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## *"Real and Counterfactual Universes"*

4pm, Wednesday 11<sup>th</sup> May, 2016  
Gustave Tuck Lecture Theatre, UCL

**Abstract:**

Powerful instruments have enabled cosmologists to delineate how our expanding universe has evolved, during 13.8 billion years, from an initial hyper-dense state to the cosmos we see around us (and of which we're a part).

The chain of events that led to this emergent complexity depends on a few key numbers: the geometry and content of space, the strength of gravity, the masses of particles, and the balance between the forces that govern the micro-world. String theorists, and some cosmologists, suspect that 'physical reality' is far more extensive than the domain our telescopes can observe - that we live in a multiverse, where domains exist beyond our observational horizon (perhaps even as the aftermaths of other 'big bangs'), and that these may even be governed by different physical laws.

Could complexity emerge in these other domains, or do we inhabit a rare 'fine-tuned' domain? Other physicists (and some philosophers) close their minds to the multiverse concept, deeming it beyond the fringe of proper scientific discourse. But even they might accept (rather as exponents of 'counterfactual history' do) that it can be an enlightening exercise to explore what things would be like if the underlying physical laws were different.

This talk will sketch some 'counterfactual' universes, to assess how 'special' the key numbers have to be to allow something as complex as life to emerge.