

# PHY-MV-FN-T35 – Quantum field theory I

Lecture held winter term 2022/23 by Prof. Dr. Timo Weigand, Universität  
Hamburg

Tjark Sievers



# 1 Prerequisites – A short revision on special relativity



## 2 The free scalar field

Lecture 01 –  
19.10.2022

### 2.1 Why Quantum Field Theory?

### 2.2 Classical scalar field: Lagrangian formalism

Formalize the transition from a classical system with a finite number of degrees of freedom  $q_i(t)$  to a system with infinitely many degrees of freedom, i.e. a classical field  $\varphi(t, \mathbf{x}) = \varphi(x^\mu)$ . We are starting from classical mechanics. The classical action is

$$S = \int_{t_1}^{t_2} dt L \tag{2.1}$$