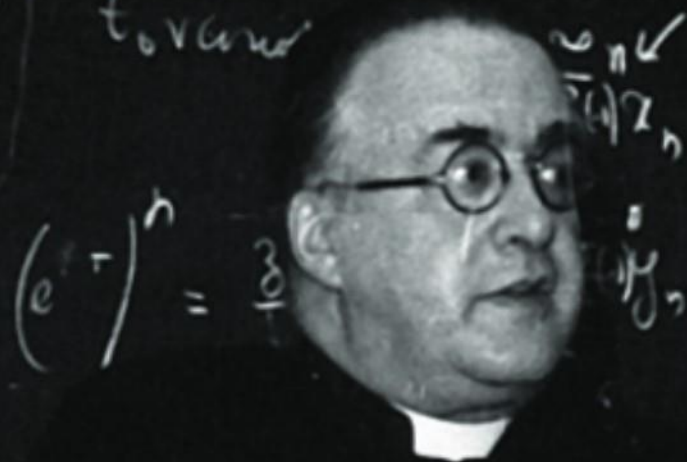


# Hubble law → Hubble-Lemaitre law?



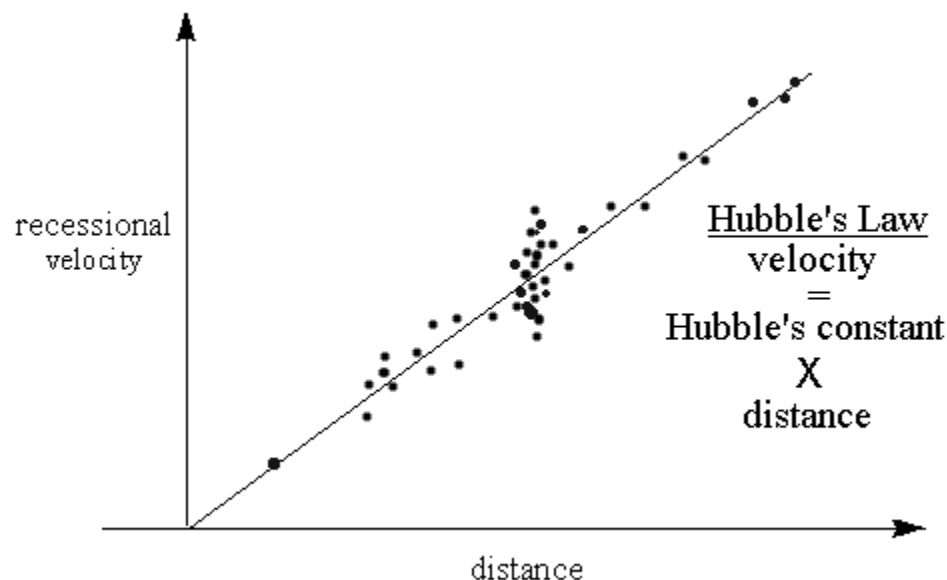
**THIRTIETH GENERAL ASSEMBLY**  
**RESOLUTIONS PRESENTED TO THE XXXth GENERAL ASSEMBLY**

**RESOLUTION B4**

on a suggested renaming of the Hubble Law

*Proposed by the IAU Executive Committee*

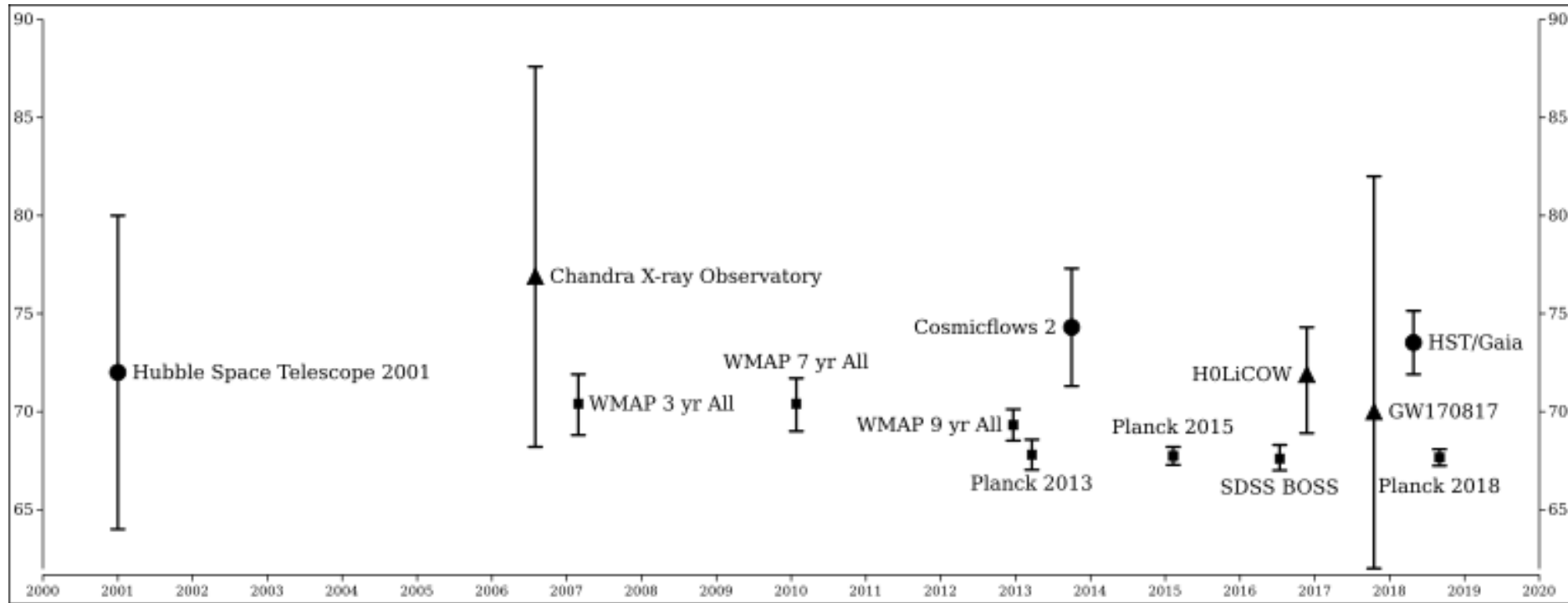
Hubble provided evidence that the **recessional velocity** of a galaxy increases with its distance from the earth, a property now known as "**Hubble's law**", despite the fact that it had been both proposed and demonstrated observationally two years earlier by **Georges Lemaître**.<sup>[10]</sup> Hubble's Law implies that the universe is expanding.<sup>[11]</sup> A



# Hubble constant prior to 1996

prior to 1996	50-90 (est.)		[47]	
early 1970s	~55 (est.)	Allan Sandage and <a href="#">Gustav Tammann</a>	[48]	
1958	75 (est.)	<a href="#">Allan Sandage</a>	[49]	This was the first good estimate of $H_0$ , but it would be decades before a consensus was achieved.
1956	180	<a href="#">Humason, Mayall and Sandage</a>	[48]	
1929	500	<a href="#">Edwin Hubble, Hooker telescope</a>	[50][48][51]	
1927	625	<a href="#">Georges Lemaître</a>	[52]	First measurement and interpretation as a sign of the <a href="#">expansion of the universe</a>

# Hubble constant in recent years



# THIRTIETH GENERAL ASSEMBLY

## RESOLUTIONS PRESENTED TO THE XXX<sup>th</sup> GENERAL ASSEMBLY

### RESOLUTION B4

**on a suggested renaming of the Hubble Law**

*Proposed by the IAU Executive Committee*

The XXX General Assembly of the International Astronomical Union,

**considering**

1. that the discovery of the apparent recession of the galaxies, which is usually referred to as the “Hubble law”, is one of the major milestones in the development of the science of Astronomy during the last 100 years and can be considered one of the founding pillars of modern Cosmology;

2. that the Belgian astronomer Georges Lemaître, in 1927 published (in French) the paper entitled “*Un Univers homogène de masse constante et de rayon croissant rendant compte de la vitesse radiale des nébuleuses extra-galactiques*” [1]. In this he first rediscovers Friedman’s dynamic solution to Einstein’s general relativity equations that describes an expanding universe. He also derives that the expansion of the universe implies the spectra of distant galaxies are redshifted by an amount proportional to their distance. Finally he uses published data on the velocities and photometric distances of galaxies to derive the rate of expansion of the universe (assuming the linear relation he had found on theoretical grounds);

3. that, at the time of publication, the limited popularity of the Journal in which Lemaître’s paper appeared and the language used made his remarkable discovery largely unperceived by the astronomical community;

4. that both Georges Lemaître (an IAU member since 1925 [2]) and the American astronomer Edwin Hubble (an IAU member since 1922 [3]) attended the 3rd IAU General Assembly in Leiden in July 1928 and exchanged views [4] about the relevance of the redshift vs distance observational data of the extragalactic nebulae to the emerging evolutionary model of the universe;

5. that Edwin Hubble, in 1929 published the paper entitled “*A Relation between Distance and Radial Velocity among Extra-Galactic Nebulae*” [5] in which he proposed and derived

# Hubble Law or Hubble-Lemaître Law? The IAU Resolution

Helge Kragh\*

Resolution B4 argues its case primarily from considerations based on the history of cosmology, stating among the aims of the resolution not only “to honour the intellectual integrity of Georges Lemaître” but also “to inform the future scientific discourses with historical facts.” The resolution consequently lists a number of such relevant facts or what are claimed to be facts. It is on the basis of the historical material appended to the resolution that the General Assembly supported it, and it is on the same basis that the astronomers will cast their electronic votes. It appears to me that at least some of the appended historical considerations are of dubious validity and hence that they provide a questionable and even illegitimate background for the voting. If the IAU wants to set “the historical record straight” – and this is what the General Assembly says in its electronic newspaper – the result is remarkably poor.

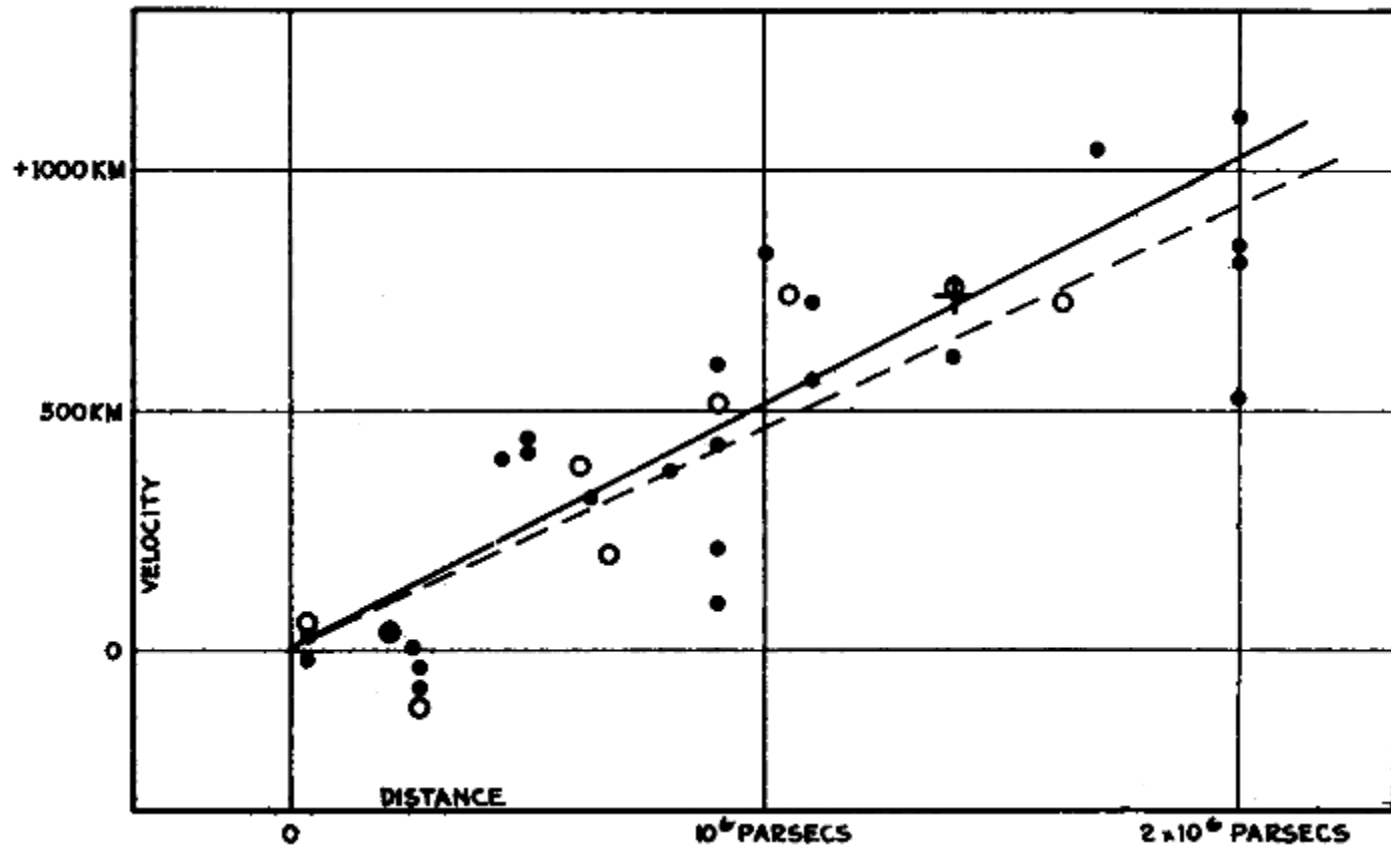
First, with regard to the name “Hubble law” it is not quite clear what the resolution refers to, as it seems to mix up the original Hubble law with later usage of the term. The resolution refers correctly to Hubble’s “discovery of the apparent recession of the galaxies” but then switches to its current usage as an expression of the cosmic expansion. What became the Hubble law was established by Hubble in

It is worth mentioning that until about 1960 Humason’s name often appeared together with Hubble’s and that the term “Hubble-Humason law” can be found in several books and articles. Remarkably, Lemaître was one of the very first to refer to “Hubble’s law,” which he unambiguously credited to the American astronomer and not to himself. In a book review of 1950 he mentioned his calculation of the expansion constant dating from 1927 and then continued, “Naturally, before the discovery and study of galactic clusters, there could be no question of establishing Hubble’s law, but only to determine the coefficient.”<sup>8</sup> That is, he indirectly suggested that whereas he had more than a share in Hubble’s constant, his role in the law was limited to a prediction without sufficient observational confirmation.



# Hubble (1929)

$$V_0 = K \times D$$



the values. For instance, let  $A = 277^\circ$ ,  $D = +36^\circ$  (Gal. long. =  $32^\circ$ , lat. =  $+18^\circ$ ),  $V_0 = 280$  km./sec.,  $K = +500$  km./sec. per million parsecs. Mr. Strömberg has very kindly checked the general order of these values by independent solutions for different groupings of the data.

# Lemaître (1927)

## UN UNIVERS HOMOGÈNE DE MASSE CONSTANTE ET DE RAYON CROISSANT, RENDANT COMPTE DE LA VITESSE RADIALE DES NÉBULEUSES EXTRA-GALACTIQUES

Note de M. l'Abbé G. LEMAITRE

A Homogeneous Universe of constant mass and increasing size,  
taking into account of the radial speed of extra-galactic nebulae

Utilisant les 42 nébuleuses figurant dans les listes de Hubble et de Strömberg <sup>(1)</sup>, et tenant compte de la vitesse propre du soleil (300 Km. dans la direction  $\alpha = 315^\circ$ ,  $\delta = 62^\circ$ ), on trouve une distance moyenne de 0,95 millions de parsecs et une vitesse radiale de 600 Km./sec, soit 625 Km./sec à  $10^6$  parsecs <sup>(2)</sup>.

Nous adopterons donc

$$\frac{R'}{R} = \frac{v}{rc} = \frac{625 \times 10^5}{10^6 \times 3,08 \times 10^{18} \times 3 \times 10^{10}} = 0,68 \times 10^{-27} \text{ cm}^{-1} \quad (24)$$

# At earlier times

**Vesto Melvin Slipher** ([/ˈslaɪfər/](#); November 11, 1875 - November 8, 1969) was an [American astronomer](#) who performed the first measurements of radial velocities for galaxies, providing the empirical basis for the expansion of the universe. <sup>[1][2][3][4]</sup>



[Edwin Hubble](#) is often incorrectly credited with discovering the redshift of galaxies; <sup>[8]</sup> these measurements and their significance were understood before 1917 by [James Edward Keeler](#) (Lick & Allegheny), Vesto Melvin Slipher (Lowell), and [William Wallace Campbell](#) (Lick) at other observatories.

Friedmann in 1922 introduced the idea of an expanding universe that contained moving matter; [Belgian astronomer Georges Lemaître](#) would later independently reach the same conclusion in 1927. <sup>[4]</sup>



## LOST IN TRANSLATION

The English translation of Lemaître's 1927 paper was published in the *Monthly Notices of the Royal Astronomical Society* in March 1931 (ref. 8). However, during the process, a few paragraphs from the original French version were deleted, notably the one in which Lemaître described Hubble's law and derived the expansion rate.

has suggested that the paragraphs may have been removed as part of standard editorial practice by the editor of the *Monthly Notices*.

Wanting to find out more, I examined original documents linked to the paper. With the help of Liliane Moens from the Archives Georges Lemaître in Louvain, Belgium, I obtained a copy of the letter sent by the then editor of the *Monthly Notices*, astronomer William Marshall Smart, to Georges Lemaître, concerning the translation and publication

Louvain, le 9 Mars 1931

Dear Dr. Smart

I highly appreciate the honour for me and for our society to have my 1927 paper reprinted by the Royal Astronomical Society. I send you a translation of the paper. I did not find advisable to reprint the provisional discussion of radial velocities which is clearly of no actual interest, and also the geometrical note, which could be replaced by a small bibliography of ancient and new papers on the subject. I join a French text with indication of the passages omitted in the translation. I made this translation as exact as I can, but I would be very glad if some of yours would be kind enough to read it and correct my English which I am afraid is rather rough. No formula is changed, and even the final suggestion which is not confirmed by recent work of mine has not been modified. I did not write again the table which may be printed from the French text.

As regards to addition on the subject, I just obtained the equations of the expanding universe by a new method which makes clear the influence of the condensations and the possible causes of the expansion. I would be very glad to have them presented to your society as a separate paper.

I would like very much to become a fellow of your society and would appreciate to be presented by Prof. Eddington and you.

If Prof. Eddington has yet a reprint of his May paper in M.N. I would be very glad to receive it.

Will you kind enough to present my best regards to professor Eddington

and believe

yours sincerely

G. Lemaître

Observatory,  
Cambridge

ROYAL ASTRONOMICAL SOCIETY,  
BURLINGTON HOUSE,  
LONDON, W.1.

17 February 1931

Dear Dr. Lemaître,

At the R.A.S. Council

meeting last Friday it was resolved to ask you if you would allow your paper "Un Univers homogène..." in *Annales de la Soc. Sci. de Bruxelles* to be reprinted in the *Monthly Notices*. It has been felt that it has not been translated as widely - or used as well as it should be - as its importance warrants specially in English speaking countries. The request of the Council is almost unanimous. The Society's annals and it shows you would the Society would appreciate the honor of giving your paper a prominent place amongst English speaking texts.

Briefly - if the Soc. Scientifique de Bruxelles is willing to give its permission - we prefer the paper translated into English.

the subject, we will be glad to do so. I suppose that if there is a note could be inserted that 591 - ~~the~~ are from the Brussels paper & the new (or something more) personally and also on behalf of I hope that you will be able

in any way, you are a fellow - if you would like to allow, really will be pleased to see you will sign your nomination card as a member of the annual subscription of £2-2-0 entrance fee of the same

With kind regards,  
Sincerely yours  
W.M. Smart.



*“Dear Dr. Smart*

*I highly appreciate the honour for me and for our society to have my 1927 paper reprinted by the Royal Astronomical Society. I send you a translation of the paper. I did not find advisable to reprint the provisional discussion of radial velocities which is clearly of no actual interest, and also the geometrical note, which could be replaced by a small bibliography of ancient and new papers on the subject. I join a french text with indication of the passages omitted in the translation. I made this translation as exact as I can,*

This clearly ends speculation about who translated the paper and who deleted the paragraphs — Georges Lemaître did both himself.

Lemaître’s letter also provides an insight into the scientific psychology of (some of) the scientists of the 1920s. Lemaître was not at all obsessed with establishing priority for his original discovery. Given that Hubble’s results had been published in 1929, Lemaître saw no point in repeating his own more tentative earlier findings in 1931. Rather, he preferred to move forward and to publish his new paper, ‘The expanding Universe’, which he did later that year<sup>11</sup>. Lemaître’s request to join the Royal Astronomical Society, at Smart’s invitation, was eventually granted; he was elected as an associate on 12 May 1939. ■