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# The quantum clock: a critical discussion on (space-)time

*Tuesday, 25 March 2014 11:00 (1 hour)*

I critically discuss the measure of very short time intervals.
By means of a conceptual experiment, I describe an ideal clock
based on the occurrence of completely random events.
I show that the minimum time interval dt that this clock can measure
scales as the inverse of its size dr.
This implies an uncertainty relation between space and time: dr dt >= Gh/(2pi c^4)
where G, h, and c are the gravitational constant, the Planck constant,
and the speed of light, respectively.
I outline and briefly discuss the implications of this uncertainty principle.
Finally I will discuss an experiment based on a balloon-borne
very large area detector capable to investigate (sub)millisecond
structures in the prompt emission of Gamma Ray Bursts.
Energy-dependent time lags in these phenomena could probe
the granular structure of the space-time fabric down to the Planck scale.

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