

***PHILOSOPHY OF  
COSMOLOGY 2009:  
CHARACTERISING  
SCIENCE AND BEYOND***

*St Anne's College  
Oxford*

Cosmology, Ultimate  
Causation and Multiverses

Do multiverses provide a complete ultimate explanation of cosmology?

No: they just postpone the ultimate issues:

- Why is the universe the way it is?  
becomes
- Why is the multiverse the way it is?
- Why is there anything at all?  
Stays unchanged

Why does life exist in the multiverse?

- remains a real issue:

*Exhibit A:* a multiverse of  $10^{500}$  universes, with  $\Lambda$  given by a normal distribution:

- life exists in the low-Lambda tail of the distribution in the multiverse

*Exhibit B:* a multiverse of 500 universes, with the same fundamental constants as our Universe in all of them

- life everywhere in the multiverse

*Exhibit C*: a multiverse of 5721 universes, all with a cosmological constant 100 times larger than in our Universe

-Life exists nowhere in the multiverse

-Mere existence of multiverse does not solve problem: depends on what type of multiverse.

-Who decides which multiverse exists?

- and why?

Two scientific approaches with promise:

## **A: based in underlying physical-style generating theory**

e.g. chaotic inflation

- So where does this generating theory come from?
- What decides its nature?
  
- Does it pre-exist all the universes in the multiverse?
- In what domain does it exist?

The basic problems remain. Resolution:

- There is a multitudes of multiverses ... ad infinitum

## **B: All possible universe exist (Lewis, Tegmark)**

Elegant complete solution: guarantees existence of life in a logically coherent way.

How did this come about?

- Why did it come about?

But: who decides what is possible??

Tegmark: all mathematical structures

What is the domain of concern of this variation?

- Only physics? Or wider issues?

If we are treating ultimate issues, is it Ok to restrict ourselves to scientific considerations and data alone?

- What about aesthetics and beauty?
  - What about emotions and feelings?
  - What about ethics and morality?
  - What about meaning?
- \* They are not reducible to physics \**

Do any of them have any existence or meaning in our multiverse theory?

If yes, in what way?

If not, how can it be considered an adequate theory of the way things are?

These can and do arise in our universe  
- e.g. we all believe there is value and meaning  
in investigating the questions we are asking.

They must then arise in a multiverse theory as  
much as any ordinary Cosmology, considered  
in the widest sense as a theory of the nature of  
existence including physical and mental life

The assumption that reductionist science is an  
adequate total world view is as unsustainable  
in this context as it is in the context of a single  
universe. All it does is move all the ultimate  
questions up one level.