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## Superpositions of causal orders in a timeless universe

*Thursday, October 10, 2019 12:10 PM (45 minutes)*

I will first review the timeless Page-Wootters picture of the quantum universe in which there is no overall dynamics, but where the states of quantum fields evolve relative to the quantum states of the underlying space. I will then introduce the concept of superposing different causal orders –a notion that could be naturally motivated within some approaches to quantum gravity –and ask if and how this phenomenon could be incorporated within the Page-Wootters formalism. I hope to finish by speculating about some possible experimental implications.

**Presenter:** Prof. VEDRAL, Vlatko (University of Oxford, ISI, National University of Singapore)

**Session Classification:** Investigating the fundamental properties of physics