
Institute of Complex Systems @Sapienza

The scientific mission of the **Institute of Complex Systems (ISC)** of the Research National Council (CNR) is the study of the science of complexity, from fundamental issues to applications. Complex systems are composed by interacting elements which exhibit some emergent properties, ranging from simple particles to entire communities and networks and their study has profound implications in modern physics. The activity includes theory and experiments, not only in the fields of condensed matter but also extending to economics, animal behaviour, neuroscience, soft-matter, photonics, and social dynamics.

The Institute has 4 units (Sapienza, Sesto Fiorentino, Tor Vergata, Montelibretti) that in total involve 63 permanent researchers and 28 post-doctoral scientists. In the period 2011-2014, ISC collected more than 10 million euros from research grants, published 787 papers with more than 6000 google-scholar citations with h-index 39. The publications include 25 articles in Nature journals and 58 Physical Review Letters.



Figure 1: Institute of Complex System @Sapienza.

The main unit of the institute is settled at and strictly collaborates with the Department of Physics of Sapienza University to which the Director, Prof. Claudio Conti, belongs. Young scientists, forming the leading groups in ISC, are worldwide recognized, highly productive, strongly committed to teaching, to master and PhD tutoring and to outreach activities. The research is fully described at www.isc.cnr.it and is both theoretical (th) and experimental (exp) with ISC laboratories [LAB] (described in other pages of this Report) located in the Physics Department. It can be summarized in the leading modern directions like:

- **Soft-matter:**

Self-assembly, gels and glasses, smart materials (th, exp): R. Angelini [LAB], N. Gnan, B. Ruzicka [LAB] (head of the ISC Sapienza Unit), S. Sennato, E. Zaccarelli (ERC-CoG 2015).

Active and biological systems (th): L. Angelani, F. Cecconi, M. Cencini, S. Melchionna.

Applied Physics(Biomedical Physics, Cultural Heritage)(exp): S.Capuani[LAB], M.Missori[LAB].

- **Complexity:**

Flocking and animal behaviour (th, exp): A. Cavagna [LAB], S. Melillo, M. Viale.

Social Dynamics (th): C. Castellano, F. Colaiori, E. La Nave.

Economic Complexity and Complex Network (th): A. Gabrielli (CRISIS Lab project), A. Scala.

Granular systems (th, exp): A. Baldassarri, A. Gnoli, A. Petri [LAB], A. Puglisi [LAB] (ERC StG 2008), A. Sarracino.

Disordered and glassy systems (th): T. Rizzo.

Cosmology (th): M. Montuori.

- **Quantum Complexity:**

Graphene, superconductors, and quantum matter (th, exp): L. Benfatto, E. Cappelluti, R. Larciprete, J. Lorenzana.

Complex photonics and quantum complexity (th, exp): C. Conti [LAB] (ERC StG 2008), S. Gentilini, N. Ghofraniha, L. Pilozzi.

Nanomaterials for the energy (exp): O. Palumbo, A. Paolone [LAB].