2 X STATE OF STATE

Correlations and Phase Transitions

Eva Pavarini and Erik Koch (Eds.)



Forschungszentrum Jülich GmbH Institute for Advanced Simulation

Lecture Notes of the Autumn School on Correlated Electrons 2024

Eva Pavarini and Erik Koch (Eds.)

Correlations and Phase Transitions

Autumn School organized by the Institute for Advanced Simulation at Forschungszentrum Jülich 16 – 20 September 2024

Schriften des Forschungszentrums Jülich Modeling and Simulation

Band / Volume 14

ISSN 2192-8525

ISBN 978-3-95806-751-6

Contents

Preface

- 1. Particle-Hole Symmetries in Condensed Matter *Martin Zirnbauer*
- 2. Mean-Field Theory: Hartree-Fock and BCS *Erik Koch*
- 3. Understanding the Hubbard Model with Simple Calculations *Richard Scalettar*
- 4. The Physics of Doped Mott Insulators *Robert Eder*
- 5. Orbital Ordering in Materials *Eva Pavarini*
- 6. Electron-Phonon Coupling *Rolf Heid*
- 7. Hole Superconductivity Jorge Hirsch
- 8. Unconventional Superconductivity: Overview and Planar Tunneling into a Kondo Lattice *Laura Greene*
- 9. Unconventional Superconductivity: Mechanisms and Experimental Probes *Andreas Kreisel*
- 10. The Berezinskii-Kosterlitz-Thouless Transition and its Application to Superconducting Systems Lara Benfatto
- 11. Polar Quantum Criticality: Challenges and Opportunities *Premala Chandra*
- 12. Competition between Kondo Effect and RKKY Coupling *Stefan Kettemann*
- 13. Quantum Magnetism In and Out of Equilibrium *Salvatore Manmana*
- 14. High-Pressure Phases of Hydrogen Markus Holzmann
- 15. Many-Body Localization Julian Léonard

Index