

Six decades of cosmology

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Cosmos. Credit: Federico Beccari via unplash

"Cosmologists are often wrong but never in doubt," Russian physicist Lev Landau once said. In the early days, astronomers began by observing and modelling stars in different stages of evolution and comparing their findings with theoretical predictions. Stellar modelling uses well-tested physics, with concepts such as hydrostatic equilibrium, law of gravitation, thermodynamics, nuclear reactions etc. Yet in contrast, cosmology is based on a large number of untested physical assumptions, like nonbaryonic dark matter and dark energy whose physics has no proven link with the rest of physics. In a recent paper published in *EPJ H*, Jayant V. Narlikar, professor emeritus at the Inter-University Centre for Astronomy and Astrophysics in Pune, India, shares his personal reminiscences of the evolution of the subject of cosmology over six decades. He tells of the increase in our confidence in the standard model of cosmology to the extent that it has become a dogma.

Narlikar first describes cosmological research in the 60s and 70s and explains how it covered key areas, including the Wheeler-Feynman theory relating the local electromagnetic arrow of time to the cosmological one, singularity in quantum cosmology and the observational tests of discrete source populations in different models of the

expanding universe. In the subsequent tests to validate theories, one key discovery—cosmic microwave background radiation (CMBR)—in the mid-sixties changed physicists' perspective of the [big bang](#).

However, today's cosmologists appear to be caught in a range of speculations in their attempts to show that the [big bang model](#) is correct as opposed to any alternative model. The author discusses how the well-accepted standard model, the so-called standard big bang cosmology (SBBC) does not have independent observational support for its basic assumptions like the non-baryonic dark matter, inflation and [dark energy](#). Nor does it have an established theoretical base. The German physicist Max Born said many years ago: "Modern cosmology has strayed from the sound empirical road to a wilderness where statements can be made without fear of observational check..." Narlikar feels that those comments apply very well to the present state of [cosmology](#).

More information: Jayant V. Narlikar, The evolution of modern cosmology as seen through a personal walk across six decades, *The European Physical Journal H* (2018). [DOI: 10.1140/epjh/e2017-80048-5](#)

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