

Space-Time in Upheaval: Relativistic Cosmology and the End of a Static Universe.

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History of science demonstrates that throughout the centuries, metaphysical ideas and philosophical preferences played a very significant role in the development of cosmological thought. This is probably unavoidable, given the fundamental incompleteness of empirical data when the object of investigation is defined as the entire Universe as a whole. This paper investigates the major transformation in the conception of the cosmological space-time that occurred during the first half of the twentieth century, namely, the abandonment of the traditional preference for a stable, static Universe and the gradual acceptance of the uncomfortable view that our Universe was born out of a singularity, in a violent, explosive way billions of years ago, then expanded dramatically, eventually can possibly collapse back into a point, and maybe even be born again. The first proposal of such a Universe appeared shortly after the formulation of the general theory of relativity, even before the discovery of any empirical astronomical evidence that could support it. The analysis of the 1922 mathematical paper by Alexander Friedman reveals its three fundamental conceptual assumptions that contradicted the then generally shared expectations of what a satisfactory cosmological model should entail: non-stability of the cosmological space-time, singularity of the creation of the Universe that decades later would be called the “Big Bang,” and potential periodicity of cosmological lifecycles. No surprisingly, the non-static model was initially rejected or, more typically, ignored. Further analysis of its gradual reception, development and confirmation during the subsequent four decades in the works by Weyl, Eddington, Lemaitre, Hubble, Einstein, De Sitter, Tolman, Gamow, and others, resulted in the acceptance of most, though not all, of its initial hypothetical assumptions. Historical debates and arguments pro and contra also allow a discussion of what was the possible philosophical/metaphysical/existential basis behind the initial proposal of the “Big Bang” model.