Contribution ID: **36**   Type: **not specified**

Lorentz-violating matter dispersion relations from modified quantum gravity

Friday, 15 January 2016 09:50 (25 minutes)

We consider "classical" fermions and scalars coupled to a 4-d diffeomorphism breaking gravity model, and we derive the one-loop Lorentz-violating effective dispersion relation for matter, after integrating out gravitons. The modified gravity model is the z=3 non-projectable Horava-Lifshitz gravity which, due to its improved UV behaviour, involves logarithmic divergences only. We find that with generic values for the different parameters, the model leads to 10^{10} GeV as the typical scale above which the current upper bounds on Lorentz violation can no longer be satisfied. On the other hand, it is always possible to fine-tune the parameters of the model, such that the effective maximum speed seen by particles is consistent with Special Relativity.

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Session Classification: Parallel session