, the present observed acceleration in the mean motion of Comet Encke can be produced by a loss of 0.002 of its mass per revolution.

The corresponding mass loss for Comet D'Arrest is 0.005. For both comets the observed changes in eccentricity are obtained if the force acts proportionately to the solar energy flux but is cut off at a solar distance of about 2 A.U.

A Comet Model. I. The Acceleration of Comet Encke
Fred L Whipple - Harvard College Observatory
The Astrophysical Journal - March 1950
https://ui.adsabs.harvard.edu/abs/1950ApJ...111..375W/abstract

And

The obsessive hunt for Fred Whipple's imaginary ***dirty snowballs*** is an embarrassing clusterfuck.



Comet 67P/Churyumov-Gerasimenko from Rosetta on 3 August 2014 at a distance of 285 km
Credit: ESA/Rosetta/MPS for OSIRIS Team MPS/UPD/LAM/IAA/SSO/INTA/UPM/DASP/IDA

They are still dreaming of a ***dirty snowball*** whilst looking at the "**sand dunes**" **on Comet 67P Churyumov-Gerasimenko.**

Stunning Rosetta Images Reveal Sand Dunes on Comet 67P Churyumov-Gerasimenko

Malaga Bay - The Moby Dick of Astronomy
https://malagabay.wordpress.com/2014/03/19/the-moby-dick-of-astronomy/

One of the stranger **mainstream obsessions** is that the water found on Earth is of an extraterrestrial origin and this **extraterrestrial water** was **brought to Earth by comets,** asteroids and meteors.

This strange obsession with cometary extraterrestrial water is difficult to understand given the wealth of modern contradictory information:

1986: Probes fail to locate surface water on Halley's comet.
1994: No volatile gases were observed when comet Shoemaker-Levy 9 broke apart.
2000: The debris of the disintegrated Comet Linear revealed virtually no water.
2001: Flyby of Comet Borrelly detected no frozen water on its surface.
2004: Flyby of Comet Wild 2 did not find a trace of water on the surface.
2005: Deep Impact on comet 9P/Tempel only showed "weak emission from water vapour".

Evidently, the mainstream still runs hot over cometary extraterrestrial water long after Deep Impact falsified their "dirty snowball" cometary theory.

Strangely, the mainstream seems to run cold whenever planetary outgassing is mentioned as a source of planetary water.

Malaga Bay - Running Hot and Cold Extraterrestrial Water
https://malagabay.wordpress.com/2013/02/26/running-hot-and-cold-extraterrestrial-water/

Earth's atmosphere and **oceans were** formed by volcanic activity and outgassing.[43] Water vapor from these sources condensed into the oceans, **augmented by water and ice from asteroids, protoplanets, and comets.**

Wikipedia - Earth
https://en.wikipedia.org/wiki/Formation_of_the_Earth#After_formation

The evidence suggests Fred Whipple failed to grasp ***meteor showers*** **rain down dust and debris instead of extraterrestrial water.**

Leonids - Prolific meteor shower associated with the comet Tempel-Tuttle

The **Leonids** … prolific **annual meteor shower** associated with the **comet Tempel–Tuttle**, and are also known for their **spectacular** meteor storms that occur about **every 33 years** …

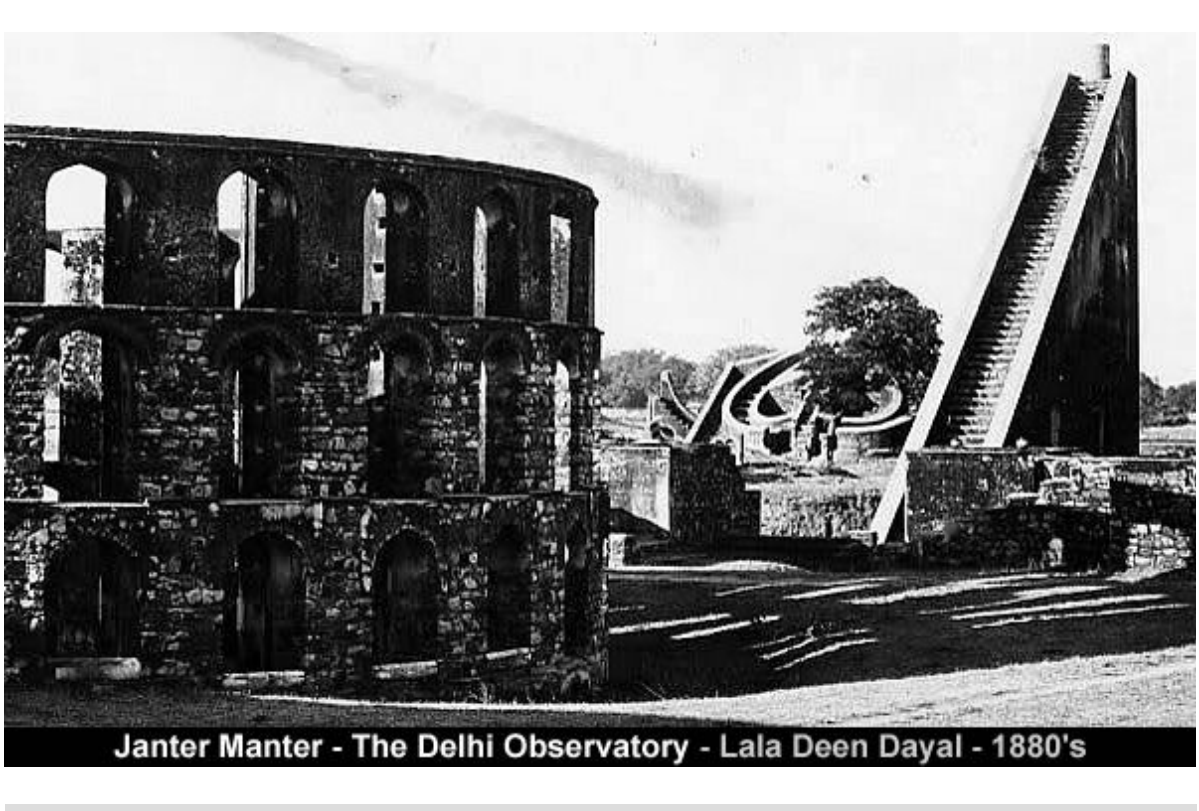
Wikipedia - Leonids
https://en.wikipedia.org/wiki/Leonids
Wikipedia - 55P/Tempel–Tuttle
https://en.wikipedia.org/wiki/55P/Tempel%E2%80%93Tuttle

Perseids Meteor Shower
Bolide station PFN32 Chelm, Poland - 11/12 August 2016
Comet and Meteor Laboratory - M Maciejewski

The **Perseids** are a prolific meteor shower … visible from mid-July to late-August.
…
The **stream of debris** … stretches along the [133 year] orbit of the **comet Swift–Tuttle**.

Wikipedia - Perseids
https://en.wikipedia.org/wiki/Perseids
Wikipedia - Comet Swift–Tuttle
https://en.wikipedia.org/wiki/Comet_Swift%E2%80%93Tuttle

It appears Fred Whipple placed his beliefs before observational evidence.

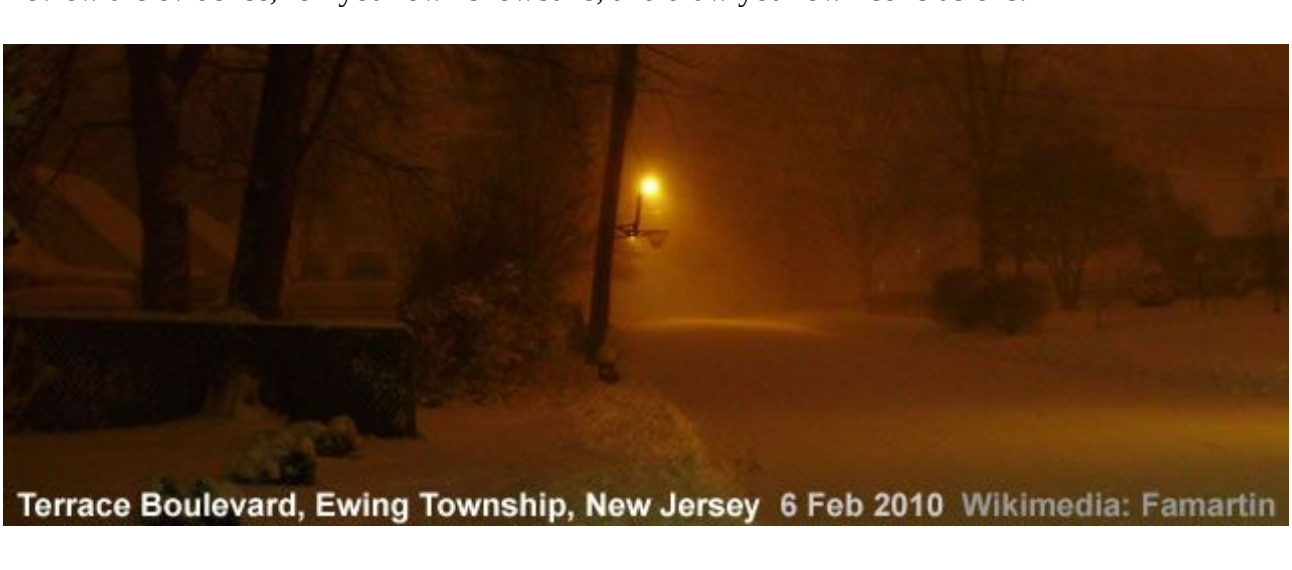


Janter Manter - The Delhi Observatory - Lala Deen Dayal - 1880's

The Observatory at Delhi
Prof. Emerita Frances W. Pritchett, Columbia University
https://franpritchett.com/00routesdata/1700_1799/jaipur/delhijantarearly/delhijantarearly.html
Wikipedia - Jantar Mantar
https://en.wikipedia.org/wiki/Jantar_Mantar

As always:

Review the evidence, roll your own snowballs, and draw your own conclusions.



Terrace Boulevard, Ewing Township, New Jersey 6 Feb 2010 Wikimedia: Famartin