Reading list **Seminar: High-Temperature Superconductivity, WiSe 23/24**

PaperIDs having talk numbers next to them and given in color indicate papers to be discussed in seminar talks.
PaperIDs given in black indicate optional papers for further reading. Information from these may optionally
be included in talks if time permits.

Talk	PaperID	Reference
	High-Tc superconductivity review	
self-study	Keimer2015	*From quantum matter to high-temperature superconductivity in copper oxides* B. Keimer, S. A. Kivelson, M. R. Norman, S. Uchida and J. Zaanen Nature **518**, 179 (2015). http://dx.doi.org/10.1038/nature14165 Review on high-Tc superconductivity, describing the state of the field, open questions
	Zhou2021	*High-temperature superconductivity* X. Zhou, W.-S. Lee, M. Imada, N. Trivedi, P. Phillips, H.-Y. Kee, P. Törmä and M. Eremets Nature Reviews Physics **3**, 462-465 (2021). https://www.nature.com/articles/s42254-021-00324-3

ARPES

1a	Kurokawa2023	*Unveiling phase diagram of the lightly doped high-T_c cuprate superconductors with disorder removed* K. Kurokawa, S. Isono, Y. Kohama, S. Kunisada, S. Sakai, R. Sekine, M. Okubo, M. D. Watson, T. K. Kim, C. Cacho, S. Shin, T. Tohyama, K. Tokiwa and T. Kondo Nature Comm. **14**, 4064 (2023).
background	Damascelli2003	*Angle-resolved photoemission studies of the cuprate superconductors* A. Damascelli, Z. Hussain and Z.-X. Shen Rev. Mod. Phys. **75**, 473-541 (2003). https://link.aps.org/doi/10.1103/RevModPhys.75.473 Extensive review of ARPES studies of cuprates.

STM

1b	Fischer2007	*Scanning tunneling spectroscopy of high-temperature superconductors* Ø. Fischer, M. Kugler, I. Maggio-Aprile, C. Berthod and C. Renner Rev. Mod. Phys. **79**, 353-419 (2007). https://link.aps.org/doi/10.1103/RevModPhys.79.353 Extensive review of STM studies of cuprates

Anderson's RVB

2a Anderson1987 *The Resonating Valence Bond State in La2CuO4 and Superconductivity*
P. W. Anderson
Science **235**, 1196-1198 (1987).
http://science.sciencemag.org/content/235/4793/1196

2a Baskaran1987 *The resonating valence bond state and high-Tc superconductivity — A mean field theory*
G. Baskaran, Z. Zou and P. Anderson
Solid State Communications **63**, 973-976 (1987).
https://doi.org/10.1016/0038-1098(87)90642-9

Long-range AFM

2b Mazurenko2017 *A cold-atom Fermi–Hubbard antiferromagnet*
A. Mazurenko, C. S. Chiu, G. Ji, M. F. Parsons, M. Kanász-Nagy, R. Schmidt, F. Grusdt, E. Demler, D. Greif and M. Greiner
Nature **545**, 462–466 (2017).
https://www-nature-com.emedien.ub.uni-muenchen.de/articles/nature22362
First realization of Fermi-Hubbard model and antiferromagnetism using cold atoms and detection using quantum gas microscope

Zhang-Rice Singlet, Emery model

3a Emery1987 *Theory of high-T_c superconductivity in oxides*
V. J. Emery
Phys. Rev. Lett. **58**, 2794-2797 (1987).
https://link.aps.org/doi/10.1103/PhysRevLett.58.2794

3a Zhang1988 *Effective Hamiltonian for the superconducting Cu oxides*
F. C. Zhang and T. M. Rice
Phys. Rev. B **37**, 3759-3761 (1988).
https://link.aps.org/doi/10.1103/PhysRevB.37.3759

Superexchange pairing

3b O'Mahony2022 *On the Electron Pairing Mechanism of Copper-Oxide High Temperature Superconductivity*
S. O'Mahony, W. Ren, W. Chen, Y. X. Chong, X. Liu, H. Eisaki, S. Uchida, M. Hamidian and J. S. Davis
PNAS **119**, e22074491 (2022).
https://www.pnas.org/doi/full/10.1073/pnas.2207449119
talk by J.S. Davis: https://www.youtube.com/watch?v=6D4MmzIa52A

3b Weber2012 *Scaling of the transition temperature of hole-doped cuprate superconductors with the charge-transfer energy*
C. Weber, C. Yee, K. Haule and G. Kotliar
Europhys. Lett. **100**, 37001 (2012).
https://iopscience.iop.org/article/10.1209/0295-5075/100/37001

Single-hole doping

4a Koepsell2019 *Imaging magnetic polarons in the doped Fermi-Hubbard model*
J. Koepsell, J. Vijayan, P. Sompet, F. Grusdt, T. A. Hilker, E. Demler, G. Salomon, I. Bloch and C. Gross
Nature **572**, 358 (2019).
https://www.nature.com/articles/s41586-019-1463-1
Study of magnetic polaron (hole in antiferromagnetic background) in Fermi-Hubbard model

Kane1989 *Motion of a single hole in a quantum antiferromagnet*
C. L. Kane, P. A. Lee and N. Read
Phys. Rev. B **39**, 6880-6897 (1989).
https://link.aps.org/doi/10.1103/PhysRevB.39.6880
Theoretical analysis of single hole in antiferromagnetic background

String picture

4b Chiu2019 *String patterns in the doped Hubbard model*
C. S. Chiu, G. Ji, A. Bohrdt, M. Xu, M. Knap, E. Demler, F. Grusdt, M. Greiner and D. Greif
Science **365**, 251-256 (2019).
https://science.sciencemag.org/content/365/6450/251
Analysis of magnetic polaron motion in half-filled Hubbard model in terms of string patterns forming in antiferromagnetic background.

4b Bordt2021 *Rotational Resonances and Regge-like Trajectories in Lightly Doped Antiferromagnets*
A. Bohrdt, E. Demler and F. Grusdt
Phys. Rev. Lett. **127**, 197004 (2021).
https://link.aps.org/doi/10.1103/PhysRevLett.127.197004

Pairing symmetry in cuprates

background	Scalapino1995	*The case for d_{x^2-y^2} pairing in cuprate superconductors* D. J. Scalapino Physics Reports **250,** 329-365 (1995).
5a	Wollman1993	*Experimental determination of the superconducting pairing state in YBCO from the phase coherence of YBCO-Pb dc SQUIDs* D. A. Wollman, D. J. Van Harlingen, W. C. Lee, D. M. Ginsberg and A. J. Leggett Phys. Rev. Lett. **71**, 2134-2137 (1993). https://link.aps.org/doi/10.1103/PhysRevLett.71.2134
	Tsuei2000	*Pairing symmetry in cuprate superconductors* C. C. Tsuei and J. R. Kirtley Rev. Mod. Phys. **72**, 969-1016 (2000). https://link.aps.org/doi/10.1103/RevModPhys.72.969
5b	Hirthe2022	*Magnetically mediated hole pairing in fermionic ladders of ultracold atoms* S. Hirthe, T. Chalopin, D. Bourgund, P. Bojović, A. Bohrdt, E. Demler, F. Grusdt, I. Bloch and T. A. Hilker arXiv:2203.10027 [cond-mat.quant-gas] (2022). https://arxiv.org/abs/2203.10027
	Bohrdt2022	*Strong pairing in mixed-dimensional bilayer antiferromagnetic Mott insulators* A. Bohrdt, L. Homeier, I. Bloch, E. Demler and F. Grusdt Nature Physics **18**, 651-656 (2022). https://www.nature.com/articles/s41567-022-01561-8

Stripes in Cuprates

6a Corboz2011 *Stripes in the two-dimensional t-J model with infinite projected entangled-pair states*
P. Corboz, S. R. White, G. Vidal and M. Troyer
Phys. Rev. B **84**, 041108 (2011).
https://link.aps.org/doi/10.1103/PhysRevB.84.041108

6a Huang2017 *Numerical evidence of fluctuating stripes in the normal state of high-Tc cuprate superconductors*
E. W. Huang, C. B. Mendl, S. Liu, S. Johnston, H.-C. Jiang, B. Moritz and T. P. Devereaux
Science **358**, 1161 (2017).
https://www.science.org/doi/10.1126/science.aak9546

Ponsioen2019 *Period 4 stripe in the extended two-dimensional Hubbard model*
B. Ponsioen, S. S. Chung and P. Corboz
Phys. Rev. B **100**, 195141 (2019).
https://link.aps.org/doi/10.1103/PhysRevB.100.195141

Stripes in cold atoms

6b Schlömer2022 *Robust stripes in the mixed-dimensional t-Jt model*
H. Schlömer, A. Bohrdt, L. Pollet, U. Schollwöck and F. Grusdt
arXiv:2208.07366 [cond-mat.quant-gas] (2022).
https://arxiv.org/abs/2208.07366

6b Schlömer2022a *Quantifying hole-motion-induced frustration in doped antiferromagnets by Hamiltonian reconstruction*
H. Schlömer, T. Hilker, I. Bloch, U. Schollwöck, F. Grusdt and A. Bohrdt
arXiv:2210.02440 [cond-mat.quant-gas] (2022).
https://arxiv.org/abs/2210.02440

Hall coefficient

7a Badoux2016 *Change of carrier density at the pseudogap critical point of a cuprate superconductor*
S. Badoux, W. Tabis, F. Laliberté, G. Grissonnanche, B. Vignolle, D. Vignolles, J. Béard, D. A. Bonn, W. N. Hardy, R. Liang, N. Doiron-Leyraud, L. Taillefer and C. Proust
Nature **531**, 210-214 (2016).
https://doi.org/10.1038/nature16983

Ando2004 *Evolution of the Hall Coefficient and the Peculiar Electronic Structure of the Cuprate Superconductors*
Y. Ando, Y. Kurita, S. Komiya, S. Ono and K. Segawa
Phys. Rev. Lett. **92**, 197001 (2004).
https://link.aps.org/doi/10.1103/PhysRevLett.92.197001

Fractionalized Fermi liquids

7b Punk2015 *Quantum dimer model for the pseudogap metal*
M. Punk, A. Allais and S. Sachdev
PNAS **112**, 9552-9557 (2015).
https://www.pnas.org/content/112/31/9552

7b Senthil2003 *Fractionalized Fermi Liquids*
T. Senthil, S. Sachdev and M. Vojta
Phys. Rev. Lett. **90**, 216403 (2003).
https://link.aps.org/doi/10.1103/PhysRevLett.90.216403

Backup topics

Twisted bilayer graphene

8a Bistritzer2011

Moiré bands in twisted double-layer graphene
R. Bistritzer and A. H. MacDonald
PNAS **108**, 12233-12237 (2011).
http://www.pnas.org/content/108/30/12233
Theoretical predition that twisted bilayer graphene will have a bandstructure which becomes flat at certain magic angles

8a Cao2018

Unconventional superconductivity in magic-angle graphene superlattices
Y. Cao, V. Fatemi, S. Fang, K. Watanabe, T. Taniguchi, E. Kaxiras and P. Jarillo-Herrero
Nature **556**, 43-49 (2018).
https://doi.org/10.1038/nature26160
Discovery of superconductivity in twisted bilayer graphene

8b Balents2020

Superconductivity and strong correlations in moiré flat bands
L. Balents, C. R. Dean, D. K. Efetov and A. F. Young
Nature Physics **16**, 725-733 (2020).
https://doi.org/10.1038/s41567-020-0906-9
Focus & Perspective paper on twistronics