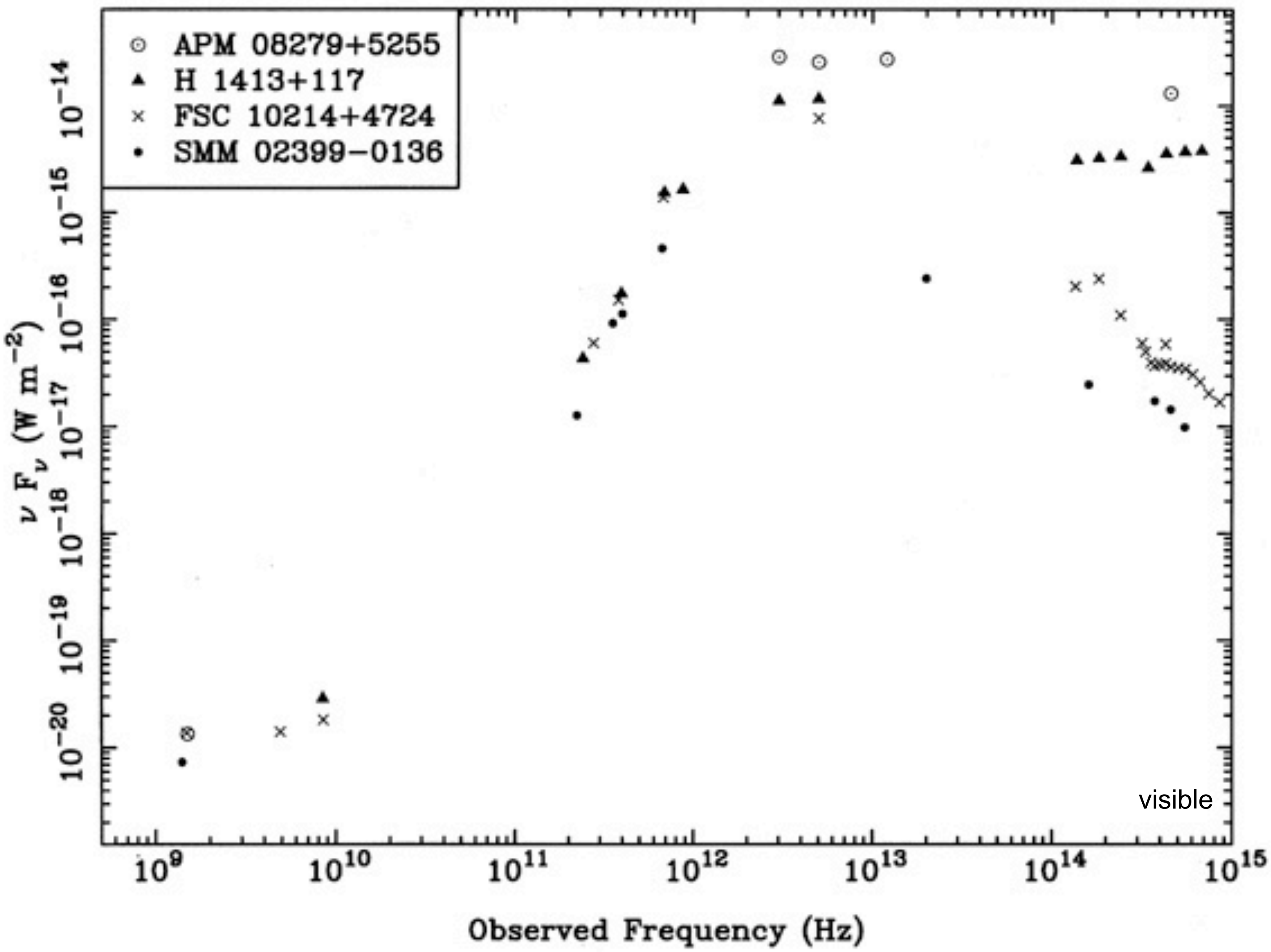
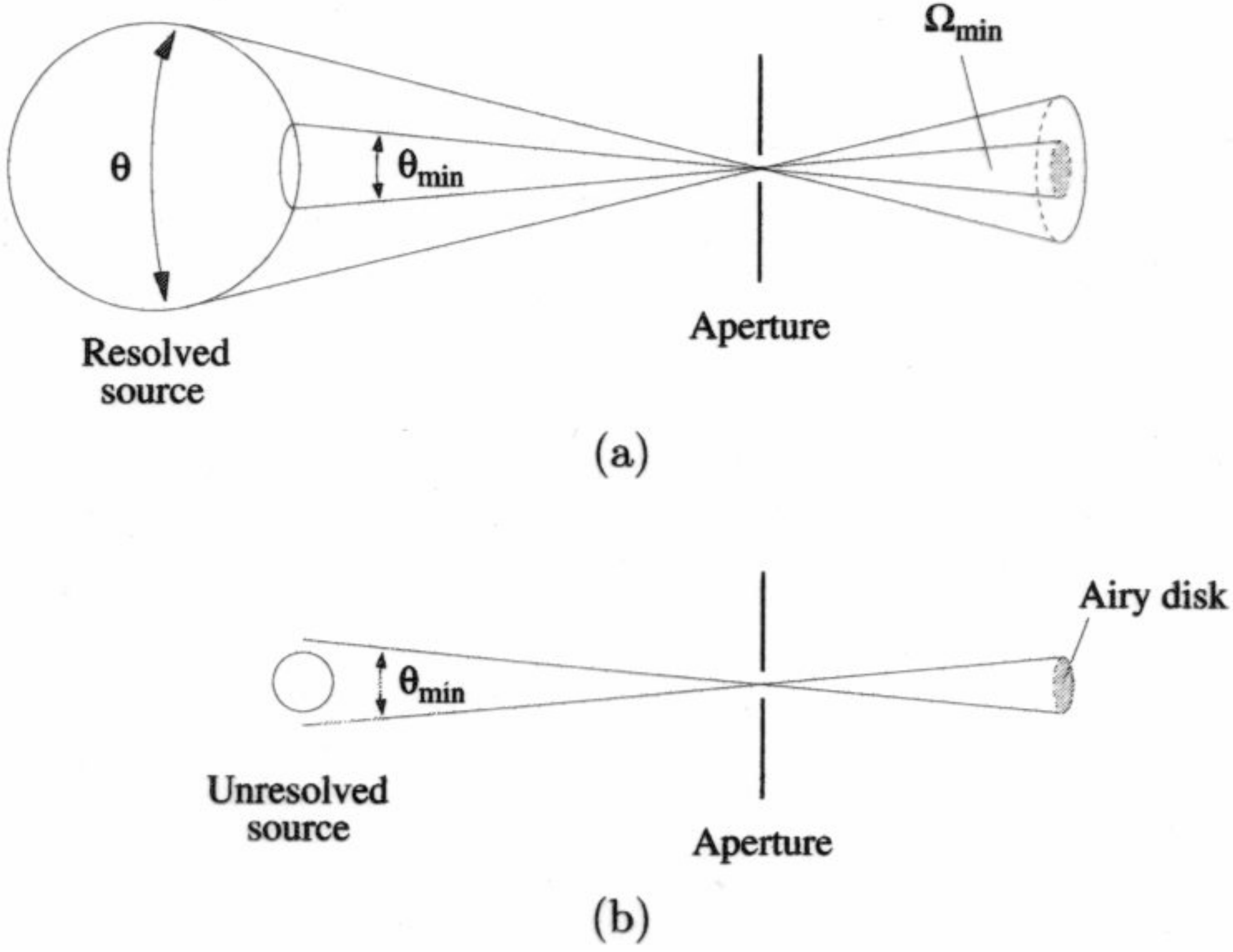
De l'utilité de définir 1 Jansky = 10^{-26} W m^{-2} Hz^{-1}:*Spectral energy distribution of the quasar APM 08279+5255 (z=3.87) compared to the ultra-luminous galaxies IRAS FSC 10214+4724 (z=2.29), SMM 02399-0136 (z=2.8), and H 1413+11 (z=2.56)***.**



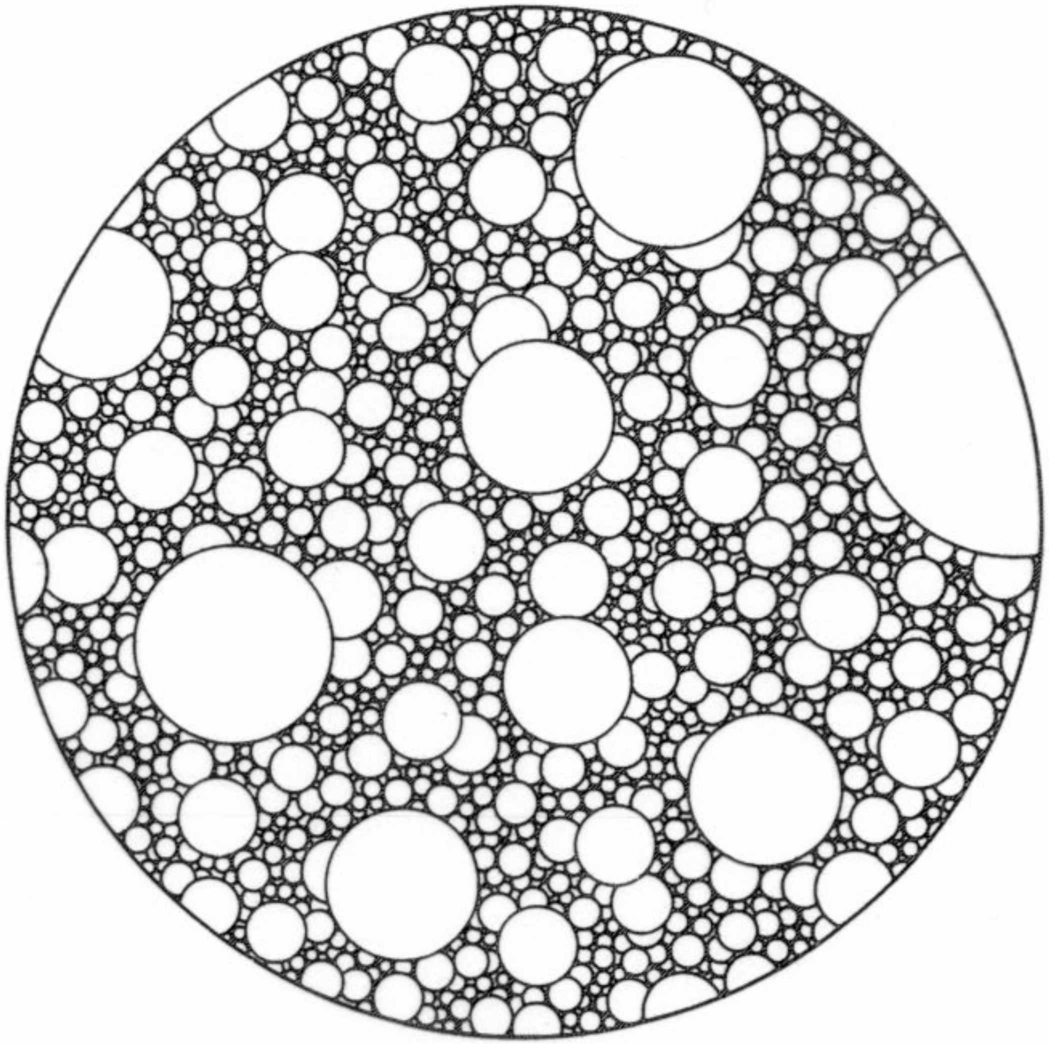
M J Irwin et al, 1998, "APM 08279+5255: an ultraluminous broad absorption line quasar at a redshift z=3.87", Astrophys J, 505, 529

L’intensité spécifique dans le cas d’une étoile résolue ou non résolue



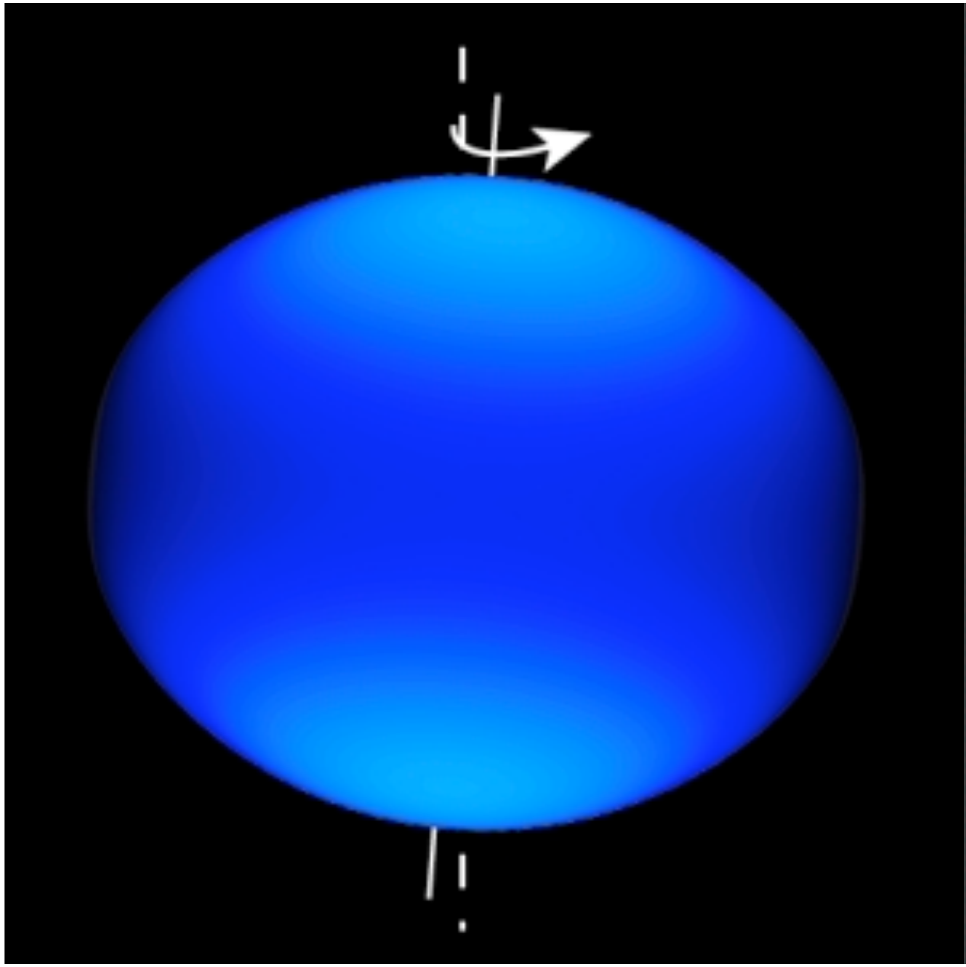
Invariance de l'intensité spécifique: l'implication cosmologique…

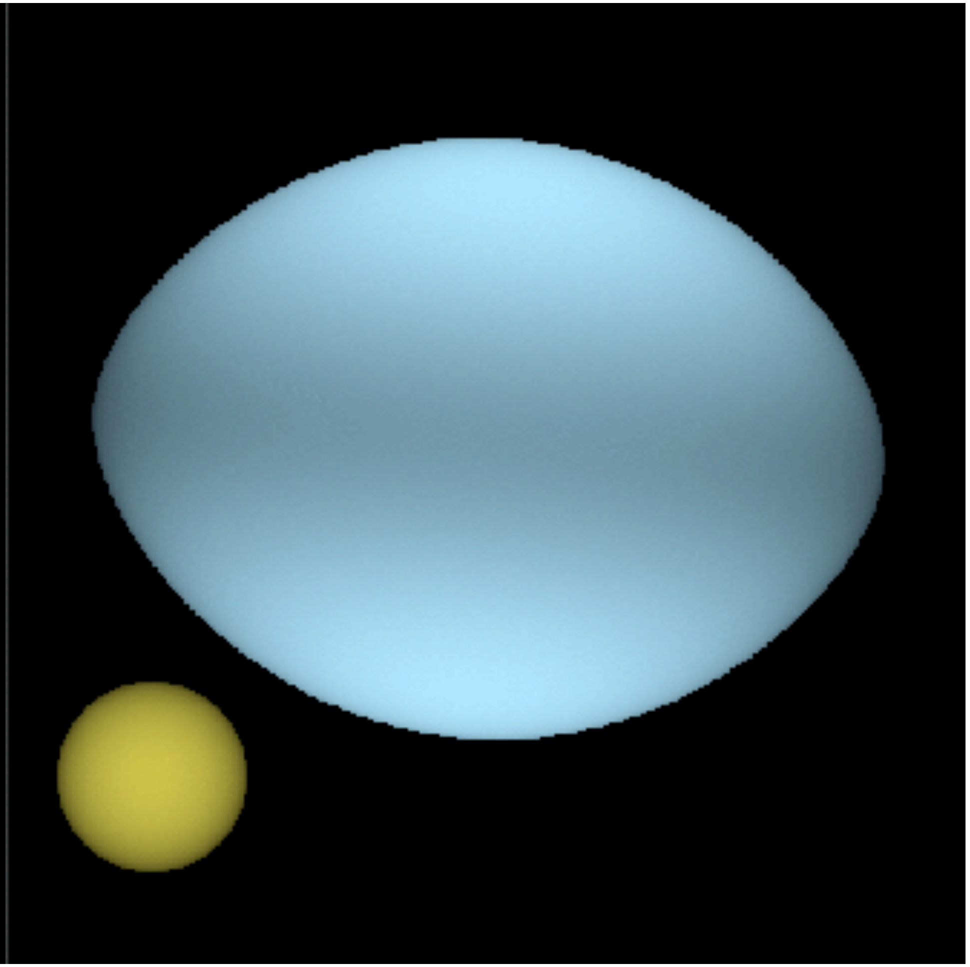
Pourquoi le ciel est-il sombre la nuit ?



Une étoile en rotation rapide:
modèle théorique de Vega vue
« equator-on »

Une étoile B en rotation
encore plus rapide (comparée au
Soleil)

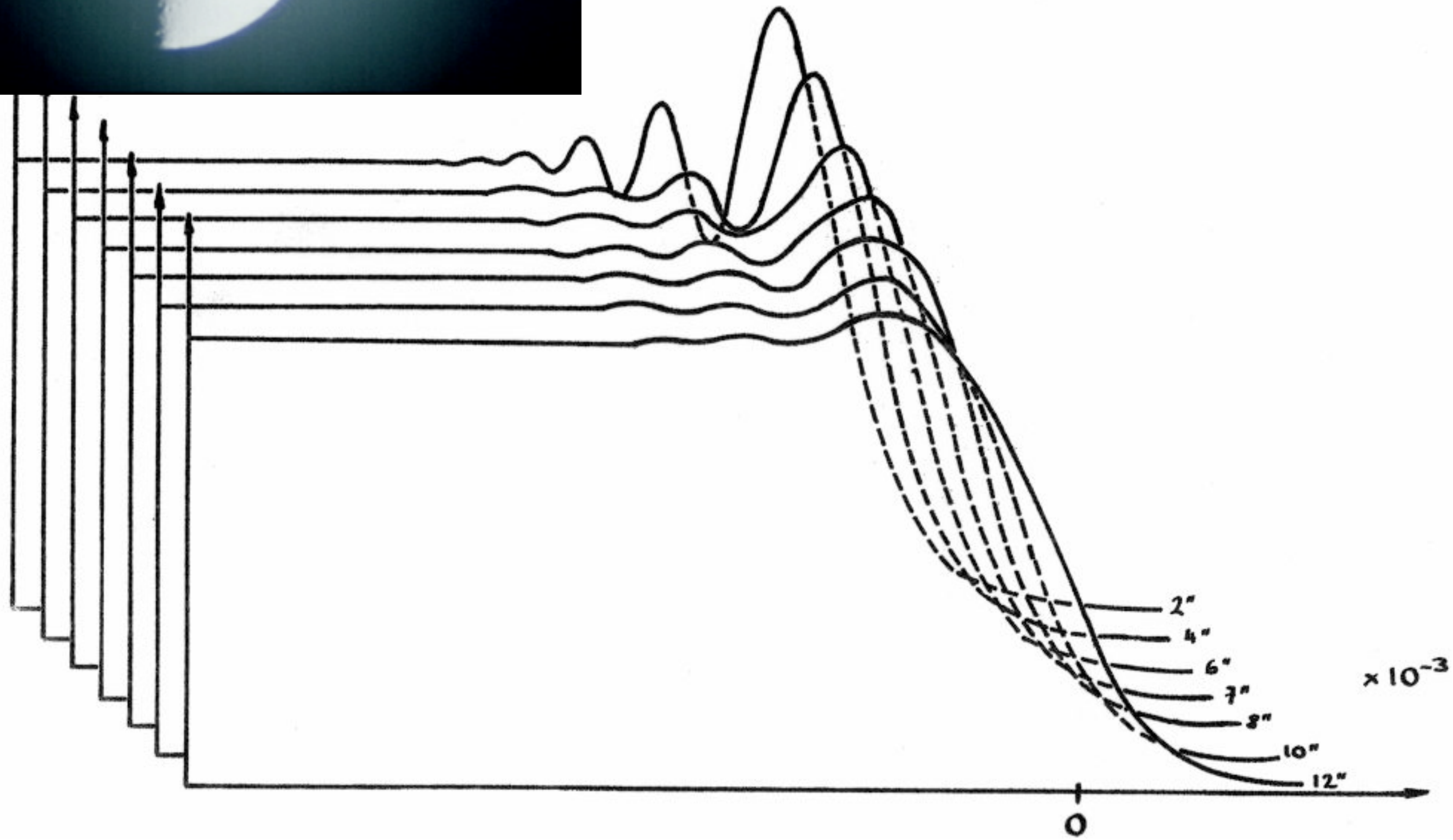


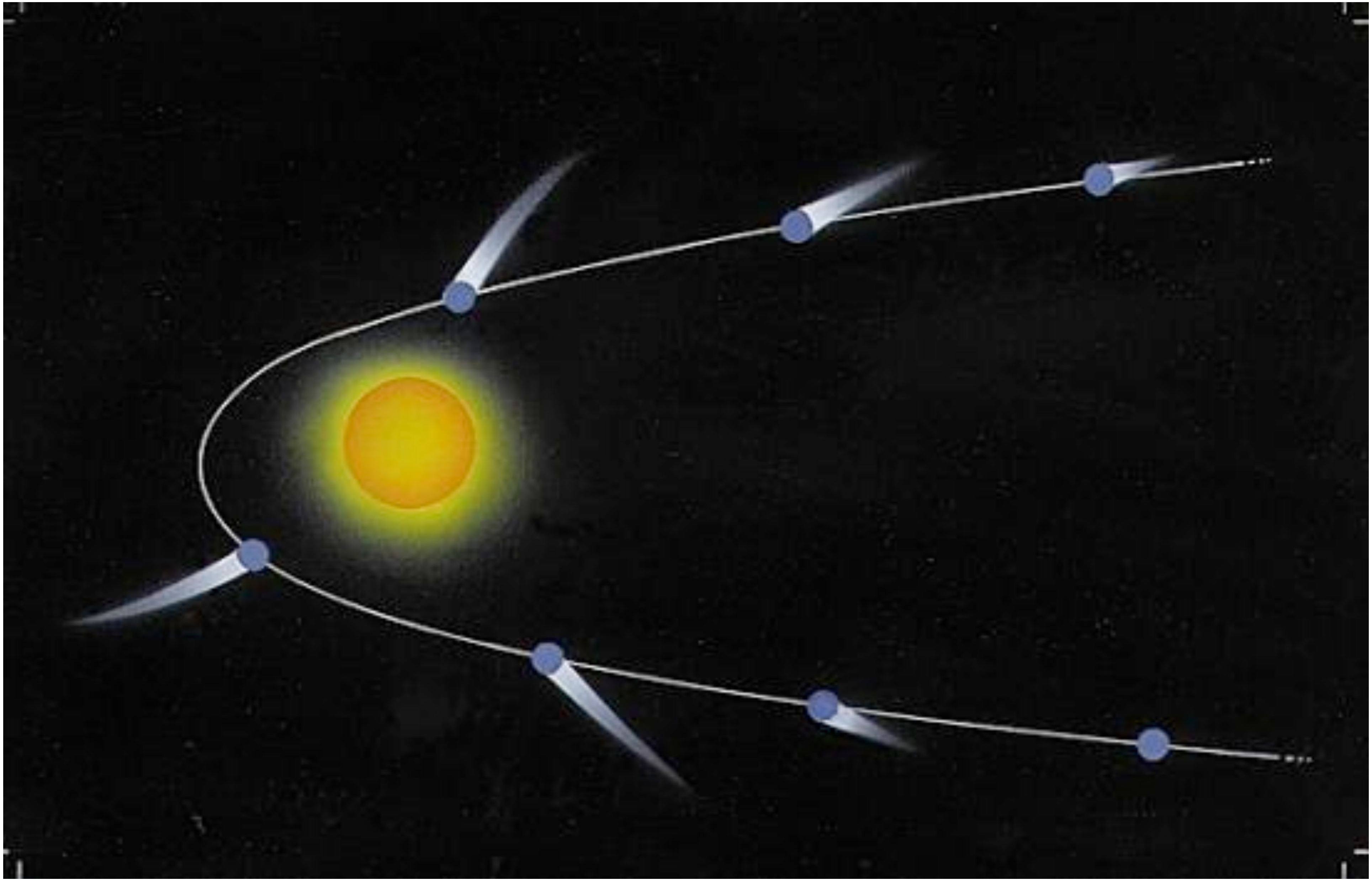


Les limites de l'approximation sphérique

Comment mesurer les diamètres apparents stellaires?

Une méthode: occultations d'étoiles par la lune



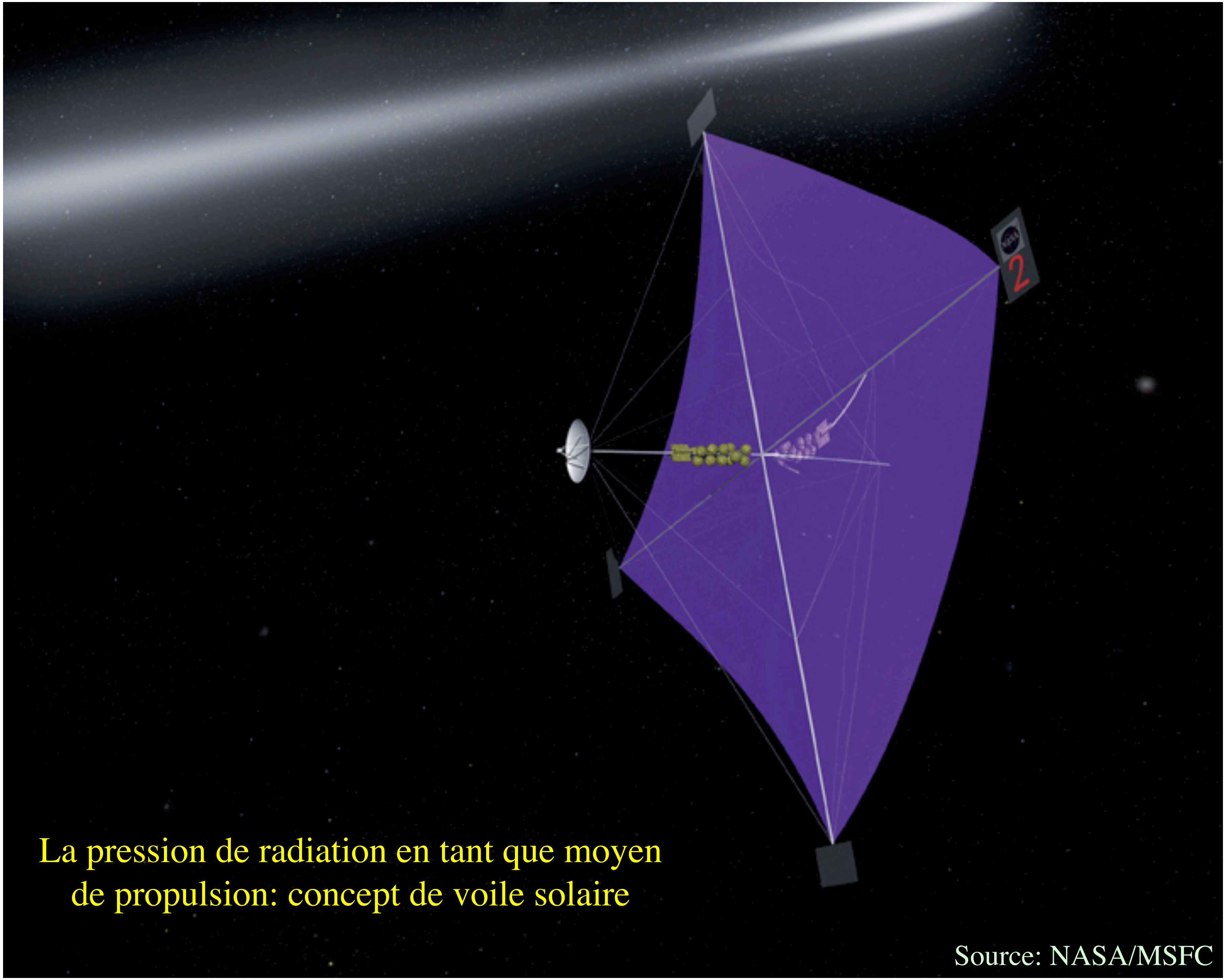


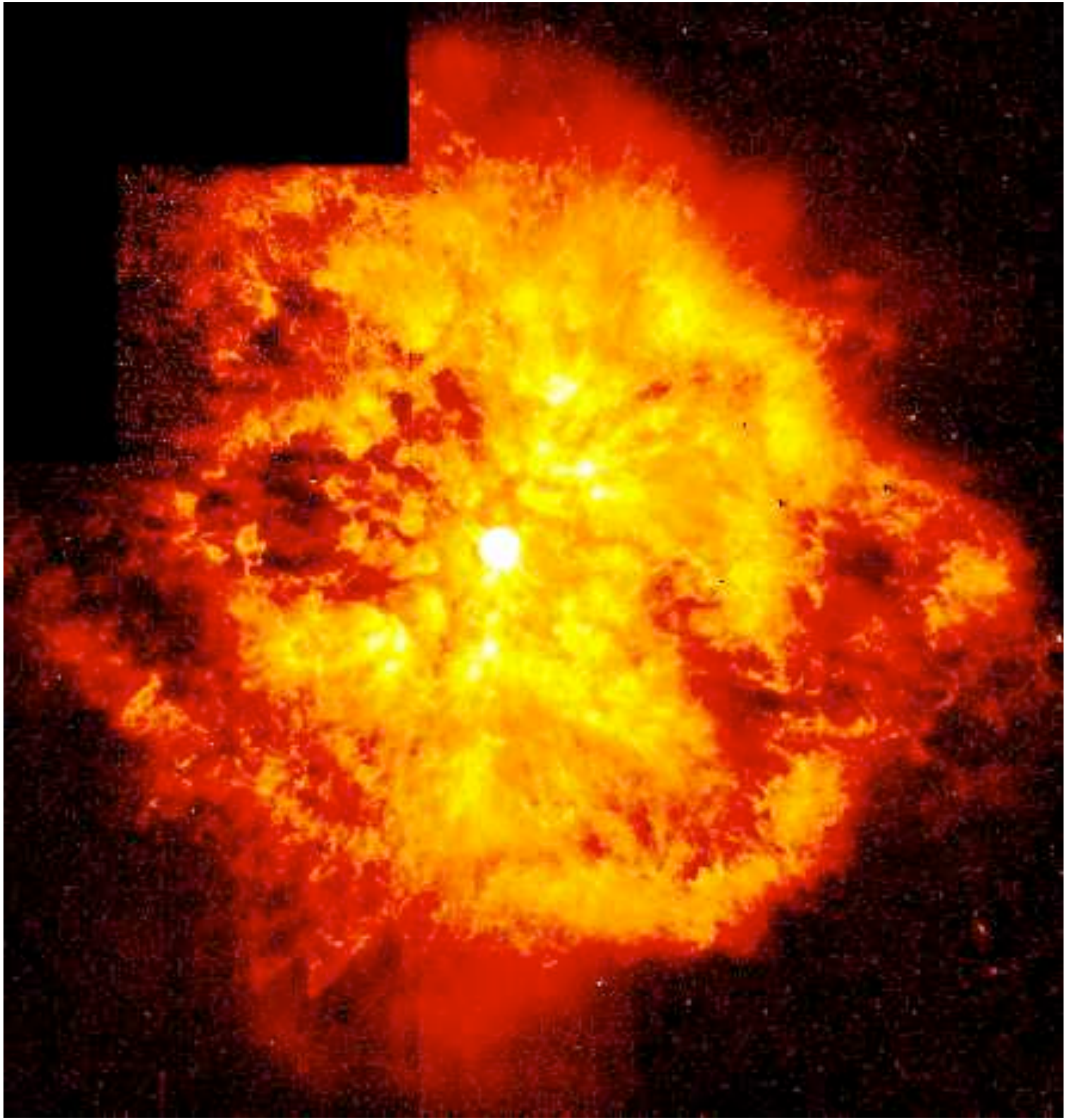
Source: jdc-meteorite.e-monsite.com

Un effet de la pression de radiation solaire: queue de poussière des comètes

Un effet de la pression de radiation solaire: queue de poussière de la Comète Hale-Bopp, 7.04.1997 (photo N. Cramer)

Autre exemple: queue de poussière de la comète McNaught, 20.01.2007


La pression de radiation en tant que moyen
de propulsion: concept de voile solaire
Source: NASA/MSFC



Autre exemple d'un effet de pression de radiation:
perte de masse d'une étoile très massive.

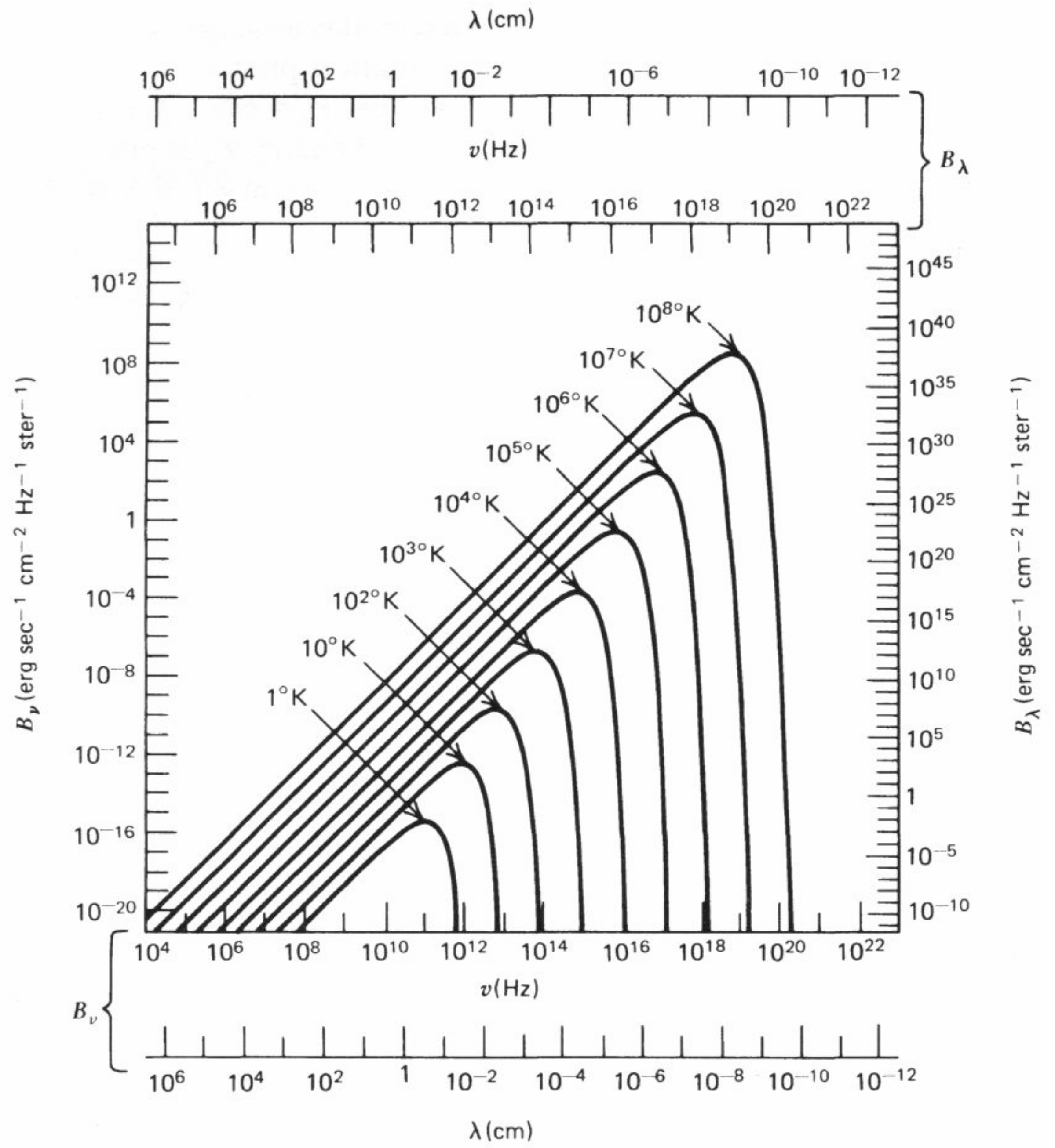
Etoile WR 124 et nébuleuse M1-67
(fausses couleurs)

(source:
Astronomy Picture Of the Day, 9.11. 1998)

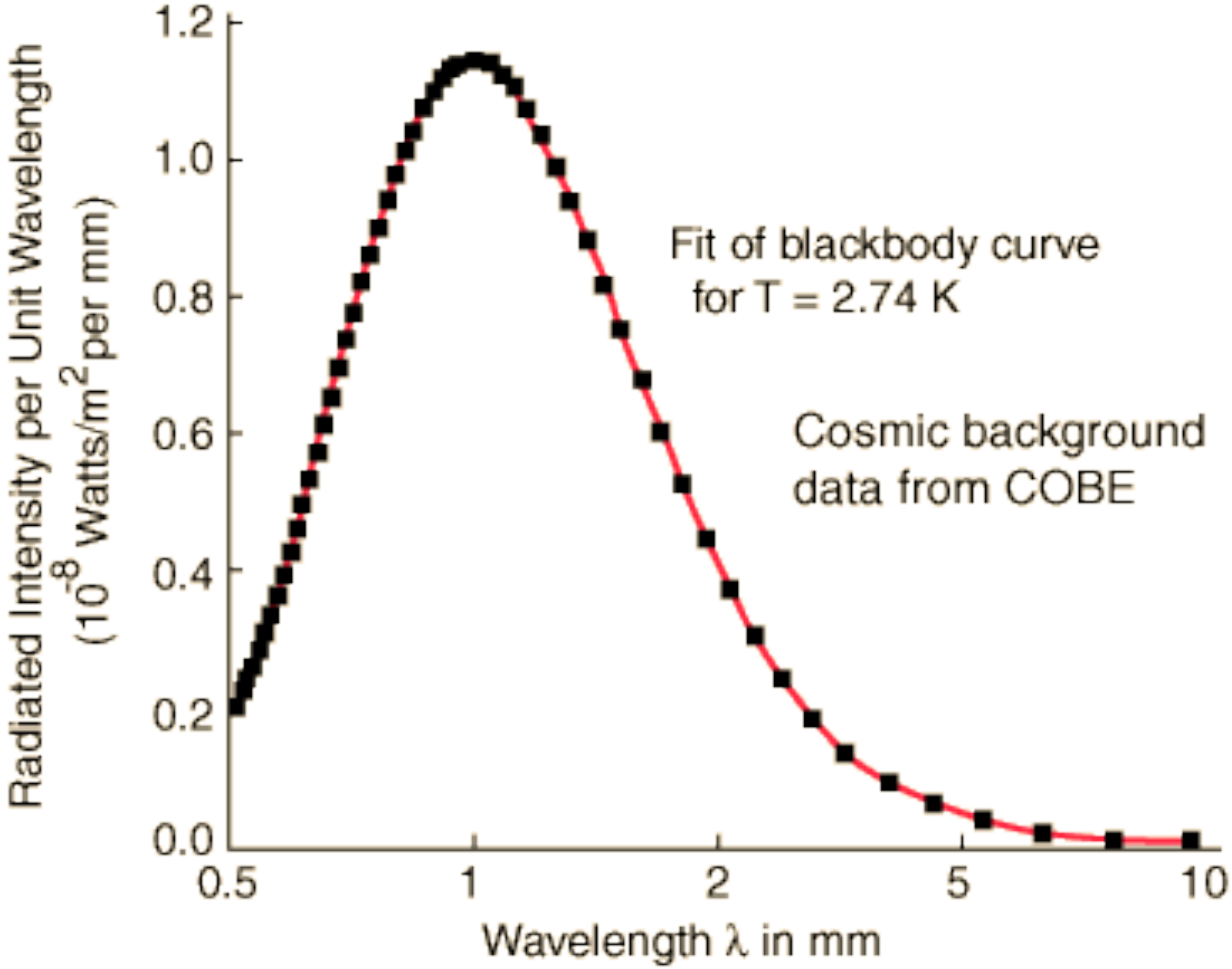
http://antwrp.gsfc.nasa.gov/apod/ap981109.html

WR 136 and the crescent nebula, NGC 6888 (APOD 15.09.2009)

La fonction de Planck



Exemple quasi parfait de corps noir en astrophysique: le rayonnement fossile du Big Bang selon le satellite COBE



M31 en UV (192.8, 224.6 & 260 nm): satellite Swift

M31 en lumière visible

Article de Penzias & Wilson
1965

(découverte du CMB)

high pressure, such as the zero-mass scalar, capable of speeding the universe through the period of helium formation. To have a closed space, an energy density of 2×10^{-29} gm/cm^3 is needed. Without a zero-mass scalar, or some other "hard" interaction, the energy could not be in the form of ordinary matter and may be presumed to be gravitational radiation (Wheeler 1958).

One other possibility for closing the universe, with matter providing the energy content of the universe, is the assumption that the universe contains a net electron-type neutrino abundance (in excess of antineutrinos) greatly larger than the nucleon abundance. In this case, if the neutrino abundance were so great that these neutrinos are degenerate, the degeneracy would have forced a negligible equilibrium neutron abundance in the early, highly contracted universe, thus removing the possibility of nuclear reactions leading to helium formation. However, the required ratio of lepton to baryon number must be $> 10^9$.

We deeply appreciate the helpfulness of Drs. Penzias and Wilson of the Bell Telephone Laboratories, Crawford Hill, Holmdel, New Jersey, in discussing with us the result of their measurements and in showing us their receiving system. We are also grateful for several helpful suggestions of Professor J. A. Wheeler.

R. H. Dicke
P. J. E. Peebles
P. G. Roll
D. T. Wilkinson

May 7, 1965
Palmer Physical Laboratory
Princeton, New Jersey

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——— 1964, in *Relativity, Groups and Topology*, ed C. DeWitt and B. DeWitt (New York: Gordon & Breach).
Zel'dovich, Ya. B. 1962, *Soviet Phys.—J.E.T.P.*, **14**, 1143.

A MEASUREMENT OF EXCESS ANTENNA TEMPERATURE AT 4080 Mc/s

Measurements of the effective zenith noise temperature of the 20-foot horn-reflector antenna (Crawford, Hogg, and Hunt 1961) at the Crawford Hill Laboratory, Holmdel, New Jersey, at 4080 Mc/s have yielded a value about 3.5° K higher than expected. This excess temperature is, within the limits of our observations, isotropic, unpolarized, and free from seasonal variations (July, 1964–April, 1965). A possible explanation for the observed excess noise temperature is the one given by Dicke, Peebles, Roll, and Wilkinson (1965) in a companion letter in this issue.

The total antenna temperature measured at the zenith is 6.7° K of which 2.3° K is due to atmospheric absorption. The calculated contribution due to ohmic losses in the antenna and back-lobe response is 0.9° K.

The radiometer used in this investigation has been described elsewhere (Penzias and Wilson 1965). It employs a traveling-wave maser, a low-loss (0.027-db) comparison switch, and a liquid helium–cooled reference termination (Penzias 1965). Measurements were made by switching manually between the antenna input and the reference termination. The antenna, reference termination, and radiometer were well matched so that a round-trip return loss of more than 55 db existed throughout the measurement; thus errors in the measurement of the effective temperature due to impedance mismatch can be neglected. The estimated error in the measured value of the total antenna temperature is 0.3° K and comes largely from uncertainty in the absolute calibration of the reference termination.

The contribution to the antenna temperature due to atmospheric absorption was obtained by recording the variation in antenna temperature with elevation angle and employing the secant law. The result, 2.3° ± 0.3° K, is in good agreement with published values (Hogg 1959; DeGrasse, Hogg, Ohm, and Scovil 1959; Ohm 1961).

The contribution to the antenna temperature from ohmic losses is computed to be 0.8° ± 0.4° K. In this calculation we have divided the antenna into three parts: (1) two non-uniform tapers approximately 1 m in total length which transform between the $2\frac{1}{8}$-inch round output waveguide and the 6-inch-square antenna throat opening; (2) a double-choke rotary joint located between these two tapers; (3) the antenna itself. Care was taken to clean and align joints between these parts so that they would not significantly increase the loss in the structure. Appropriate tests were made for leakage and loss in the rotary joint with negative results.

The possibility of losses in the antenna horn due to imperfections in its seams was eliminated by means of a taping test. Taping all the seams in the section near the throat and most of the others with aluminum tape caused no observable change in antenna temperature.

The backlobe response to ground radiation is taken to be less than 0.1° K for two reasons: (1) Measurements of the response of the antenna to a small transmitter located on the ground in its vicinity indicate that the average back-lobe level is more than 30 db below isotropic response. The horn-reflector antenna was pointed to the zenith for these measurements, and complete rotations in azimuth were made with the transmitter in each of ten locations using horizontal and vertical transmitted polarization from each position. (2) Measurements on smaller horn-reflector antennas at these laboratories, using pulsed measuring sets on flat antenna ranges, have consistently shown a back-lobe level of 30 db below isotropic response. Our larger antenna would be expected to have an even lower back-lobe level.

From a combination of the above, we compute the remaining unaccounted-for antenna temperature to be 3.5° ± 1.0° K at 4080 Mc/s. In connection with this result it should be noted that DeGrasse *et al.* (1959) and Ohm (1961) give total system temperatures at 5650 Mc/s and 2390 Mc/s, respectively. From these it is possible to infer upper limits to the background temperatures at these frequencies. These limits are, in both cases, of the same general magnitude as our value.

We are grateful to R. H. Dicke and his associates for fruitful discussions of their results prior to publication. We also wish to acknowledge with thanks the useful comments and advice of A. B. Crawford, D. C. Hogg, and E. A. Ohm in connection with the problems associated with this measurement.

Note added in proof.—The highest frequency at which the background temperature of the sky had been measured previously was 404 Mc/s (Pauliny-Toth and Shakeshaft 1962), where a minimum temperature of 16° K was observed. Combining this value with our result, we find that the average spectrum of the background radiation over this frequency range can be no steeper than $\lambda^{0\,7}$. This clearly eliminates the possibility that the radiation we observe is due to radio sources of types known to exist, since in this event, the spectrum would have to be very much steeper.

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R. W. WILSON

May 13, 1965
BELL TELEPHONE LABORATORIES, INC
CRAWFORD HILL, HOLMDEL, NEW JERSEY

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ERRATUM

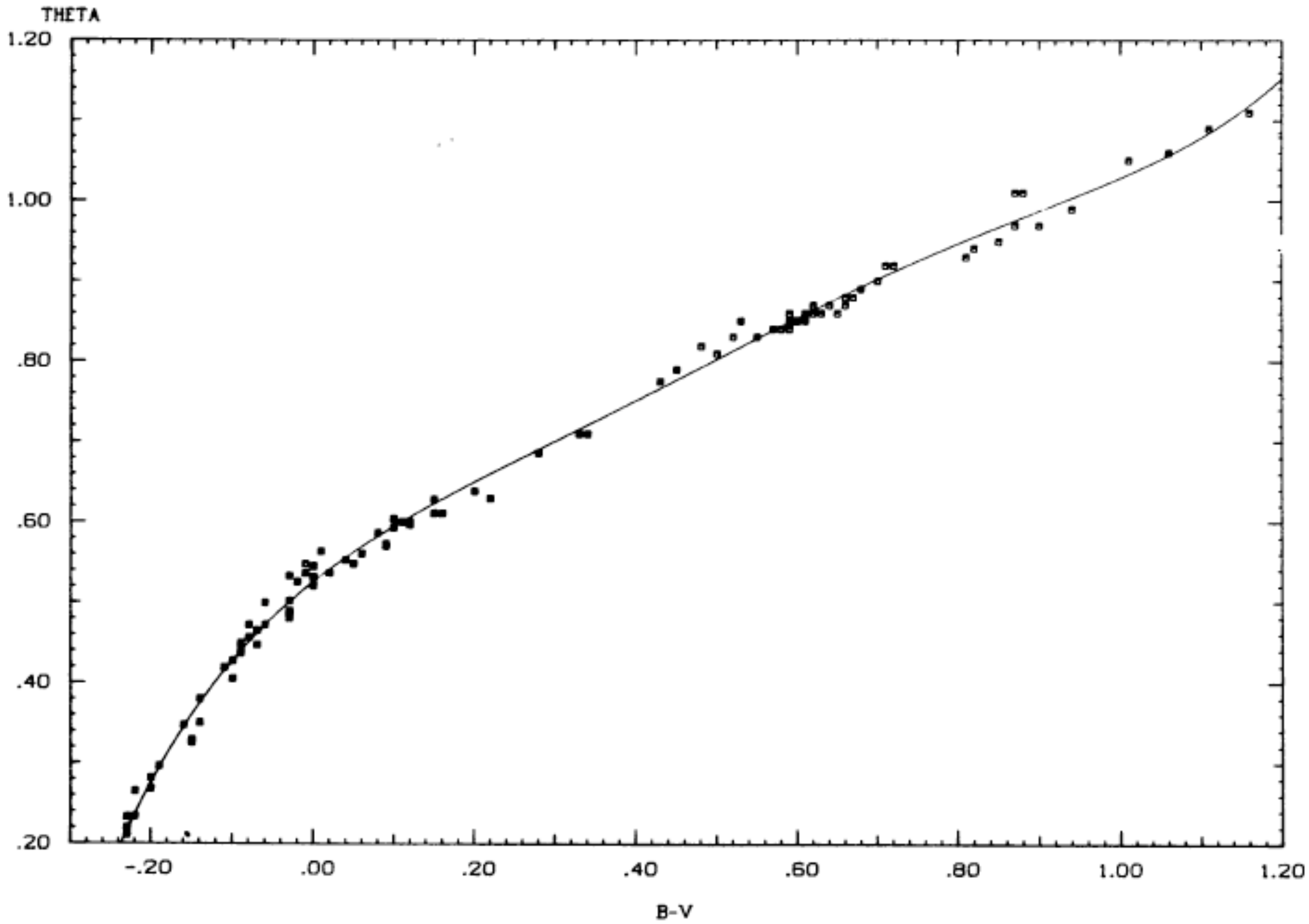
In the paper "Stellar Evolution. I. The Approach to the Main Sequence" (*Ap. J.*, **141**, 993), the following corrections are to be made: page 993, line 1, replace "popuation" by "population"; page 997, line 18, delete the last word "energy"; page 999, line 2, replace "expanding" by "contracting"; page 1007, section heading VI—replace "8" by "9"; page 1007, line 1, replace "Figure 12" by "Figure 17"; page 1017, line 5, replace "equation (19)" by "equation (B9)"; page 1018, line 6, replace "W. Z. Fowler" by "W. A. Fowler."

ICKO IBEN, JR.

June 7, 1965
MASSACHUSETTS INSTITUTE
OF TECHNOLOGY

Article de Penzias & Wilson 1965 (suite)

Relation $\theta_{eff} = 5040/T_{eff}$ vs indice de couleur B-V



La température d'équilibre de la Terre

E

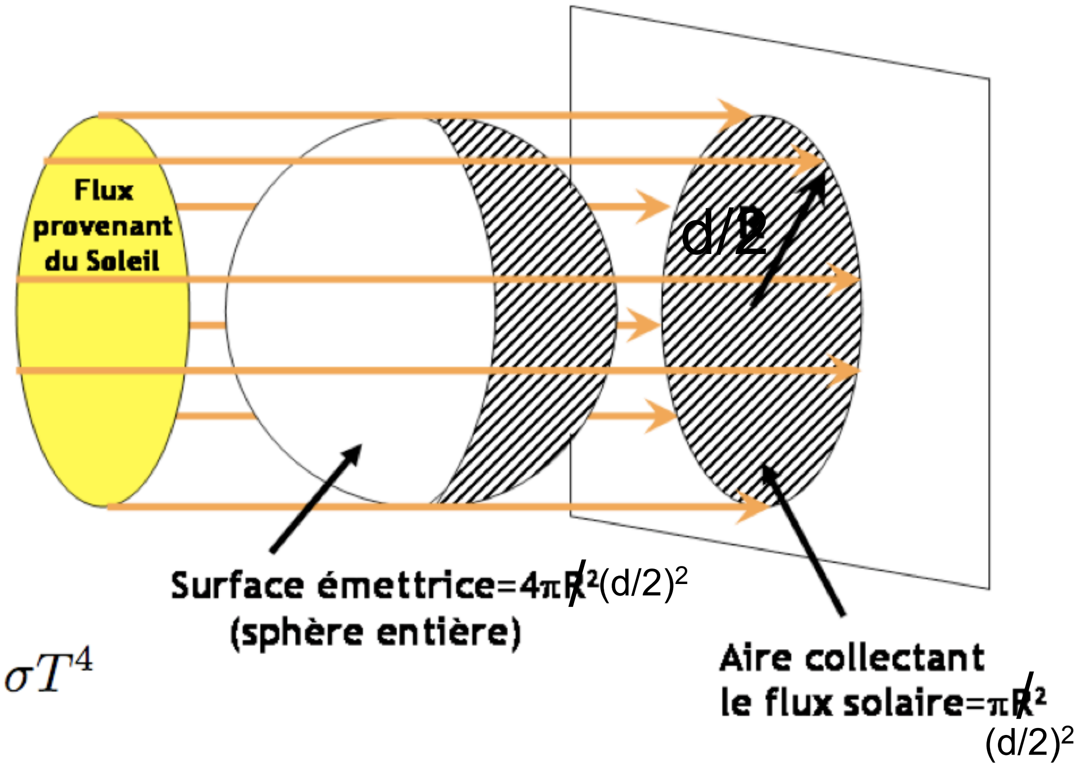
↓

$$\frac{L}{4\pi D^2}\pi\left(\frac{d}{2}\right)^2 = \frac{4\pi R^2\sigma T_{\rm eff}^4}{4\pi D^2}\pi\left(\frac{d}{2}\right)^2$$

$$= \left(\frac{R}{D}\right)^2 \sigma T_{\rm eff}^4 \pi \left(\frac{d}{2}\right)^2 .$$

↑

Énergie reçue par la Terre



Énergie émise par la Terre: $4\pi\left(\frac{d}{2}\right)^2 \sigma T^4$

A l'équilibre:

$$4\pi\left(\frac{d}{2}\right)^2 \sigma T^4 = \left(\frac{R}{D}\right)^2 \sigma T_{\rm eff}^4 \pi \left(\frac{d}{2}\right)^2 \Rightarrow T^4 = \frac{1}{4}\left(\frac{R}{D}\right)^2 T_{\rm eff}^4 \Longrightarrow T = \left(\frac{\Delta\Omega}{4\pi}\right)^{1/4} T_{\rm eff}$$

On obtient une valeur trop basse de ~33 degrés!

La température d’équilibre de la Terre (suite)

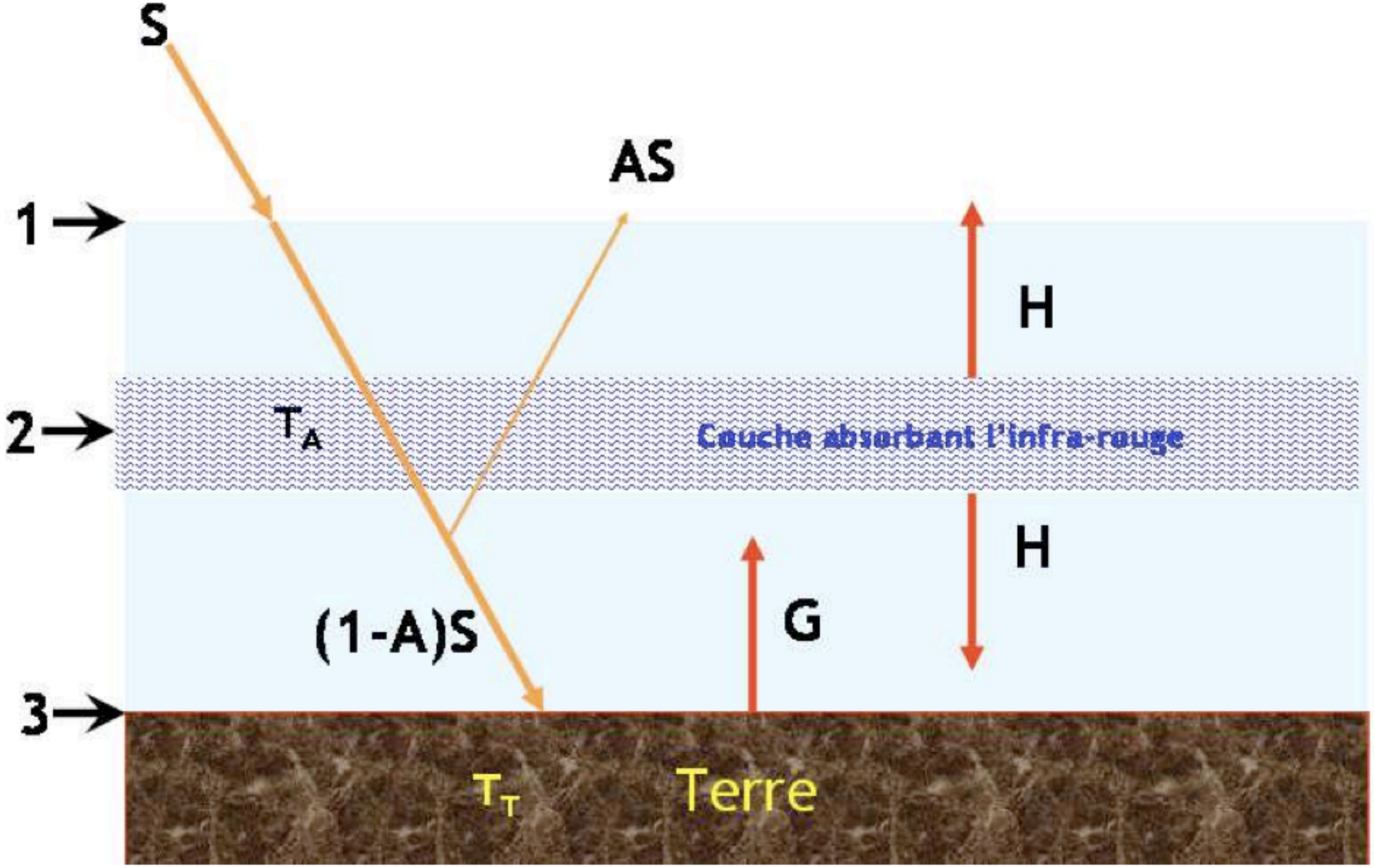
Effet de serre:

1) $(1\text{-}A)S\pi R^2 = H 4\pi R^2 \rightarrow H = (1\text{-}A)S/4$

2) $2H = G \rightarrow \sigma(T_A)^4 8\pi R^2 = \sigma(T_T)^4 4\pi R^2 \rightarrow 2\sigma(T_A)^4 = \sigma(T_T)^4$

3) $(1\text{-}A)S\pi R^2 + H 4\pi R^2 = \sigma(T_T)^4 4\pi R^2 \rightarrow \frac{1}{2}(1\text{-}A)S = \sigma(T_T)^4$ (idem 2)

Avec $A=0.3$, $S=1370\ W/m^2$, $\sigma=5.67\ 10^{-8}\ W/(m^2\ K^4)$ → T_A–255 K–18 C, T_T–303 K–30 C



Concept de zone d'habitabilité