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Who ordered the disformal coupling for the Proca field?

Tuesday 30 April 2024 10:00 (1 hour)

In this talk, we will study the massless limits of two cases of Proca theory – in the presence of self-interactions, and with non-minimal coupling to gravity. In contrast to its massless counterpart, this theory propagates an additional longitudinal mode in flat spacetime. Due to this, conventional methods indicate that the perturbative series is singular in mass. In the presence of self-interactions, we will confirm that the longitudinal mode becomes strongly coupled at the Vainshtein scale, and decouples from the remaining transverse modes beyond it, which in turn remain weakly coupled. In the case of non-minimal coupling to gravity, however, the longitudinal mode will cause the strong coupling of the tensor modes, leading to a surprising inconsistency. We will show that this can be solved by the introduction of the disformal couplings, and discuss further implications to the cosmological backgrounds.

Presenter: HELL, Anamaria (Kavli IPMU, the University of Tokyo)