

## Frontiers on *ab initio* approach to nuclear physics in super-computing era

**Abstract:** In this talk I will introduce a series of new developments in the *ab-initio* approach to nuclear physics for the coming super-computing era. In the first part I will present a nonperturbative method aiming for solving quantum field theory based on first principles. In this method, the quantum fields are quantized on the so-called "light-front", a 3-surface in 4-dimensional spacetime formed by a traveling beam of light. This method allows us not only to obtain the information on how each individual constituent is distributed in bound states such as the meson and the baryon systems, but also to simulate the time-evolution of quantum field configurations. In the second part, I will turn to low-energy nuclear physics and introduce a time-dependent nonperturbative method for solving nuclear scatterings on the amplitude level. I will illustrate the details through an application to the process where a deuteron is excited by an impinging heavy-ion through Coulomb interactions. The resulting time evolution of both the charge and the momentum distributions will be shown. Finally, I will talk about a recent project where we study the time-evolution of a heavy-quarkonium system in a thermal medium through solving a time-dependent Schroedinger equation.

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3:30pm

## 50 Years of beam Seminar Series

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Room 228**

**Refreshments will be served  
at 3:15pm**



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