



LUDWIG-
MAXIMILIANS-
UNIVERSITÄT
MÜNCHEN

CHAIR FOR THEORETICAL SOLID STATE PHYSICS
PHYSICS DEPARTMENT
ARNOLD SOMMERFELD CENTER &
CENTER FOR NANOSCIENCE



Tensor Networks Summer Semester 2017

Website: www.physik.uni-muenchen.de/lehre/vorlesungen/sose_17/tensor_networks_17/index.html

Lectures: Mo 14:15-16:00, We 10-12 (Room 450)

Tutorial: Th 10:15-12:00 (Room 450)

Lecturer: Jan von Delft <vondelft@lmu.de>

Tutorials: Hong-Hao Tu <h.tu@lmu.de>

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Technical advisors: Andreas Weichselbaum, Benedikt Bruognolo

Topics:

- Tensor Networks: Basic Concepts
- Numerical Renormalization Group (NRG)
- Density-Matrix Renormalization Group (DMRG)
- Symmetries
- Projected Entangled Pair States (PEPS)
- Multiscale Entanglement Renormalization Ansatz (MERA)
- Other topics (holography, machine learning...)

For a more detailed time table, see course homepage, under “Overview”.

Tutorials:

Will involve hands-on coding: analyzing pre-designed snippets of code for performing various tasks, and combining these to carry out standard tensor network computations.

Software:

All codes will be based on Matlab. Every participant will need to run Matlab scripts. A student version of Matlab (for 35 €) can be downloaded from here:

https://de.mathworks.com/academia/student_version.html

Save the receipt! At the end of the semester, every student that has passed the course and shows me a receipt for a Matlab student licence will be reimbursed by 35 €.

If you don't want to buy a Matlab licence, try Octave, an open-source version thereof, which purportedly uses the same syntax as Matlab, and hopefully will work on most of our Matlab scripts (no guarantees!): <https://www.gnu.org/software/octave/>

Final exam:

Coding exercises, to be performed using the code snippets developed during the course of the semester.

Literature:

There is no suitable textbook yet for this course. For introductory topics I will follow various review articles, and for advanced topics I will follow the original literature. A bibtex file (to be extended and updated during the course of the semester), containing bibliographic info to these articles, is available on the course homepage under “References”.