

## Contribution submission to the conference Berlin 2018

### Phase transition of the 2D Hubbard-Holstein model —

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In the 2d Hubbard-Holstein model at zero temperature, a quantum phase transition between Mott and Peierls insulator can be observed. Whether a metallic phase emerges in between remains an open question [1,2]. As the emergence of the Mott phase is a many body effect, a description beyond the mean field level is crucial. At the same time, a method that can cope with 2 dimensions is needed.

To address this open question, we have extended Density Matrix Embedding Theory (DMET) from the purely electronic case [3] to coupled fermion-boson systems.

DMET is an embedding theory which benefits from the exponentially decaying correlation in most quantum systems thus allowing a description beyond mean field at low cost.

We show the phase diagram of the 2d Hubbard-Holstein model at zero temperature obtained for different levels of accuracy.

[1] R. T. Clay and R. P. Hardikar, Phys. Rev. Lett 95, 096401 (2005)  
[2] J. Bauer, EPL 90 27002 (2010) [3] G. Knizia, G. K.-L Chan, Phys. Rev. Lett 109, 186404, (2012)

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**Type:** Vortrag;Talk  
**Topic:** Focus Session: Frontiers of  
Electronic-Structure Theory: Correlated  
Electron Materials  
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