

PUBLICATIONS (Walter Metzner)

3 review articles, 99 peer-reviewed original research articles, 12 conference proceedings

- 1.** *Ground-state properties of correlated fermions: Exact analytic results for the Gutzwiller fave function,*
W. Metzner and D. Vollhardt, Phys. Rev. Lett. **59**, 121 (1987).
- 2.** *Analytic calculation of momentum distributions and ground state energies of correlated fermions with the Gutzwiller wave function,*
W. Metzner and D. Vollhardt, Jpn. J. Appl. Phys. Suppl. **26**, 479 (1987)
(Proc. 18th Int. Conf. on Low Temperature Physics, Kyoto, 1987).
- 3.** *Analytic calculation of ground-state properties of correlated fermions with the Gutzwiller wave function,*
W. Metzner and D. Vollhardt, Phys. Rev. B **37**, 7382 (1988).
- 4.** *Correlated lattice fermions in $d = \infty$ dimensions,*
W. Metzner and D. Vollhardt, Phys. Rev. Lett. **62**, 324 (1989).
- 5.** *Ground-state energy of the $d = 1, 2, 3$ dimensional Hubbard model in the weak-coupling limit,*
W. Metzner and D. Vollhardt, Phys. Rev. B **39**, 4462 (1989).
- 6.** *The Hubbard model in infinite dimensions,*
W. Metzner and D. Vollhardt in *Interacting Electrons in Reduced Dimensions*, edited by D. Baeriswyl and D. Campbell (Plenum Press, New York 1989), p. 129.
- 7.** *Variational theory for correlated fermions in high dimensions,*
W. Metzner, Z. Phys. B **77**, 253 (1989).
- 8.** *Correlated fermions in high dimensions,*
W. Metzner and D. Vollhardt, Helv. Phys. Acta **63**, 364 (1990).
- 9.** *Gutzwiller-type wave functions for correlated fermions,*
D. Vollhardt, P.G.J. van Dongen, F. Gebhard and W. Metzner, Mod. Phys. Lett. B **4**, 499 (1990).
- 10.** *Hubbard model in high dimensions: A perturbation expansion about the atomic limit,*
W. Metzner, Physica B **165&166**, 403 (1990)
(Proc. 19th Int. Conf. on Low Temperature Physics, Brighton, 1990).
- 11.** *Linked-cluster expansion around the atomic limit of the Hubbard model,*
W. Metzner, Phys. Rev. B **43**, 8549 (1991).
- 12.** *Analytic evaluation of resonating valence bond states,*
W. Metzner, Z. Phys. B **82**, 183 (1991).
- 13.** *Ward identities and the β -function in the Luttinger liquid,*
C. Di Castro and W. Metzner, Phys. Rev. Lett. **67**, 3852 (1991).
- 14.** *Hole dynamics in a spin background: A sum-rule-conserving theory with exact limits,*
W. Metzner, P. Schmit and D. Vollhardt, Phys. Rev. B **45**, 2237 (1992).

- 15.** *Instabilities of anisotropic interacting Fermi systems,*
 C. Castellani, C. Di Castro and W. Metzner, Phys. Rev. Lett. **69**, 1703 (1992).
- 16.** *Conservation laws and correlation functions in the Luttinger liquid,*
 W. Metzner and C. Di Castro, Phys. Rev. B **47**, 16107 (1993).
- 17.** *Dimensional crossover from Fermi to Luttinger liquid,*
 C. Castellani, C. Di Castro and W. Metzner, Phys. Rev. Lett. **72**, 316 (1994).
- 18.** *Normal metallic states of interacting electrons: Luttinger liquid vs. Fermi liquid,*
 W. Metzner, Physica B **197** 457 (1994)
 (Proc. 20th Int. Conf. on Low Temperature Physics, Eugene, 1993).
- 19.** *Conservation laws in normal metals: Luttinger liquid vs. Fermi liquid,*
 C. Di Castro, C. Castellani and W. Metzner in *The Physics and the Mathematical Physics of the Hubbard Model*, edited by D. Campbell (Plenum Press, New York, 1995).
- 20.** *Two particle scattering and orthogonality catastrophe in the Hubbard model,*
 W. Metzner in *The Physics and the Mathematical Physics of the Hubbard Model*, edited by D. Campbell
 (Plenum Press, New York, 1995).
- 21.** *Two-particle correlations and orthogonality catastrophe in interacting Fermi systems,*
 W. Metzner and C. Castellani, Int. J. Mod. Phys. B **9**, 1959 (1995).
- 22.** *Korrelierte Fermionen in hohen Dimensionen,*
 W. Metzner, Phys. Bl. **51**, 665 (1995).
- 23.** *Fermi surface of the 2D Hubbard model at weak coupling,*
 C.J. Halboth and W. Metzner, Z. Phys. B **102**, 501 (1997).
- 24.** *Spectral function of two-dimensional Fermi liquids,*
 C.J. Halboth and W. Metzner, Phys. Rev. B **57**, 8873 (1998).
- 25.** *Fermi systems with strong forward scattering,*
 W. Metzner, C. Castellani and C. Di Castro, Adv. Phys. **47**, 317 (1998).
- 26.** *Fermion loops, loop cancellation and density correlations in two-dimensional Fermi systems,*
 A. Neumayr and W. Metzner, Phys. Rev. B **58**, 15449 (1998).
- 27.** *Reduction formula for fermion loops and density correlations of the 1D Fermi gas,*
 A. Neumayr and W. Metzner, J. Stat. Phys. **96**, 613 (1999).
- 28.** *Thermodynamics of a superconductor with strongly bound Cooper pairs,*
 M. Keller, W. Metzner and U. Schollwöck, Phys. Rev. B **60**, 3499 (1999).

- 29.** *Boundary effects on one-particle spectra of Luttinger liquids,*
 K. Schönhammer, V. Meden, W. Metzner, U. Schollwöck and O. Gunnarson, Phys. Rev. B **61**, 4393 (2000).
- 30.** *Renormalization group analysis of the 2D Hubbard model,*
 C.J. Halboth and W. Metzner, Phys. Rev. B **61**, 7364 (2000).
- 31.** *Luttinger Liquids with Boundaries: Power-Laws and Energy Scales,*
 V. Meden, W. Metzner, U. Schollwöck, O. Schneider, T. Stauber, and K. Schönhammer, Eur. Phys. J. B **16**, 631 (2000).
- 32.** *Superconductivity in the Two-Dimensional Hubbard Model,*
 W. Metzner, Found. Phys. **30**, 2101 (2000).
- 33.** *d-wave Superconductivity and Pomeranchuk Instability in the Two-Dimensional Hubbard Model,*
 C. J. Halboth and W. Metzner, Phys. Rev. Lett. **85**, 5162 (2000).
- 34.** *Inhomogeneous Luttinger Liquids: Power-Laws and Energy Scales,*
 V. Meden, W. Metzner, U. Schollwöck, and K. Schönhammer in *Open Problems in Strongly Correlated Electron Systems*, edited by J. Bonca et al. (Kluwer 2001).
- 35.** *Renormalization Group Analysis of a Two-Dimensional Interacting Electron System,*
 W. Metzner, Int. J. Mod. Phys. A **16**, 1889 (2001)
 (Proc. Second Conference on the Exact Renormalization Group, Rome, 2000).
- 36.** *Dynamical Mean-Field Theory for Pairing and Spin Gap in the Attractive Hubbard Model,*
 M. Keller, W. Metzner, and U. Schollwöck, Phys. Rev. Lett. **86**, 4612 (2001).
- 37.** *Pair-Fluctuation-Induced Pseudogap in the Normal Phase of the Two-Dimensional Attractive Hubbard Model at Weak Coupling,*
 D. Rohe and W. Metzner, Phys. Rev. B **63**, 224509 (2001).
- 38.** *On the Analyticity of Solutions in the Dynamical Mean-Field Theory,*
 Th. Pruschke, W. Metzner, and D. Vollhardt, J. Phys.: Cond. Mat. **13**, 9455 (2001).
- 39.** *Scaling Behavior of Impurities in Mesoscopic Luttinger Liquids,*
 V. Meden, W. Metzner, U. Schollwöck, and K. Schönhammer, Phys. Rev. B **65**, 045318 (2002).
- 40.** *Dynamical Mean-Field Theory for the Normal Phase of the Attractive Hubbard Model,*
 M. Keller, W. Metzner, and U. Schollwöck, J. Low Temp. Phys. **126**, 961 (2002).
- 41.** *A Single Impurity in a Luttinger Liquid: How it "Cuts" the Chain,*
 V. Meden, W. Metzner, U. Schollwöck, and K. Schönhammer, J. Low Temp. Phys. **126**, 1147 (2002).
- 42.** *DMRG Studies of Impurities in Luttinger Liquids,*
 U. Schollwöck, V. Meden, W. Metzner, and K. Schönhammer, Prog. Theor. Phys. Suppl. **145**, 312 (2002).

- 43.** *Renormalization Group Analysis of the Two-Dimensional Hubbard Model: Spin Correlations and D-Wave Superconductivity,*
 W. Metzner, in *Series of Advances in Quantum Many-Body Theory*, Vol. **6**, ed. by R.F. Bishop et al. (World Scientific 2002), p. 303.
- 44.** *Renormalized Perturbation Theory for Fermi Systems: Fermi Surface Deformation and Superconductivity in the Two-Dimensional Hubbard Model,*
 A. Neumayr and W. Metzner, Phys. Rev. B **67**, 035112 (2003).
- 45.** *Soft Fermi Surfaces and Breakdown of Fermi Liquid Behavior,*
 W. Metzner, D. Rohe, and S. Andergassen, Phys. Rev. Lett. **91**, 066402 (2003).
- 46.** *Pairing Transition in a Normal Fermi System with Attractive Interactions,*
 M. Keller, W. Metzner, and U. Schollwöck, in *Recent Trends in Theory of Physical Phenomena in High Magnetic Fields*, ed. by I.D. Vagner et al. (Kluwer 2003), p. 47.
- 47.** *Scaling of the Conductance in a Quantum Wire,*
 V. Meden, S. Andergassen, W. Metzner, U. Schollwöck, and K. Schönhammer, Europhys. Lett. **64**, 769 (2003).
- 48.** *Functional Renormalization Group for Interacting Fermi Systems,*
 W. Metzner, Ann. Henri Poincaré **4**, 775 (2003)
 (Proc. International Conference on Theoretical Physics, Paris 2002).
- 49.** *Renormalization Group Analysis of the Two-Dimensional Hubbard Model: Spin Correlations and d-Wave Superconductivity,*
 W. Metzner, Int. J. Mod. Phys. B **17**, 5279 (2003).
- 50.** *Functional Renormalization Group for Luttinger Liquids with Impurities,*
 S. Andergassen, T. Enss, V. Meden, W. Metzner, U. Schollwöck, and K. Schönhammer, Phys. Rev. B **70**, 075102 (2004).
- 51.** *Renormalization Group Flows into Phases with Broken Symmetry,*
 M. Salmhofer, C. Honerkamp, W. Metzner, and O. Lauscher, Prog. Theor. Phys. **112**, 943 (2004).
- 52.** *Correlation Effects on Resonant Tunneling in One-Dimensional Quantum Wires,*
 V. Meden, T. Enss, S. Andergassen, W. Metzner, and K. Schönhammer, Phys. Rev. B **71**, 041302(R) (2005).
- 53.** *Pseudogap at hot spots in the two-dimensional Hubbard model at weak coupling,*
 D. Rohe and W. Metzner, Phys. Rev. B **71**, 115116 (2005).
- 54.** *Impurity and correlation effects on transport in one-dimensional quantum wires,*
 T. Enss, V. Meden, S. Andergassen, X. Barnabé-Thériault, W. Metzner, and K. Schönhammer, Phys. Rev. B **71**, 155401 (2005).
- 55.** *Semiclassical theory of electron drag in strong magnetic fields,*
 S. Brener and W. Metzner, Pis'ma v ZhETF **81**, 618 (2005) [JETP Letters **81**, 498 (2005)].

- 56.** *Mean-field theory for symmetry-breaking Fermi surface deformations on a square lattice*, H. Yamase, V. Oganesyan, and W. Metzner, Phys. Rev. B **72**, 035114 (2005).
- 57.** *Green functions for nearest- and next-nearest-neighbor hopping on the Bethe lattice*, M. Kollar, M. Eckstein, K. Byczuk, N. Blümer, P. van Dongen, M. H. Radke de Cuba, W. Metzner, D. Tanasković, V. Dobrosavljević, G. Kotliar, and D. Vollhardt, Ann. Phys. (Leipzig) **14**, 642 (2005).
- 58.** *Fermionic renormalization group flow into phases with broken discrete symmetry: charge-density wave mean-field model*, R. Gersch, C. Honerkamp, D. Rohe, and W. Metzner, Eur. Phys. J. B **48**, 349 (2005).
- 59.** *Functional renormalization group computation of interacting Fermi systems*, W. Metzner, Prog. Theor. Phys. Suppl. **160**, 58 (2005).
- 60.** *Magnetic and superconducting correlations in the two-dimensional Hubbard model*, W. Metzner, J. Reiss, and D. Rohe, Phys. stat. sol. **243**, 46 (2006).
- 61.** *Renormalization group analysis of the one-dimensional extended Hubbard model with a single impurity*, S. Andergassen, T. Enss, V. Meden, W. Metzner, U. Schollwöck, and K. Schönhammer, Phys. Rev. B **73**, 045125 (2006).
- 62.** *Fermi surface fluctuations and single electron excitations near Pomeranchuk instability in two dimensions*, L. Dell'Anna and W. Metzner, Phys. Rev. B **73**, 045127 (2006).
- 63.** *Spontaneous Fermi surface symmetry breaking on a square lattice*, H. Yamase, V. Oganesyan, and W. Metzner, Physica B **378-80**, 139 (2006).
- 64.** *Magnetic excitations and their anisotropy in $\text{YBa}_2\text{Cu}_3\text{O}_{6+x}$: Slave boson mean-field analysis of the bilayer t - J model*, H. Yamase and W. Metzner, Phys. Rev. B **73**, 214517 (2006).
- 65.** *Functional renormalization group approach to correlated electron systems*, W. Metzner, in *Lectures on the physics of highly correlated electron systems X*, ed. by A. Avella and F. Mancini (AIP, Melville 2006), p. 130.
- 66.** *Renormalized mean-field analysis of antiferromagnetism and d-wave superconductivity in the two-dimensional Hubbard model*, J. Reiss, D. Rohe, and W. Metzner, Phys. Rev. B **75**, 075110 (2007).
- 67.** *Electrical resistivity near Pomeranchuk instability in two dimensions*, L. Dell'Anna and W. Metzner, Phys. Rev. Lett. **98**, 136402 (2007).
- 68.** *Competition of Fermi surface symmetry breaking and superconductivity*, H. Yamase and W. Metzner, Phys. Rev. B **75**, 155117 (2007).
- 69.** *Theory of in-plane anisotropy of magnetic excitations in $\text{YBa}_2\text{Cu}_3\text{O}_{6+y}$* , H. Yamase and W. Metzner, Physica C **460**, 979 (2007).

- 70.** *Fermi surface fluctuations and breakdown of Fermi liquid behavior*,
W. Metzner and L. Dell'Anna, Physica C **460**, 1105 (2007).
- 71.** *Superconductivity in the attractive Hubbard model*,
R. Gersch, C. Honerkamp, and W. Metzner, New J. Phys. **10**, 045003 (2008).
- 72.** *Renormalization group for phases with broken discrete symmetry near quantum critical points*,
P. Jakubczyk, P. Strack, A.A. Katanin, and W. Metzner, Phys. Rev. B **77**, 195120 (2008).
- 73.** *Renormalization group flow for fermionic superfluids at zero temperature*,
P. Strack, R. Gersch, and W. Metzner, Phys. Rev. B **78**, 014522 (2008).
- 74.** *Non-Fermi liquid behavior from critical Fermi surface fluctuations*,
W. Metzner and L. Dell'Anna, Prog. Theor. Phys. Suppl. **176**, 22-43 (2008).
- 75.** *Nematic order and non-Fermi liquid behavior from a Pomeranchuk instability in a two-dimensional electron system*,
W. Metzner, L. Dell'Anna, and H. Yamase, J. Phys.: Conf. Ser. **150**, 032058 (2009)
(Proc. 25th Int. Conf. on Low Temperature Physics, Amsterdam, 2008).
- 76.** *Turning a first order quantum phase transition continuous by fluctuations: general flow equations and application to d-wave Pomeranchuk instability*,
P. Jakubczyk, W. Metzner, and H. Yamase, Phys. Rev. Lett. **103**, 220602 (2009).
- 77.** *Anomalous scaling of fermions and order parameter fluctuations at quantum criticality*,
P. Strack, S. Takei, and W. Metzner, Phys. Rev. B **81**, 125103 (2010).
- 78.** *Finite temperature crossovers near quantum tricritical points in metals*,
P. Jakubczyk, J. Bauer, and W. Metzner, Phys. Rev. B **82**, 045103 (2010).
- 79.** *Parametrization of Nambu Vertex in a Singlet Superconductor*,
A. Eberlein and W. Metzner, Prog. Theor. Phys. **124**, 471 (2010).
- 80.** *Nematic quantum criticality without order*,
H. Yamase, P. Jakubczyk, and W. Metzner, Phys. Rev. B **83**, 125121 (2011).
- 81.** *Anomalous criticality near semimetal-to-superfluid quantum phase transition in a two-dimensional Dirac cone model*,
B. Obert, S. Takei, and W. Metzner, Ann. Phys. (Berlin) **523**, 621 (2011).
- 82.** *Critical temperature and Ginzburg region near a quantum critical point in two-dimensional metals*,
J. Bauer, P. Jakubczyk, and W. Metzner, Phys. Rev. B **84**, 075122 (2011).
- 83.** *Singular order parameter interaction at the nematic quantum critical point in two-dimensional electron systems*,
S. C. Thier and W. Metzner, Phys. Rev. B **84**, 155133 (2011).
- 84.** *Fermi-Surface Truncation from Thermal Nematic Fluctuations* ,
H. Yamase and W. Metzner, Phys. Rev. Lett. **108**, 186405 (2012).

- 85.** *Functional renormalization group approach to correlated fermion systems*,
 W. Metzner, M. Salmhofer, C. Honerkamp, V. Meden, and K. Schönhammer, Rev. Mod. Phys. **84**, 299 (2012).
- 86.** *Incommensurate nematic fluctuations in two-dimensional metals*,
 T. Holder and W. Metzner, Phys. Rev. B **85**, 165130 (2012).
- 87.** *Incommensurate nematic fluctuations in the two-dimensional Hubbard model*,
 C. Husemann and W. Metzner, Phys. Rev. B **86**, 085113 (2012).
- 88.** *Effective interactions and fluctuation effects in spin-singlet superfluids*,
 A. Eberlein and W. Metzner, Phys. Rev. B **87**, 174523 (2013).
- 89.** *Low-energy singularities in the ground state of fermionic superfluids*,
 B. Obert, C. Husemann, and W. Metzner, Phys. Rev. B **88**, 144508 (2013).
- 90.** *Superconductivity in the two-dimensional $t-t'$ Hubbard model*,
 A. Eberlein and W. Metzner, Phys. Rev. B **89**, 035126 (2014).
- 91.** *Competing order in correlated electron systems made simple: Consistent fusion of functional renormalization and mean-field theory*,
 J. Wang, A. Eberlein, and W. Metzner, Phys. Rev. B **89**, 121116(R) (2014).
- 92.** *From Infinite to Two Dimensions through the Functional Renormalization Group*,
 C. Taranto, S. Andergassen, J. Bauer, K. Held, A. Katanin, W. Metzner, G. Rohringer, and A. Toschi, Phys. Rev. Lett. **112**, 196402 (2014).
- 93.** *Non-Fermi-liquid behavior at the onset of incommensurate $2k_F$ charge- or spin-density wave order in two dimensions*,
 T. Holder and W. Metzner, Phys. Rev. B **90**, 161106(R) (2014).
- 94.** *Functional Renormalization Group Approach to Interacting Fermi Systems: DMFT as a Booster Rocket*,
 W. Metzner, in *Lecture Notes of the Autumn School on Correlated Electrons 2014*, E. Pavarini, E. Koch, D. Vollhardt, and A. Lichtenstein (Eds.).
- 95.** *Anomalous dynamical scaling from nematic and $U(1)$ gauge field fluctuations in two-dimensional metals*,
 T. Holder and W. Metzner, Phys. Rev. B **92**, 041112(R) (2015).
- 96.** *Fermion loops and improved power-counting in two-dimensional critical metals with singular forward scattering*,
 T. Holder and W. Metzner, Phys. Rev. B **92**, 245128 (2015).
- 97.** *Coexistence of Incommensurate Magnetism and Superconductivity in the Two-Dimensional Hubbard Model*, H. Yamase, A. Eberlein, and W. Metzner, Phys. Rev. Lett. **116**, 096402 (2016).
- 98.** *Fermi Surface Reconstruction and Drop in the Hall Number due to Spiral Antiferromagnetism in High- T_c Cuprates*,
 A. Eberlein, W. Metzner, S. Sachdev, and H. Yamase, Phys. Rev. Lett. **117**, 187001 (2016).

- 99.** *Longitudinal fluctuations in the Berezinskii-Kosterlitz-Thouless phase,*
 P. Jakubczyk and W. Metzner, Phys. Rev. B **95**, 085113 (2017).
- 100.** *Nonseparable frequency dependence of the two-particle vertex in interacting fermion systems,*
 D. Vilardi, C. Taranto, and W. Metzner, Phys. Rev. B **96**, 235110 (2017).
- 101.** *Fluctuation effects at the onset of the $2k_F$ density wave order with one pair of hot spots in two-dimensional metals,*
 J. Sýkora, T. Holder, and W. Metzner, Phys. Rev. B **97**, 155159 (2018).
- 102.** *Dynamically enhanced magnetic incommensurability: Effects of local dynamics on nonlocal spin correlations in a strongly correlated metal,*
 D. Vilardi, C. Taranto, and W. Metzner, Phys. Rev. B **97**, 235110 (2018).
- 103.** *Longitudinal conductivity and Hall coefficient in two-dimensional metals with spiral magnetic order,*
 J. Mitscherling and W. Metzner, Phys. Rev. B **98**, 195126 (2018).
- 104.** *Antiferromagnetic and d-wave pairing correlations in the strongly interacting two-dimensional Hubbard model from the functional renormalization group,*
 D. Vilardi, C. Taranto, and W. Metzner, Phys. Rev. B **99**, 104501 (2019).
- 105.** *Phase stiffness in an antiferromagnetic superconductor,*
 W. Metzner and H. Yamase, Phys. Rev. B **100**, 014504 (2019).
- 106.** *Charge carrier drop at the onset of pseudogap behavior in the two-dimensional Hubbard model,*
 P. M. Bonetti, J. Mitscherling, D. Vilardi, and W. Metzner, Phys. Rev. B **101**, 165142 (2020).
- 107.** *Dynamical functional renormalization group computation of order parameters and critical temperatures in the two-dimensional Hubbard model,*
 D. Vilardi, P. M. Bonetti, and W. Metzner, Phys. Rev. B **102**, 245128 (2020).
- 108.** *The nonperturbative functional renormalization group and its applications,*
 N. Dupuis, L. Canet, A. Eichhorn, W. Metzner, J. M. Pawłowski, M. Tissier, and N. Wschebor, Phys. Rep. **910**, 1 (2021).
- 109.** *Fluctuation effects at the onset of $2k_F$ density wave order with two pairs of hot spots in two-dimensional metals,*
 J. Sýkora and W. Metzner, Phys. Rev. B **104**, 125123 (2021).
- 110.** *Non-Hermitian band topology from momentum-dependent relaxation in two-dimensional metals with spiral magnetism,*
 J. Mitscherling and W. Metzner, Phys. Rev. B **104**, L201107 (2021).
- 111.** *Spin stiffness, spectral weight, and Landau damping of magnons in metallic spiral magnets,*
 P. M. Bonetti and W. Metzner, Phys. Rev. B **105**, 134426 (2022).
- 112.** *SU(2) gauge theory of the pseudogap phase in the two-dimensional Hubbard model,*
 P. M. Bonetti and W. Metzner, Phys. Rev. B **106**, 205152 (2022).

113. *Non-Fermi liquid behavior at flat hot spots from quantum critical fluctuations at the onset of charge- or spin-density wave order,*

L. Debbeler and W. Metzner, Phys. Rev. B **107**, 165152 (2023).

114. *Comprehensive mean-field analysis of magnetic and charge orders in the two-dimensional Hubbard model,*

R. Scholle, P. M. Bonetti, D. Vilardi, and W. Metzner, Phys. Rev. B **108**, 035139 (2023).