Initial value problem and causality in string-inspired non-local field theory

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We investigate causality in a non-local scalar field theory inspired by open SFT. For purely time-dependent configurations, we show that a field redefinition perturbative in a parameter ξ , characterizing the non-locality, can turn the theory into a local two-derivative theory with ξ -dependent potential. We support this claim by 'taming' the unbounded oscillations of the rolling solution of the non-local theory into a standard rolling solution of the field-redefined potential. For general configurations, we demonstrate that it is possible to field redefine the theory into two-derivative-in-time theory by breaking manifest Lorentz covariance. We discuss light-cone formulation and dispersion relations.

Presenter: HILMI FIRAT, Atakan