

Title: Philosophical Theories of Time meet Quantum Gravity

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Abstract: <span>A number of startling claims about the nature of time have made on the basis of certain theories of quantum gravity. I canvas the landscape of philosophical theories of time in order to place these claims in a rather different context of argument and counterargument. My aim is to clarify from a philosophical perspective what is at stake in accepting each of these claims.</span>

# Philosophical theories of time meet quantum gravity

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## Time of experience

events present as ordered

direction from past to future

time flows

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## Philosophical theories of time

Eternalism: the past, present and future exist equally

Presentism: only the present exists, the past and future do not

Growing Block: only the past and present exists, the future does not

Idealism: time exists only in our minds

Barbour-verse

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Flow of time

- argument for
- Spotlighter
- Growing block/presentism

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Truthmakers



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## Philosophical theories of time

### Flow of time

The belief in the flow of time "enjoys such powerful positive epistemic status for us that not only can we be said to know that tense and temporal becoming are real, but also that this belief constitutes an intrinsic defeater-defeater which overwhelms the objections brought against it."

William Lane Craig

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Augustine says:

"past and future do exist, but that time emerges from some secret refuge when it passes from the future to the present, and goes back into hiding when it moves from the present to the past."

Augustine, Confessions, trans. by R. S. Pine-Coffin (Penguin 1961). Book XI, §18.

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## Healey's objection

Richard Healey 'Can physics coherently deny the reality of time?'

Epistemic incoherence

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Epistemic incoherence

"Time is a secondary quality... we can show how it arises from the fundamental properties, so as to explain why we experience the world as temporal and *why we are warranted in so describing it*" Healey p. 303

- Colour in our heads
- Colour in our heads but produced reliably by particular arrangements of primary qualities
- Colour is an emergent property of objects, arising from particular arrangements of primary qualities

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## Healey's "charitable interpretation"

1. Time capsules depict a history of the gross features of the universe

Arrayed along "streamers" / "tubes" in relative configuration space

Members of this set "cohere", tell the same story with minor inconsistencies"

- we have a stand-in for history

2. 'C1 records C2' is asymmetric, and typically C1 records C2 in multiple ways - this gives us a way to get a "direction of time"- Butterfield

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Events count as actual relative to a streamer

Streamers have a branching structure

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