

With the start of the new year a new look was taken at an old problem: "What came before the Big Bang". It is only natural to want to know what happened before the Big Bang. For years' cosmologists answered that it was unknown, unknowable, or that there was nothing before the Big Bang, not even time. As you extrapolate our expanding universe backwards, you eventually reach a point of infinite density where the known laws of physics break down. But then something changed. Now serious cosmological questions are being raised: How can we fit a Big Bang into an infinite and eternal Universe? Even if ours is a new universe starting, it must still fit into the eternal background. It is tied up with our deepest cosmic quest - to understand the nature of time, and why it keeps propelling us so relentlessly into the future.

Pioneer cosmologist Aian Guth says ... the Big Bang theory doesn't tell us what banged, why it banged, or if anything happened before it banged.

A short reflection may be in order here on how the Big Bang expression originated. Astronomer Sir Fred Hoyle, while having no argument with Edwin Hubble's observations that the universe was expanding, disagreed on its interpretation. He found the idea that the universe had a beginning to be pseudoscience, resembling arguments for a creator, "for it's an irrational process, and can't be described in scientific terms". Commenting on the efforts of others to prove the creation of the Universe from a hot, initial state (which he disparagingly referred to as a Big Bang, Hoyle, along with Thomas Gold and Hermann Bondi began in 1948 to argue for the universe as being in a "steady state" and formulated their Steady State theory. The theory tried to explain how the universe could be eternal and essentially unchanging while still having the galaxies we observe moving away from each other. The theory hinged on the creation of matter between galaxies over time, so that even though galaxies get further apart, new ones that develop between them fill the space they leave. The resulting universe is in a "steady state" in the same manner that a flowing river is - the individual water molecules are moving away but the overall river remains the same.

He coined the term "Big Bang" on BBC radio's Third Programme broadcast on 28 March 1949. It caught the public's imagination and was quickly adopted by the general public.

While the Big Bang initially symbolised the start of the Universe, our Universe, a gradual realisation of the possibilities of recycling universes raised the possibility of having the Big Bang happen in a pre-existing environment, were the possibility of multiple Big Bangs creating multiple universes became a real possibility.

The discipline is called physical cosmology. Its theoretical foundations include general relativity and the standard model of particle physics, and additional, yet-to-be-discovered fields that may have played a role, especially in the very early universe.

And there are many other possibilities. The existence of Dark Matter, a core concept in the concordance model, is questioned by those who attempt to attribute the same effects that dark matter is supposed to explain to modifications of Einstein's gravity instead. Physical cosmology is still a young science, and there are many unknowns and new theoretical proposals appear almost daily. Not even the most ardent advocates of the concordance model suggest that it is the last word on the topic. AK, with EarthSky and Wikipedia Notes



Sir Fred Hoyle, born 24 June 1915 and died 20 August 2001, was a British astronomer who formulated the theory of stellar nucleosynthesis. He also held controversial stances on other scientific matters - in particular his rejection of the "Big Bang" theory, a term coined by him on BBC radio. He also wrote science fiction novels, short stories and radio plays, and co-authored twelve books with his son, Geoffrey Hoyle. He spent most of his working life at the Institute of Astronomy at Cambridge and served as its director for six years.