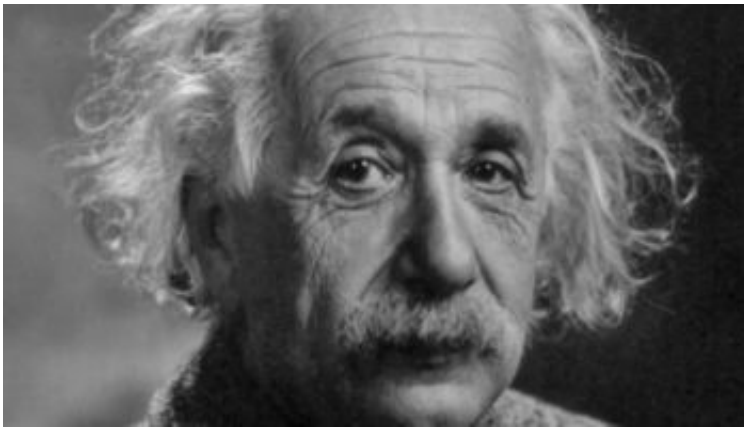


Einstein's conversion from a static to an expanding universe

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Albert Einstein

Albert Einstein accepted the modern cosmological view that the universe is expanding long after his contemporaries, new study shows.

Until 1931, physicist Albert Einstein believed that the [universe](#) was static.. An urban legend attributes this change of perspective to when American astronomer Edwin Hubble showed Einstein his observations of redshift in the light emitted by far away nebulae—today known as galaxies. But the reality is more complex. The change in Einstein's viewpoint, in fact, resulted from a tortuous thought process. Now, in an article published in *European Physical Journal H*, Harry Nussbaumer from the Institute of Astronomy at ETH Zurich, Switzerland, explains how Einstein changed his mind following many encounters with some of

the most influential astrophysicists of his generation.

In 1917 Einstein applied his theory of general relativity in the universe, and suggested a model of a homogenous, static, spatially curved universe. However, this interpretation has one major problem: If gravitation was the only active force, his universe would collapse – an issue Einstein addressed by introducing the cosmological constant.

He then fiercely resisted the view that the universe was expanding, despite his contemporaries' suggestions that this was the case. For example, in 1922, Russian physicist Alexander Friedman showed that Einstein's equations were viable for dynamical worlds. And, in 1927, Georges Lemaître, a Belgian astrophysicist from the Catholic University of Louvain, concluded that the universe was expanding by combining [general relativity](#) with astronomical observations. Yet, Einstein still refused to abandon his static universe.

However, in an April 1931 report to the Prussian Academy of Sciences, Einstein finally adopted a model of an expanding universe. In 1932 he teamed up with the Dutch theoretical physicist and astronomer, Willem de Sitter, to propose an eternally expanding universe which became the [cosmological model](#) generally accepted until the middle of the 1990s. To Einstein's relief these two models no longer needed the [cosmological constant](#).

More information: H. Nussbaumer (2013), "Einstein's conversion from his static to an expanding universe," *European Physical Journal H*, [DOI: 10.1140/epjh/e2013-40037-6](https://doi.org/10.1140/epjh/e2013-40037-6)

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