

# Do we live in an anthropic universe?

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## Abstract

I cast doubt upon the desired consistency between the anthropic principle and modern cosmology.

Amongst all possible universes we live in one that *deserves* us. This is what could be called the *naïve version* of the anthropic principle. At what extent this view is consistent with modern scientific results obtained from theoretical and observational work in cosmology?

The anthropic principle was originally put forward by the cosmologist Brandon Carter (1974) with the statement that ‘our location in the universe is necessarily privileged to the extent of being compatible with our existence as *observers*’. (The italic is mine). The definite status as a consensual principle of nature has been crowned with the thorough account of its implications in seemingly unpaired areas of human knowledge as philosophy, quantum mechanics, cosmology, biochemistry, the search for extraterrestrial life and ultimately the future of the universe, by John D. Barrow and Frank J. Tipler, in the now classical book entitled *The Anthropic Cosmological Principle* (Barrow & Tipler 1986 but see Soares 2001).

Since then, two major achievements in cosmology lie on our pathway, two brilliant milestones. On the theoretical side, Alan Guth invented the inflationary theory (Guth 1997) in the early 80’s, and on the observational side, the first results from the Cosmic Background Explorer satellite were published in the early 90’s<sup>1</sup>. The expanding universe paradigm gained strength with renewed blood from these sources. Two recent reviews by Michael S. Turner (2002) and Max Tegmark (2002) give a clear picture of the present situation. The evidence for a flat global topology comes from both inflation and measurements of the anisotropy of the cosmic microwave background on angular scales of about 1 degree. The measurements were triggered by COBE’s spectacular results, from a plethora of satellite and balloon experiments (see Tegmark 2002).

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<sup>1</sup>See COBE’s homepage at <http://space.gsfc.nasa.gov/astro/cobe/>

Current cosmological models should be at least reassuring of an anthropic universe. But, what does the cosmic budget tell us? Following Turner one has:

- Bright stars: 0.5%
- Baryonic dark matter: 3.5%
- Nonbaryonic dark matter: 30%
- Dark energy: 66%

Flatness requires that everything adds up to 100% of the closure density. Except for a half per cent of visible, ordinary, *observable* matter, we are left with dark, exquisite, *unobservable* stuff.

Now, back right to the beginning: aren't we in the *wrong* universe?

## References

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