# Massachusetts Institute of Technology
## Department of Physics

# Condensed Matter Theory Seminar

## "BLUES function method in an iterative procedure"

### Jonas Berx, KU Leuven, Belgium

**Abstract:** A method is presented for calculating solutions to nonlinear differential equations analytically for a variety of problems in physics. An iteration procedure based on the recently proposed BLUES (Beyond Linear Use of Equation Superposition) function method is shown to converge for nonlinear differential equations of diverse types. Case studies are presented for solitary waves of the Camassa-Holm equation, for traveling wave fronts of the Burgers' equation and for oscillatory wave fronts of the nonlinear Duffing oscillator, with source terms. The convergence of the analytical approximations towards the numerically exact solution is exponentially rapid. In practice, the zeroth-order approximation (a simple convolution) is already useful and the first-order approximation is already accurate while still easy to calculate. The type of nonlinearity can be chosen rather freely, which makes the method generally applicable.

### 12:00pm noon
### Tuesday, May 28, 2019
### Duboc Room (4-331)

**Host: Mehran Kardar**