

UNIVERSITY OF MILAN

Selection procedure for recruiting associate professors under art.18, paragraph 1 and 4, of Law No.240/2010 for competition sector 02/B2 FISICA TEORICA DELLA MATERIA, (scientific disciplinary sector FIS/03) at the Physics Department “Aldo Pontremoli”, (announcement published in Official Gazette No. 35 of 04/05/2021) - Competition code 4584

Adriano Amaricci
CURRICULUM VITAE

PERSONAL DATA

Surname	AMARICCI
Name	ADRIANO
Date of Birth	29 May 1979

CURRENT EMPLOYEMENT

Researcher (III level, permanent position). 1 July 2019- *now*. C.N.R.-Istituto Officina dei Materiali, Ts-SISSA. Trieste, Italy.

PROFESSIONAL EXPERIENCES

Researcher TD type A. 28 March 2018 - 30 June 2019. Condensed Matter group, International School Advanced Studies. Trieste, Italy.

Grant holder researcher (Assegnista di Ricerca). 1 April, 2016 - 15 January, 2018. Condensed Matter group, International School Advanced Studies. Trieste, Italy. Supervisor: Prof. M. Fabrizio.

Grant holder researcher (Assegnista di Ricerca). 16 January, 2011 - 31 March, 2016. C.N.R.-Istituto Officina dei Materiali, Ts-SISSA. Trieste, Italy. Supervisor: Prof. M. Capone.

Post-doctoral researcher. 15 December, 2010 - 15 December, 2011. C.N.R.-Istituto Officina dei Materiali, Ts-SISSA. Trieste, Italy. Supervisor: Prof. M. Capone.

Post-doctoral research associate. April, 2009 - June, 2010. Physics department, Rutgers the state University of New Jersey, USA. Supervisor: prof. G. Kotliar.

April 2018. Short-list for an Assistant Professor position at the Ecole Polytechnique, Palaiseau (FR).

May 2015. Short-list for an Assistant Professor position at the Laboratoire de Physique des Solides, Université Paris-Sud, Orsay (FR).

April 2014. Short-list for a Researcher position at the Department of Theoretical Physics of the Jozef Stefan Institute. Ljubljana (SLO).

EDUCATION

Ph.D. in physics. 16 March, 2009. Laboratoire de Physique des Solides, Université Paris XI, Orsay (France) and Dipartimento di Fisica, Università di Roma “Tor Vergata”, Rome (Italy). Thesis: “*Mottness scenario for the non-Fermi liquid phase in heavy fermions*”. Supervisor: Dr. M.J. Rozenberg. Final Mark: “Trés honorable”, “Cum Laude”

Degree in physics. 27 May, 2004. Dipartimento di Fisica, Università di Roma “La Sapienza”. Thesis: “*Statistical properties of the chaotic flow for an out-of-equilibrium mechanical system*”. Supervisor: prof. G. Gallavotti. Final Mark: 110/110.

RESEARCH

Research interests and achievements

My research activity focuses on the electronic properties of quantum materials and their phase-transitions. These include transition metal oxides, chalcogenides, pnictides or heavy element alloys. All of these systems feature narrow electronic bands making electronic interaction large compared to average kinetic energy. The resulting competing collective behaviours and electron-mediated exchanges are responsible for many surprising phenomena playing a significant role in material science, technological applications and quantum computing. From a general perspective I am interested in the electronic and topological properties at or out-of-equilibrium arising nearby a Mott phase, i.e. an insulating state promoted by strong interaction.

So far, my major contributions to this field concern the non-equilibrium quantum dynamics (Ref. [7] below) and the correlated topological quantum phase transitions (Refs. [11,14]). In [7] I introduced the first description of quantum steady-state dynamics in driven correlated systems, integrating the concept of thermostat as a way to achieve an average energy conservation. In [11,14] I demonstrated the first interaction driven spontaneous gap generation in topological systems, showing that quantum many-body effects can deeply modify topological states. Both these works introduced significant conceptual shifts into their respective areas, as testified by their extensive inclusion in top reviews of the fields.

Researcher Author Identifier

Researcher ID: [H-4183-2012](#), ORCID [0000-0003-0737-987X](#)

Publications

I published a total of **29** (WoS), **30** (Google Scholar) scientific articles in international peer-reviewed journals. In addition 1 preprint is to appear in PNAS and 1 is under review at Computer Physics Communications. In total my publications have a citation count of (April 2021): 487 (WoS), 707 (Google Scholar). My h-index is: 14 (WoS), 16 (Google Scholar). My publications include: 1 Nature Communication, 1 Nano Letters, 4 Physical Review Letters, 1 Journal of Mathematical Physics.

1. **A. Amaricci**, F. Bonetto and P. Falco *Analyticity of the Sinai-Ruelle-Bowen measure for a class of simple Anosov flows*. J. Math. Phys. **48** 072701 (2007).
2. G. Sordi, **A. Amaricci** and M. J. Rozenberg *Metal-Insulator transitions in the periodic Anderson model*. Phys. Rev. Lett., **99**, 196403 (2007).
3. **A. Amaricci**, G. Sordi and M.J. Rozenberg *Non-Fermi liquid behavior in the periodic Anderson model*. Phys. Rev. Lett., **101**, 146403 (2008).

4. G. Sordi, **A. Amaricci** and M. J. Rozenberg *Asymmetry between the electron- and hole-doped Mott transition in the periodic Anderson model*. Phys. Rev. B., **80**, 035129 (2009).
5. **A. Amaricci**, A. Camjayi, D. Tanasković, K. Haule, V. Dobrosaljević and G. Kotliar *Extended Hubbard model: Charge ordering and Wigner-Mott transition*. Phys. Rev. B, **82**, 155102 (2010).
6. **A. Amaricci**, L. de' Medici, G. Sordi, M.J.Rozenberg and M.Capone *A path to poor coherence in heavy fermions from Mott physics and hybridization*. Phys. Rev. B **85**, 235110 (2012).
7. **A. Amaricci**, C. Weber, M. Capone and G. Kotliar *Approach to a stationary state in a driven Hubbard model coupled to a thermostat*. Phys. Rev. B **86**, 085110 (2012).
8. C. Weber, **A. Amaricci**, M. Capone and P. Littlewood *Augmented hybrid exact diagonalization solver for dynamical mean field theory*. Phys. Rev. B **86**, 115136 (2012).
9. **A. Amaricci**, A. Privitera and M. Capone *Inhomogeneous BCS-BEC crossover for trapped cold atoms in optical lattices*. Phys. Rev. A **89**, 053604 (2014).
10. F. Novelli, G. De Filippis, V. Cataudella, M. Esposito, I. Vergara, F. Cilento, E. Sindici, **A. Amaricci**, C. Giannetti, D. Prabhakaran, S. Wall, A. Perucchi, S. dal Conte, G. Cerullo, M. Capone, A. Mishchenko, M. Grüninger, N. Nagaosa, F. Parmigiani and D. Fausti *Witnessing the formation and relaxation of dressed quasi-particles in a strongly correlated electron system*. Nat. Comm. **5**, 141007 (2014)
11. **A. Amaricci**, J. Budich, M. Capone, B. Trauzettel and G. Sangiovanni *First order character and observable signatures of topological quantum phase transitions*. Phys. Rev. Lett. **114**, 185701 (2015).
12. G. Mazza, **A. Amaricci**, M. Capone and M. Fabrizio *Electronic transport and dynamics in correlated heterostructures*. Phys. Rev. B. **91**, 195124 (2015).
13. **A. Amaricci** and M. Capone *Dynamical Mean-Field Theory description of the voltage induced transition in a non-equilibrium superconductor*. Phys. Rev. B. **93**, 014508 (2016).
14. **A. Amaricci**, J. Budich, M. Capone, B. Trauzettel and G. Sangiovanni *Strong Correlation Effects on Topological Quantum Phase Transitions in Three Dimensions..* Phys. Rev. B. **93**, 235112 (2016).
15. G. Mazza, **A. Amaricci**, M. Capone and M. Fabrizio *Field-driven Mott gap collapse and resistive switch in correlated insulators*. Phys. Rev. Lett. **117**, 176401 (2016).
16. A. Valli, **A. Amaricci**, A. Toschi, T. Saha-Dasgupta, K. Held and M. Capone *Effective magnetic correlations in hole-doped graphene nanoflakes*. Phys. Rev. B. **94**, 245146 (2016).
17. K. Kapcia, S. Robaszkiewicz, M. Capone and **A. Amaricci** *Doping driven metal-insulator transitions and charge orderings in the extended Hubbard model*. Phys. Rev. B **95**, 125112 (2017).
18. **A. Amaricci**, L. de Medici and M. Capone *Mott transitions with partially-filled correlated orbitals*. Euro-Phys. Lett **118**, 17004 (2017).
19. **A. Amaricci**, G. Sangiovanni, L. Privitera, F. Petocchi, M. Capone and B. Trauzettel *Edge states reconstruction from strong correlations in quantum spin Hall insulators*. Phys. Rev. B **95**, 205120 (2017).
20. A. Valli, **A. Amaricci**, V. Brosco and M. Capone *Quantum interference assisted spin filtering in graphene nanoflakes*. Nano Lett. 2018, **18**, 3, 2158-2164.
21. F. Grandi, **A. Amaricci**, M. Capone and M. Fabrizio *Correlation-driven Lifshitz transition and orbital order in a two-band Hubbard model*. Phys. Rev. B **98**, 045105 (2018).
22. **A. Amaricci**, A. Valli, G. Sangiovanni, B. Trauzettel and M. Capone *Coexistence of metallic edge states and antiferromagnetic ordering in correlated topological insulators*. Phys. Rev. B **98**, 045133 (2018).
23. M. Angeli, D. Mandelli, A. Valli, **A. Amaricci**, M. Capone, E. Tosatti and M. Fabrizio *Emergent D_6 symmetry in fully-relaxed magic-angle twisted bilayer graphene*. Phys. Rev. B **98**, 235137 (2018).
24. A. Valli, **A. Amaricci**, V. Brosco and M. Capone *Interplay between destructive quantum interference and symmetry-breaking phenomena in graphene quantum junctions*. Phys. Rev. B **100**, 075118 (2019).

25. L. Crippa, **A. Amaricci**, N. Wagner, G. Sangiovanni, J. C. Budich, and M. Capone *Nonlocal annihilation of Weyl fermions in correlated systems*. Phys. Rev. Research **2**, 012023(R) (2020).
26. J. Skolimowski, **A. Amaricci**, and M. Fabrizio *Misuse of the minimal coupling to the electromagnetic field in quantum many-body systems*. Phys. Rev. B **101**, 21104(R) (2020).
27. F. Grandi, **A. Amaricci** and M. Fabrizio *Unraveling the Mott-Peierls intrigue in vanadium dioxide*. Phys. Rev. Research **2**, 013298 (2020).
28. K. Baumann, A. Valli, **A. Amaricci** and M. Capone *Inducing and controlling magnetism in the honeycomb lattice through a harmonic trapping potential*. Phys. Rev. A **101**, 033611 (2020).
29. N. Nilforoushan, M. Casula, M. Caputo, E. Papalazarou, J. Caillaux, Z. Chen, L. Perfetti, **A. Amaricci**, D. Santos-Cottin, Y. Klein, A. Gauzzi, and M. Marsi *Photo-induced renormalization and electronic screening of quasi-two-dimensional Dirac states in BaNiS₂*. Phys. Rev. Research **2**, 043397 (2020).
30. G. Mazza, **A. Amaricci** and M. Capone, *Interface and bulk superconductivity in superconducting heterostructures with enhanced critical temperatures*. Phys. Rev. B **103**, 094514 (2021).

Pre-Prints

1. N. Nilforoushan, M. Casula, **A. Amaricci**, M. Caputo, J. Caillaux, L. Khalil, E. Papalazarou, P. Simon, L. Perfetti, I. Vobornik, P.K. Das, J. Fujii, D. Santos-Cottin, Y. Klein, M. Fabrizio, A. Gauzzi and M. Marsi *Tuning Dirac nodes with correlated d-electrons in BaNiS₂*. arXiv:1905.12210. Under review in Proceedings of the National Academy of Sciences.
2. **A. Amaricci** L. Crippa, A. Scazzola, G. Mazza, L. de Medici and M. Capone *EDIPack: A parallel exact diagonalization package for quantum impurity problems*. arXiv: 2105.06806. Under review in Computer Physics Communications.

Invited talks

1. *Conference ECEPQM20-Electron correlation, Emergent Phenomena, and Quantum Materials* “*Lectiones Amalfitanae*), Amalfi (Italy). 7-10 September 2020, re-scheduled to April 2022.
2. *Correlated Electron Physics beyond the Hubbard Model*, Bremen (Germany). 5-8 February, 2019.
3. *Lectiones Clitumnaliae*, Campello sul Clitunno (It). 31 August, 2018.
4. *Frontiers’ in 2D quantum systems*. Trieste (Italy), 13-17 November 2017.
5. *Cutting-edge topics in quantum materials*. Paris (France), 16-19 October 2017.
6. *Computational methods towards engineering novel correlated materials*. Losanne (Switzerland). 24-26 October, 2016.
7. *New Generations in Strongly Correlated Electrons Systems*. Trogir (HR). 14 September, 2015.
8. *NATO conference, electron correlation in nanostructures*. Odessa (Ukraine). 03 September, 2015.
9. *Condensed Matter Physics in the City*. London (UK). 22 June, 2015.
10. *The 2nd-International Conference of Young Researches on Advanced Materials*. Haikou (CHINA), 24-29 October, 2014.
11. *Non-equilibrium dynamics of Correlated electrons systems*. Krvavec (Slo). 18-20 December, 2013.
12. *Wigner meets Mott: charge ordering and related phenomena in Mott system*. Grenoble (Fr) 16-17 December, 2013.

Presentations

1. Laboratoire de Physique des Solides, Université Paris-Sud. Orsay (Fr). 2 February, 2018.
2. Laboratoire de Physique d'Étude des Matériaux, ESPCI. Paris (Fr). 1 February, 2018.
3. College de France. Paris (Fr). 17 January, 2018.
4. *Fis-Mat 2017*. **Talk & Poster**. Trieste (Italy), 5 October 2017.
5. *What about U? - Effects of Hubbard Interactions and Hund's Coupling in Solids*. **Talk**. Trieste (Italy). 17-21 October, 2016.
6. *SuperFOx 2016*. **Talk**. Turin (Italy). 19-21 September, 2016.
7. *Deutsche Physikalische Gesellschaft'. German Physics Society 79th Spring meeting of condensed matter section*. **Talk**. Berlin (DE). 20 October, 2015.
8. *New Generations in Strongly Correlated Electrons Systems*. **Talk**. Nice (FR). 19 June, 2014.
9. Laboratoire de Physique des Solides. Orsay (Fr). 20 March, 2014.
10. *XCIX Italian Physical Society Conference*. **Talk**. Trieste (It). 23-27 September, 2013.
11. Institut Neël, Institut Laue-Langevin. Grenoble (Fr). 03 December, 2012.
12. Laboratoire de Physique des Solides. Orsay (Fr). 29 November, 2012.
13. Laboratoire de Physique Theorique. Toulouse (Fr). 28 November, 2012.
14. *New Generations in Strongly Correlated Electrons Systems*. Portoroz (SLO). 27 June, 2012.
15. Stephan Institute, Dept. of theoretical physics. Ljubljana. 20 March, 2012.
16. APS March Meeting. Boston (MA), 27 February - 2 March, 2012.
17. *Emerging Trends in Advanced Correlated Materials*. **Talk**. Anacapri (Italy), 6-8 October, 2010.
18. *22nd Condensed Matter Division of European Physical Society Conference*, **Talk**. Rome (Italy). 25-29 August, 2008
19. *Gordon Research Conference "Correlated electron systems"*. **Poster**. University of New England, Biddeford (ME), USA. 8-13 June, 2008.

Conferences organization

New Generation in Strongly Correlated Electrons Systems, 25-30 September 2016. Trieste (Italy).

Participation in International Research Activities

28 March 2018 - 30 June 2019. Post-doctoral researcher within European Research Council StG "FIRSTORM Modeling first-order Mott transitions". Responsible: prof.M.Fabrizio.

01 April 2016 - 15 January 2018. Post-doctoral researcher within European Research Council project "GO-FAST "Governing ultrafast the conductivity of correlated materials". Responsible: prof.M.Fabrizio.

15 January 2012 - 31 March 2016. Post-doctoral researcher within European Research Council StG "SUPER-BAD Superconductivity as a cure for the Bad metallic behavior". Responsible: prof.M.Capone.

Fellowships

Young Research Grant, International School Advanced Studies. October, 2012.

Marie-Curie Early Research Training Fellowship. December, 2005. Laboratoire de Physique des Solides, Université Paris XI, France.

Undergraduate Fellowship September, 2003. Physics Department, University of Rome "La Sapienza".

Referee activity

International Peer review Journals: Physical Review Letter, Physical Review B, Physical Review X, Nature Communication, Europhysics Letter, SciPost.

Funding agencies: Netherlands Organisation for Scientific Research (NWO), National Science Center Poland, Leibnitz Association Germany.

Visiting periods

Laboratoire de Physique d'Étude des Matériaux, ESPCI. Paris (France). January-February 2018.

Theoretical Physics and Astronomy Department, Würzburg University. Würzburg (Germany). November 2012, July 2014, May 2016.

Physics department, Rutgers University. Piscataway, NJ (USA). July-August, 2008.

Physics department, Universidade Estadual de Campinas. Campinas (Brasil). May-June, 2007

Institute Haut Etudes Scientifiques. Bures-sur-Yvette (France). April, 2005

Mathematics department, Rutgers University. Piscataway, NJ (USA). December, 2003

School of Mathematics, Georgia Institute of Technology. Atlanta, Georgia (USA). September-December, 2003

TEACHING

Teaching activity

As a Researcher in a doctoral school my teaching activity predominantly focused on advanced courses to small-groups (5-15 Ph.D. and Master students). Beside such frontal teaching, my activity concerns integrated teaching and student services, e.g. one-to-one supervision of Master and Ph.D. students. The total amount of time dedicated to such activities can be estimated to be around 300h/year.

2020-2021. Teaching assistant for the Ph.D. course “Hartree-Fock for multiband superconductors or for multi-orbital Hubbard models”, International School for Advanced Studies, 12h. Ph.D course.

2018-2019. Teaching assistant for the Ph.D. course “Strongly correlated systems from Fermi liquid to DMFT”, International School for Advanced Studies, 15h. Ph.D course.

2018-2019. “Methods for correlated systems: calculations and computation from topological states to non-equilibrium dynamics”, International School for Advanced Studies, 40h. Ph.D course.

2014-2015. Teaching assistant for the Ph.D. course “Strongly correlated systems from Fermi liquid to DMFT”, International School for Advanced Studies, 15h. Ph.D course.

2005. Mathematics introductory course. Department of Architecture, University of Rome “La Sapienza”. 45h. Undergraduate level L1.

Ph.D. Students

G.Bellomia, SISSA/ISAS, 2019-, with Prof.M.Capone.

F.Paoletti, SISSA/ISAS, 2019-, with Prof.M.Capone.

L.Crippa, SISSA/ISAS, 2016-2020, with Prof.M.Capone (Würzburg University).

F.Grandi, SISSA/ISAS, 2015-2018. with Prof.M.Fabrizio (Erlang University)

F.Petocchi, SISSA/ISAS, 2013-2016, with Prof.M.Capone (Fribourg University)

G.Mazza, SISSA/ISAS, 2012-2015, with Prof.M.Fabrizio (Ambizione fellow at University of Geneva).

Master Students

M.Zendra, Università Cattolica del Sacro Cuore, Brescia 2020, with Prof.C.Giannetti.

F.Paoletti, SISSA/ISAS, 2019, with Prof.M.Capone.

M.Fava, SISSA/ISAS, 2017, with Prof.M.Capone.

Internship Students

A.Bigue, Internship ESPCI, SISSA/ISAS, 2019.

N.Ronceray, Internship, Ecole Polytechnique, SISSA/ISAS, 2018. Awarded: *Prix du stage de recherche 2018*.

S. Körber, Würzburg University, SISSA/ISAS, 2015-2016.

OUTREACH

Science Communication Courses

2019. Science Dialogues - Training course in Science Communication. SISSA-Medialab, Trieste. 20h.

2018. Science Dialogues - Training course in Science Communication. SISSA-Medialab, Trieste. 20h.

Public engagement

2019 - 2021. ReThink project, EU program “Science with and for Society”.

2017 - now. *SISSA 4 Schools*. Scientific Activities for primary and secondary schools. International Schools for Advanced Studies. Trieste (Italy).

2018-2020. *SISSA Student Day*. Scientific activity for last year secondary high schools. International Schools for Advanced Studies. Trieste (Italy).

2017. *Trieste NEXT*. Trieste (Italy).

ADMINISTRATION

Positions of Institutional responsibilities

Board: Delegate to the Institute Board of the CNR-IOM, 2020-now.

Equal Opportunity Committee: External member of the Equal Opportunity Committee (CUG) at the International School for Advanced Studies, 2016-2018.

Academic Senate: Delegate to the Academic Senate of the ISAS/SISSA, 2016-2018.

HPC Administration: Administration of the multi-users high-performance calculation cluster at the Laboratoire de Physique des Solides, Université Paris-Sud XI. 2006-2015

Software development

Responsible for the [QcmPlab](#) Quantum Many-Body software lab, hosting a number of computational tools for research in correlated systems and condensed matter physics.

[ScientificFortran](#): an open source library of scientific tools to support software production for mathematics, physics and engineer.

[DMFTtools](#): an open source library to perform quantum many body and DMFT calculations.

[EDIPack](#) : a massively parallel exact diagonalization package for quantum impurity problems.

[Slave Spins](#): a Slave Spins mean-field library to solve models of strongly correlated electrons on a lattice.

Memberships of scientific societies

2012. Member of the American Physical Society

2020. Member of the American Physical Society

Date: **June 3, 2021**

Place: **Trieste**