



Einladung zum Vortrag

“Complex fluids, biology and optics: a soft love”

Roberto Cerbino

Applied Physics, Department of Medical Biotechnology and Translational Medicine,
University of Milan

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Ort: Erwin-Schrödinger-Hörsaal
9. Boltzmannngasse 5, 5. Stock

Abstract:

Soft condensed matter science is a particularly successful example of interbreeding between disciplines. Physics, chemistry, biology, material science, nanotechnology and engineering join forces to understand, describe, explain and predict the behavior of systems as diverse as colloidal suspensions and cell collectives. One of the reasons behind this success is the availability of a countless number of weapons that during the years have been developed and sharpened in all these fields to tackle - experimentally, theoretically and numerically - complex problems of different kind. In this talk, through examples drawn from my own research activity, I will show how the development of innovative optical techniques for the study of complex fluids and biological systems [1-3] worked out as an effective fil rouge throughout my career prompting collaborative and inter-disciplinary research. Beyond briefly surveying recent results and achievements, I will describe in more detail experiments and numerical simulations aimed at understanding jamming and unjamming transitions in dense cell collectives in two and three dimensions [4-8]. Finally, I will present future perspectives and possible applications of my research, both on Earth and in microgravity [9].

- [1] Quantitative optical microscopy of colloids: The legacy of Jean Perrin. R. Cerbino. *Curr. Op. Coll. Int. Science* 34, 47 (2018)
- [2] Perspective: Differential dynamic microscopy extracts multi-scale activity in complex fluids and biological systems. R. Cerbino, P. Cicuta. *J. Chem. Phys* 147, 110901 (2017)
- [3] Digital Fourier Microscopy for Soft Matter Dynamics. F. Giavazzi, R. Cerbino. *J. Opt.* 16, 083001 (2014)
- [4] Endocytic reawakening of motility in jammed epithelia. C. Malinverno, S. Corallino, F. Giavazzi, M. Bergert, Q. Li, A. Disanza, E. Frittoli, A. Oldani, E. Martini, T. Lendenmann, G. Deflorian, G. Beznoussenko, M. Leoni, D. Poulidakos, K. H. Ong, M. Uroz, X. Trepas, D. Parazzoli, P. Maiuri, W. Yu, A. Ferrari, R. Cerbino, G. Scita. *Nature Materials* 16, 587 (2017)
- [5] Giant fluctuations and structural effects in a flocking epithelium. F. Giavazzi, C. Malinverno, S. Corallino, F. Ginelli, G. Scita, R. Cerbino. *J. Phys. D: Appl. Phys.* 50 384003 (2017)
- [6] Flocking Transitions in Confluent Tissues. F. Giavazzi, M. Paoluzzi, M. Macchi, D. Bi, G. Scita, L. Manning, R. Cerbino and M. C. Marchetti. *Soft Matter* 14 3471 (2018)
- [7] Tracking-Free Determination of Single-Cell Displacements and Division Rates in Confluent Monolayers. F. Giavazzi, C. Malinverno, G. Scita, R. Cerbino. *Frontiers in Physics* 6 120 (2018)
- [8] Unjamming overcomes kinetic and proliferation arrest in terminally differentiated cells and promotes collective motility of carcinoma. A. Palamidessi, C. Malinverno, E. Frittoli, S. Corallino, E. Barbieri, S. Sigismund, G. V. Beznoussenko, E. Martini, M. Garre, I. Ferrara, C. Tripodo, F. Ascione, E. A. Cavalcanti-Adam, Q. Li, P. P. Di Fiore, D. Parazzoli, F. Giavazzi, R. Cerbino, G. Scita. *Nature Materials* (2019) accepted for publication
- [9] The NEUF-DIX Space Project - Non-equilibrium fluctuations during Diffusion in complex liquids. P. Baaske, H. Bataller, M. Braibanti, M. Carpineti, R. Cerbino, F. Crococolo, A. Donev, W. Köhler, J. M. Ortiz de Zarate, and A. Vailati. *Eur. Phys. J. E* 39, 119 (2016)

**Im Rahmen des Vortrages findet eine Lehrprobe zum Thema
„Brownian Motion: Theory and Experiment“ statt.**