

# KIDS TALK

## Quantum Monte Carlo Algorithms - A Story of Continuous and Discrete Time -

Speaker: Dominik Straßel, AG Eggert

Abstract: Quantum Monte Carlo (QMC) Simulations are widely used in today's scientific world. For many it is simply a tool to use, like a big black box. But what are the ideas behind? Why do so many people do Monte Carlo simulations and what is imaginary time? To make this more transparent, not only for experts in the field, we will have this talk here.

As the title suggests, it will be a story of *continuous* and *discrete time*. At the beginning we have to make clear what imaginary time is. Which will give us also the answer why  $d$ -dimensional quantum systems are actually  $(d+1)$ -dimensional. Then following the story we will go into more details concerning *continuous time* algorithms, focus on *Stochastic Series Expansion*. Not only will we introduce the basics of this algorithm but also tell you more about the actual problems we can tackle with it and its limitations.

The other part of the story is about *discrete time* and *Discrete-time auxiliary-field QMC*; the older and slower part, many people do not like any more. But if we understand the key point behind it we will find a lot of problems we can attack with these kinds of algorithms.

At the end of the story, we hope we have convinced you that QMC is no crazy black box or something that only weird gamblers use. It is well suited for various problems and knowing the basics helps us to find out which algorithm we should use.

When: Friday, May 15<sup>th</sup> 2015, **10:00 am**

Where: Room 46-387/388

All undergraduate and graduate students as well as postdocs are welcome and encouraged to join our discussion!

\*\*\*\*\* COFFEE, TEA AND COOKIES WILL BE SERVED \*\*\*\*\*

For questions, comments or suggestions: [vollmar@rhrk.uni-kl.de](mailto:vollmar@rhrk.uni-kl.de)

