# Fabio Guglietta - Curriculum Vitae

(Updated on September 2023)

## Personal Data

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| **Given and family name**: | Fabio Guglietta |
| **Date and place of birth**: | 8 June 1994, Rome (Italy) |
| **Phone number**: | +39 329 438 08 38 |
| **E-mail address**: | fabio.guglietta@roma2.infn.it |
| | f.guglietta94@gmail.com |

## Professional Experience

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| 2023–today | **Researcher (RTDa)** (Tor Vergata University of Rome, Dept. of Physics, Italy) |
| 2021–2023 | **Postdoctoral researcher** (Helmholtz Institute Erlangen-Nürnberg for Renewable Energy (IEK-11), Forschungszentrum Jülich, Germany) |
| 2018–today | **Associate member of INFN** (Istituto Nazionale Fisica Nucleare, Italy) |
| 2018–2021 | **Graduate Research Fellow** (The Cyprus Institute, Cyprus) |

## Teaching Experience

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| 2022–2023 | **Scientific Computing in Engineering II**, *teaching assistant* (Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany) |
| 2017–2020 | **Classical Electrodynamics**, *teaching assistant* (Tor Vergata University of Rome, Italy) |

## Scientific Education

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| 03/2022 | **Joint PhD** (Marie Sklodowska-Curie fellowship) <br> *Topic*: theoretical and computational physics <br> *Institutions*: Tor Vergata University of Rome, The Cyprus Institute, RWTH Aachen University <br> *Thesis title*: Mesoscale investigations on the effects of membrane viscosity on transient red blood cell dynamics <br> *Supervisors*: Prof. Mauro Sbragaglia, Prof. Giannis Koutsou, Prof. Marek Behr |
| 11/2018–11/2021 | European Joint Doctorate in theoretical and computational physics |
| 03/2021–05/2021 | **Secondment at NVIDIA** (Jülich Applications Lab) <br> *Topic*: implementation of Eulerian simulations of blood dynamics on GPUs <br> *Supervisor*: Jiri Kraus. |
| 07/2018 | **Master's degree** <br> *Topic*: theoretical physics <br> *Institution*: Tor Vergata University of Rome <br> *Grade*: 110/110 (cum laude) <br> *Thesis title*: Probabilistic cellular automata in statistical mechanics on GPU computing platforms |
| 10/2016–07/2018 | Studies of theoretical physics at Tor Vergata University of Rome |
| 2018 | **Visiting Student** (Cranfield University) |
| 2016–2017 | **Stage** (Research activity in Theoretical Physics) <br> *Topic*: Irreversible dynamics on one dimensional Ising-type spin system <br> *Institution*: Tor Vergata University of Rome |
| 10/2016 | **Bachelor's degree** <br> *Topic*: physics <br> *Institution*: Tor Vergata University of Rome |
| 10/2013–10/2016 | Studies of physics at Tor Vergata University of Rome |

## Publications

7. **F. Guglietta**, F. Pelusi, M. Sega, O. Aouane and J. Harting (2023). Suspensions of viscoelastic capsules: Effect of membrane viscosity on transient dynamics. *Journal of Fluid Mechanics*, 971, A13.

6. F. Pelusi, **F. Guglietta**, M. Sega, O. Aouane, J. Harting (2023). A sharp interface approach for wetting dynamics of coated droplets and soft particles. *Physics of Fluids*, 35(8): 082126.

5. D. Taglienti, **F. Guglietta** and M. Sbragaglia (2023). Reduced model for droplet dynamics in shear flows at finite capillary numbers. *Physical Review Fluids*, 8(1), 013603.

4. G. Parise, A. Cianchi, A. Del Dotto, **F. Guglietta**, A. R. Rossi and M. Sbragaglia (2022). Lattice Boltzmann simulations of plasma wakefield acceleration. *Physics of Plasmas*, 29(4), 043903.

3. **F. Guglietta**, M. Behr, L. Biferale, G. Falcucci and M. Sbragaglia (2021). Lattice Boltzmann simulations on the tumbling to tank-treading transition: effects of membrane viscosity. *Philosophical Transactions of the Royal Society A*, 379(2208), 20200395.

2. **F. Guglietta**, M. Behr, G. Falcucci and M. Sbragaglia (2021). Loading and relaxation dynamics of a red blood cell. *Soft Matter*, 17(24), 5978-5990. ISO 690

1. **F. Guglietta**, M. Behr, L. Biferale, G. Falcucci and M. Sbragaglia (2020). On the effects of membrane viscosity on transient red blood cell dynamics. *Soft Matter*, 16(26), 6191-6205.

## Research Interest

My research interest mainly concerns the study of the dynamics of viscoelastic *capsules* and *droplets* immersed in Newtonian *fluids*. I developed a code to numerically investigate such systems by using algorithms based on the hybrid *immersed boundary - lattice Boltzmann (IBLB) method* to simulate the fluid and to handle the fluid-structure interaction. I also parallelised this code both on CPUs (by using *MPI*) and on GPUs (by using *CUDA* language). I have also worked on numerical lattice Boltzmann (LB) simulations to reproduce *plasma wakefield acceleration* experiments: we mainly studied the diffusion effects introduced by the LB method which have not been considered so far with other standard numerical solvers employed in the plasma acceleration community. Recently, I have also taken part in a project to investigate the *hydrodynamic properties of some ancient naval rams* that were used during the first Punic war (3rd century BC): since both Roman and Punic naval rams have been found on the seabed, my task is to provide a hydrodynamic characterisation of them to understand which of these two types is more suitable for navigation.

## Computer Skills

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| **Operating systems** | Linux, macOS and Microsoft Windows *(expert user)*. |
| **Programming languages** | Fortran, C, awk, Python *(expert user)*; Julia *(user)*. |
| **Parallel computing** | MPI, OpenMP, CUDA C, CUDA Fortran *(expert user)*. |
| **Open source libraries** | LAPACK, BLAS *(user)*. |
| **Visualisation software** | gnuplot, paraview *(expert user)*. |
| **Packages** | Office, LibreOffice, LaTeX *(expert user)*. |

## Awards, Funding & Fellowship

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| 2022 | - GCS grant, from Jülich Supercomputing Centre (JSC), Forschungszentrum Jülich, Germany<br>    Title: An extended immersed boundary lattice Boltzmann method for wetting dynamics of Ga2O3 droplets<br>    and dynamics of viscoelastic dense suspensions (POLPS) - Awarded 30M core-hours. |
| 2019 | - Funding from Tor Vergata University of Rome for "Detailed Simulation of Red blood Cell Dynamics<br>    accounting for membRane viscoElastic propertieS" (SorCeReS, CUP No. E84I19002470005),<br>    "Beyond Borders 2019" call (PI: Prof. G. Falcucci). |
| 2018 | - Fellow of the "SimulaTIon in MUltiscaLe physicAl and biological sysTEms" (STIMULATE)<br>    European joint doctorate under the European Union's Horizon 2020 research<br>    and innovation programme, grant agreement No. 765048. |

## Contributed Presentations, Posters & Schools

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| 2023 | - Dynamics of Capsules, Vesicles and Cells in Flow (DynaCaps) 2023, Compiègne, France (Talk)<br>- International Conference of Rheology (ICR) 2023, Athens, Greece (Talk) |
| 2022 | - Discrete Simulations in Fluid Dynamics (DSFD) 2022, Suzhou, China (Talk)<br>- DPG Meeting of the Condensed Matter Section, Regensburg, Germany (Talk)<br>- 14th European Fluid Mechanics Conference (EFMC), Athens, Greece (Talk) |
| 2021 | - Discrete Simulations in Fluid Dynamics (DSFD) 2021, Viterbo, Italy (Talk)<br>- Conference on Multiscale Physical and Biological Systems 2021, Paphos, Cyprus (Talk) |
| 2020 | - Discrete Simulations in Fluid Dynamics (DSFD) 2020, Viterbo, Italy (Talk)<br>- Machine and Reinforcement Learning, Rare Events and Tensor Networks, Rome, Italy (School)<br>- Fields and Particles in Turbulence, Rome, Italy (Talk) |
| 2019 | - APS: Discrete Fluid Dynamics (DFD) 2019, Seattle, USA (Talk)<br>- Discrete Simulations in Fluid Dynamics (DSFD) 2019, Bangalore, India (Talk)<br>- Multiscale, multilevel algorithms and uncertainty quantification, Wuppertal, Germany (School)<br>- Mathematical Modeling and Numerical Analysis for Exascale, Berlin, Germany (School)<br>- School on Computational Modelling, Geilo, Norway (School)<br>- School on Fundamentals of Data Science, Ferrara, Italy (School)<br>- Young Researcher Meeting (YRM) 2019, Rome, Italy (Poster) |
| 2018 | - Workshop in High performance computing and simulation, Jülich, Germany (School) |

## Organisation of Conferences/Workshops/Schools

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| 2020 | - Machine and Reinforcement Learning, Rare Events and Tensor Networks, Rome, Italy (School) |

## Students Supervision

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| 2021 | - Diego Taglienti: Master Thesis in Physics, Univeristy of Rome "Tor Vergata".<br>- Gianmarco Parise: Master Thesis in Physics, Univeristy of Rome "Tor Vergata". |
| 2019 | - Diego Taglienti: Bachelor Thesis in Physics, Univeristy of Rome "Tor Vergata". |

## Peer Review

Communications Physics, European Physical Journal E, Soft Matter (The Royal Society of Chemistry), Microfluidics and Nanofluidics, International Journal of Multiphase Flow, Journal of Computational Science, International Journal of Modern Physics C, Computers & Mathematics with Applications, Mathematics and Computers in Simulations, Computer Methods in Applied Mechanics and Engineering.