

Testing Quantum Gravity Workshop

Cavallerizza Reale | Turin, May 26 -27

BOOK of ABSTRACTS

POSTER Session (preliminary list)

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Modified Lorentz transformations in Deformed Special Relativity

Deformed special relativity is a semiclassical approach to the main open problem of contemporary physics, namely the lackness of a consistent gravity theory at the Planck scale, where quantum mechanics and general relativity lead to different physical scenarios. By introducing covariant auxiliary variables, we generalize and extend some recent Deformed Special Relativity models based on deformed dispersion laws and entailing deformed Lorentz transformations and, at the same time, noncommutative geometry and intrinsically discrete spacetime. In so doing we obtain the explicit form of the modified Lorentz transformations for a wide class of modified momentum-energy relations often proposed in literature and arising from elementary particle physics. Actually, the deformed Lorentz transformations involve new relativistic phenomena in the spacetime and momentum-energy sectors (as, e.g., transverse length contraction). In particular, the new transformations do imply that in the limit of very high speed boosts ($V \sim c$) the deformed Lorentz factor does not diverge as in ordinary Special Relativity, but results to be upperly bounded by a large finite value of the order of the ratio between the Planck mass and the particle mass.

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Quantum holometer: *Proof of principle preliminary experimental set-up.*

The Holometer aims to detect holographic noise looking for correlation in phase fluctuations of two correlated Michelson interferometers. According to theoretical calculation quantum light can improve the performances of the instrument. In order to realise a “proof-of-principle” experiment, we are working on a preliminary set-up. The experimental scheme and the preliminary experimental results, still using classical light, are presented. Since experimentally squeezing can not be perfectly single-mode, consequences of multi-mode are also considered.