Title:	Quantum Field Theory in Accelerated Frames and Proton Decay
Authors:	Kala, Abhinav (/jspui/browse?type=author&value=Kala%2C+Abhinav)
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Abstract:	Quantum field theory on curved spacetime is an approach to calculate the lowest order effects of gravity on interactions of quantum fields. Although, far from being the complete theory of quantum gravity it does predict some astonishing phenomena. Possibility of particle creation in an expanding spacetime is one such important result for cosmology.[Dav82] The most celebrated result is Hawking radiation emission by a black hole.[@Wik16b] Not only non-trivial spacetime geometry, but even acceleration in Minkowski spacetime can have effects ranging from alteration of standard model's reaction rates to making some forbidden processes possible. Proton decay is one of those forbidden processes and is of much interest for physicists, since recent experiments put a lower bound of ~ 10 raise to 34 years on proton's half-life [@Wik16e]. The possibility of these non-standard model processes are a consequence of the inability to find a definition of 'particle' for a general background spacetime, which has one implication of change in the definition of particle for uniformly accelerated observers compared to inertial observers, famously known as Fulling-Davies-Unruh effect or just Unruh effect[Dav82]. This difference in particle concepts in inertial and non-inertial frame also means difference in concept of 'vacuum', which is in general defined as the state annihilated by annihilation operators ˆ akjvacuumi = 0 . Decay rate of proton(due to Fermi interaction) has been calculated and verified to be matching for both inertial and non-inertial frame calculations both in the case of massless[Mat01a] and massive neutrinos[Yam03]. A recent claim has been made about mismatch in the decay rates calculated in both frames in presence of neutrino oscillations.[Tor15] In this material, all the necessary background for performing decay rate calculation along with the calculation of proton decay rate is presented. Also the validity of claims in [Tor15] is questioned. The complications caused by neutrino oscillations in the evaluation of decay rate is discussed too.

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