Wir laden recht herzlich zu einem Vortrag im Rahmen des Oberseminars Numerische Optimierung ein:

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**REDUCED BASIS METHOD FOR PARAMETER FUNCTIONS WITH APPLICATION IN QUANTUM MECHANICS**

Dienstag, 11. Juni 2019

Beginn: 10:15 Uhr
Raum: C421

Interessenten sind herzlich willkommen!

S. Volkwein, G. Ciaramella

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**Abstract**: The aim of the project is to consider the time-dependent linear Schrödinger equation (SE)

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\begin{align*}
  i \partial_t \psi(t, x) &= -\Delta \psi(t, x) + \mu(t, x) \psi(t, x) + f(t, x) \\
  \psi(t, x) &= 0 \\
  \psi(0, x) &= \psi(x)
\end{align*}
\]

with a variable reaction coefficient \( \mu \), which is interpreted as a parameter function within the Reduced Basis Method (RBM). Typically, the parameter space \( P \) is given by a finite-dimensional subset of \( \mathbb{R}^P, P \in \mathbb{N} \). However, the parameter space consisting of all possible reaction coefficients is of infinite dimension. While finite-dimensional parameter spaces have been studied well, there has been done little work on the infinite-dimensional setting so far. First progress in this direction has been made by A. Mayerhofer and K. Urban, where the initial value of parabolic PDEs is interpreted as a parameter function. In the end, this setting should be transferred to a PDE constrained optimal control problem, where an external potential arises in the SE as parameter function.

For this we propose an ansatz based on a space-time variational formulation of the SE on which we want to focus in this talk. It is well-known, that a space-time variational formulation of a time-dependent parameterized PDE leads – at least analytically – to sharper error estimates for the reduced solution, which is a crucial aspect for the construction of a reduced model within the RBM. However, the setting of a well-posed variational space-time formulation with a weakly differentiable initial value as well as its stable discretization, based on tensor formats, is – according to our knowledge – not studied, yet. Numerical examples will be presented.