

# Gabriele Spada

Via Sommarive 14  
I-38123 Povo, Trento  
Italy

## Curriculum vitae et studiorum

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### Personal Information

date of birth

place of birth

citizenship

identifiers ORCID:0000-0002-3505-8603, BAI:Gabriele.Spada.1, Google Scholar

### Research

- 2020 – present **Post-Doc at Pitaevskii BEC Center, INO-CNR and University of Trento, (IT)**  
Path integral simulations of Bose gases, study of the magnetic properties of Bose mixtures in cold-atom experiments.
- 2018 – 2020 **Post-Doc at Laboratoire Kastler Brossel, ENS, Paris (FR)**  
Study of the superfluid phase of the Fermi-Hubbard model, study of the first-order normal-to-superfluid phase transition for the polarized system. Development of a C++ connected determinant diagrammatic Monte-Carlo code.

### Education

- 2014 – 2018 **PhD in Theoretical Particle Physics, SISSA, Trieste (IT)**  
Supervisors: Prof. Marco Serone, Prof. Giovanni Villadoro  
Thesis: “*The Power of Perturbation Series*”, defended on the 20/09/2018, *cum laude*
- 2011 – 2014 **Master degree in Physics, University of Padova (IT)**  
Supervisors: Prof. Paride Paradisi and Prof. Fabio Zwirner,  
Thesis: “*Flavor physics and supersymmetry after the first run of LHC*”, defended on the 16/09/2014, *110/110 cum laude*
- 2008 – 2011 **Bachelor degree in Physics, University of Padova (IT)**  
Supervisor: Prof. Pieralberto Marchetti,  
Thesis: “*Resonances in Quantum Mechanics*”, defended on the 29/09/2011, *104/110*

### Talks

- 05/09/2023 “Attractive solution of binary Bose mixtures: Liquid-vapor coexistence and critical point”, Universitat Politècnica de Catalunya, Barcelona (ES)
- 06/12/2022 “Phase separation in binary Bose mixtures at finite temperature”, *Seminar on Theoretical Physics of Quantum Matter*, University of Padova (IT)
- 25/05/2022 “Phase separation in Bose mixtures at finite temperature”, *BEC Seminar*, University of Trento (IT)
- 27/10/2021 “Magnetic properties of quantum mixtures”, *PRIN workshop*, Arcetri (IT)
- 26/08/2021 “High-order expansion around BCS theory: Superfluid phase of the attractive Hubbard model”, Short Talk, *17èmes Journées de la Matière Condensée, Société Française de Physique*, on-line

- 15/12/2020 “The polarized Fermi-Hubbard superfluid at large order”, Short Talk, *Exploring Quantum Many-Body Physics with Ultracold Atoms and Molecules*, 735 WE-Heraeus-Seminar, on-line
- 05/04/2019 “Two-dimensional  $\phi^4$  theory at large order”, Séminaire du LPTHE, Campus Jussieu Paris (FR)
- 01/02/2019 Flash talk at Journées de Physique Statistique, ENS Paris (FR)
- 25/05/2018 “ $\lambda\phi^4$  at NNNNNNNLO”, New Frontiers in Theoretical Particle Physics, Cortona (IT)
- 20/02/2018 “ $\phi^4$  revisited: non-perturbative physics from perturbation theory”, LPTHE string seminar, ENS Paris (FR)
- 22/06/2017 “The Power of Series”, PASCOS 2017, IFT Madrid (ES)
- 11/04/2017 “The Power of Series”, Math-Phys Seminar, SISSA Trieste (IT)
- 14/12/2016 “Instantons from Perturbation Theory”, Resurgence, Kavli IPMU (JP)
- 05/12/2016 “Instantons from Perturbation Theory”, Journal Club, ICTP Trieste (IT)

## Teaching Experience

- Feb – Sept 2022 **Teaching and exercises**, *LT1, Department of Information Engineering and Computer Science, University of Trento*  
Course: “**Physics**” held by Albrecht Haase  
Teaching hours: 34h
- Mar – Jun 2021 **Teaching and exercises**, *LM1, Department of Physics, University of Trento*  
Course: “**Quantum theories for multiparticle systems**” held by Giuseppina Orlandini  
Teaching hours: 10h online via Zoom
- Sept – Dec 2019 **Teaching and exercises**, *Licence 1 Maths, Université Paris-Diderot, Paris 7*  
Course: “**Méthodologie de la Physique**”, held by Sylvie Hénon  
Teaching hours: 27h, in French
- Sept – Dec 2019 **Teaching and exercises**, *Licence 1 Chimie, Université Paris-Diderot, Paris 7*  
Course: “**Interactions mathématiques - physique - chimie**”, held by Sylvie Hénon  
Teaching hours: 27h, in French

## Reviewer for International Journals

- 2023 – present *Physical Review Journals*, APS
- 2020 – present *Journal of High Energy Physics*, Springer
- 2020 – present *Physics Letters B*, Elsevier

## Other Activities

- 31/01/2020 **Qualification to *Maître de conférences*** – section 29 “Constituants élémentaires”
- 2016 – 2018 **Student Representative**, *SISSA*, Trieste  
Representative for the Theoretical Particle Physics course. Tasks: organization of student activities, monitoring of didactic activities of the school

## Visiting

- Jul 2019 Center for Computational Quantum Physics, Flatiron Institute, New York (USA)
- Nov 2018 Center for Computational Quantum Physics, Flatiron Institute, New York (USA)
- Oct 2018 UMass, Amherst (USA)
- Feb 2018 ENS, Paris (FR)

## Schools, Conferences and Workshops

- Sept 2023 *QACTUS 2023 workshop*, Barcelona (ES)  
Nov 2022 *Celebrating 20 years of the Trento Center on Bose-Einstein Condensation*, Trento (IT)  
Jul 2022 *SIF course on Quantum Mixtures with Ultra-Cold Atoms*, Varenna (IT)  
Oct 2021 *PRIN workshop*, Villa il Gioiello Arcetri, Firenze (IT)  
Aug 2021 *17èmes Journées de la Matière Condensée, Société Française de Physique*, on-line  
Dec 2020 *Exploring Quantum Many-Body Physics with Ultracold Atoms and Molecules, 735 WE-Heraeus-Seminar*, on-line  
Nov 2020 *Cold-atom On-Line Meeting 2020*, on-line  
Sept 2019 *Non-Perturbative Methods in QFT*, ICTP, Trieste (IT)  
Jul 2019 *Diagrammatic Monte-Carlo*, CCQ Flatiron Institute, New York (USA)  
Oct 2018 *Precision Many Body Physics*, UMass Amherst (USA)  
Oct 2018 *Ultracold Fermions*, Les Houches (FR)  
May 2018 *New Frontiers in Theoretical Particle Physics*, Cortona (IT)  
Jun 2017 *PASCOS 2017*, IFT Madrid (ES)  
Jun 2017 *Summer School on Particle Physics*, ICTP Trieste (IT)  
Mar 2017 *Spring School on Superstring Theory*, ICTP Trieste (IT)  
Dec 2016 *Resurgence*, Kavli IPMU (JP)  
Jul 2016 *Resurgence in Gauge and String Theories*, IST Lisbon (PT)

## Computer skills

■■■■■	C, C++	■■■■■	Wolfram Mathematica
■■■ ■	MPI, OpenMP	■■■■ ■	Bash scripting
■■■■■	python	■■■■ ■	Git, Gitlab
■■■■■	Slurm, PBS, Torque	■■■■■	L <sup>A</sup> T <sub>E</sub> X, Overleaf

## Languages

italian	Native Speaker	
english	Full professional proficiency	<i>Self-assessment: C2</i>
french	Intermediate	<i>Self-assessment: B1</i>

## Awards

- 2008–2009 “*Piano Lauree Scientifiche*” by Società Italiana di Fisica (Amount of 4000€)

## Academic References

### Research

- **Stefano Giorgini**  
*Professor, University of Trento, (IT)*  
stefano.giorgini@unitn.it
- **Marco Serone**  
*Full professor, SISSA Trieste (IT)*  
marco.serone@sissa.it
- **Felix Werner**  
*CNRS researcher, LKB Paris (FR)*  
werner@lkb.ens.fr
- **Giovanni Villadoro**  
*Research scientist, ICTP Trieste (IT)*  
villador@ictp.it

### Teaching

- **Albrecht Haase**  
*Associate professor, University of Trento (IT)*  
albrecht.haase@unitn.it
- **Giuseppina Orlandini**  
*Senior Professor, University of Trento (IT)*  
giuseppina.orlandini@unitn.it
- **Sylvie Hénon**  
*Professor, Université Paris Diderot (FR)*  
sylvie.henon@univ-paris-diderot.fr

## Publications

- [1] G. Spada, S. Giorgini and S. Pilati, *Path-integral monte carlo worm algorithm for bose systems with periodic boundary conditions*, *Condensed Matter* **7** (2022) .
- [2] G. Spada, S. Pilati and S. Giorgini, *Thermodynamics of a dilute bose gas: A path-integral monte carlo study*, *Phys. Rev. A* **105** (2022) 013325.
- [3] G. Sberveglieri, M. Serone and G. Spada, *Self-Dualities and Renormalization Dependence of the Phase Diagram in 3d  $O(N)$  Vector Models*, *JHEP* **02** (2021) 098.
- [4] G. Sberveglieri, M. Serone and G. Spada, *Renormalization scheme dependence, RG flow, and Borel summability in  $\phi^4$  Theories in  $d < 4$* , *Phys. Rev.* **D100** (2019) 045008.
- [5] M. Serone, G. Spada and G. Villadoro,  *$\lambda\phi^4$  Theory II: The Broken Phase Beyond NNNN(NNNN)LO*, *JHEP* **05** (2019) 047.
- [6] M. Serone, G. Spada and G. Villadoro,  *$\lambda\phi^4$  Theory I: The Symmetric Phase Beyond NNNNNNNNLO*, *JHEP* **08** (2018) 148.
- [7] M. Serone, G. Spada and G. Villadoro, *The Power of Perturbation Theory*, *JHEP* **05** (2017) 056.
- [8] M. Serone, G. Spada and G. Villadoro, *Instantons from Perturbation Theory*, *Phys. Rev.* **D96** (2017) 021701.
- [9] D. Ghosh, P. Paradisi, G. Perez and G. Spada, *CP Violation Tests of Alignment Models at LHCII*, *JHEP* **02** (2016) 178.

## Preprints

- [P10] G. Spada, S. Pilati and S. Giorgini, *Attractive solution of binary Bose mixtures: Liquid-vapor coexistence and critical point*, arXiv:2304.12334 (2023).
- [P11] G. Pascual, G. Spada, S. Pilati, S. Giorgini and J. Boronat, *Thermal-induced Local Imbalance in Repulsive Binary Bose Mixtures*, Accepted for publication in Physical Review Research, arXiv:2302.13659 (2023).
- [P12] G. Spada, L. Parisi, G. Pascual, N.G. Parker, T.P. Billam, S. Pilati et al., *Phase separation in binary Bose mixtures at finite temperature*, arXiv:2211.09574 (2022).
- [P13] R. Garioud, I. Šimkovic, F., R. Rossi, G. Spada, T. Schäfer, F. Werner et al., *Symmetry-broken perturbation theory to large orders in antiferromagnetic phases*, arXiv:2210.17423 (2022).
- [P14] G. Spada, R. Rossi, F. Simkovic, R. Garioud, M. Ferrero, K.V. Houcke et al., *High-order expansion around BCS theory*, arXiv:2103.12038 (2021).

## PhD Thesis

- [P15] G. Spada, *The Power of Perturbation Series*, Ph.D. thesis, SISSA, (2018).