

PROJECT YEAR 1 – PRESS RELEASE



The **aim of the GOFAST project** is to develop a joint theoretical-experimental effort to develop and test, for the first time, realistic non-equilibrium models for the ultrafast interaction of femtosecond light pulses with correlated electrons in transition metal oxides. The final goal is to achieve the ultrafast (<100 fs) control of the physical properties of these systems by photoinducing non-thermal final states with novel functionalities.

*The GO FAST project, launched last 1st April 2012, **has achieved its first year of life**. The first results have been achieved and have been presented in Brescia during the I Review meeting, on April 15 and 16, 2013.*

The GO FAST project, full title: “Governing ultrafast the conductivity of correlated materials”, is funded with 1,673,200.00 Euro granted by the European Commission within the 7th Framework Programme.

The project will develop efficient schemes to study electronic, optical and structural properties of correlated materials driven out of equilibrium, in view of achieving an ultrafast optical control of their electronic properties. In particular, advanced tools for dealing with correlated systems, specifically Dynamical Mean Field Theory (DMFT) and the Gutzwiller variational approach, will be extended to model the temporal evolution after high-energy excitations are impulsively photo-injected by ultrafast laser pulses. Realistic modeling will be achieved through validation against the outcomes of different ad-hoc time-resolved techniques. The possibility to optically switch on and off the metallic phase in models of Mott insulators and the superconducting phase in models of high-temperature superconductors will be investigated and tested.

To achieve this goal, a **multidisciplinary network** has been organized that comprises the condensed-matter theory group at SISSA (Trieste), with expertise in strongly correlated systems and density functional theory, and well established European experimental groups in the field of ultrafast spectroscopies, with expertise in time-resolved optical and photoemission spectroscopies, time resolved X-ray and electron diffraction. The mutual and effective collaboration between the theoretical and experimental groups is the key of the project, mandatory to develop and validate realistic models of the ultrafast dynamics in complex materials.

The project has now reached the first year of life and this was characterized by a set of encouraging results: The first year activity comprised the development of all modeling and experimental tools necessary to accomplish the objectives of the project, as well as of the vehicles to efficiently disseminate the project results. This task has been successfully achieved and has already led to more than ten publications on prestigious peer reviewed scientific journals. From the theoretical modeling side, the numerical codes for simulating the out-of-equilibrium dynamics have been implemented and tested on several cases. From the experimental side, all set ups have been made ready and tested, apart from a delay due to a cryostat problem for Participant nr. 2, which is going to be solved soon.

The **GO FAST project** is coordinated by **Prof. Michele Fabrizio** of the Scuola Internazionale Superiore di Studi Avanzati - SISSA (Italy). The GO FAST project involves 7 entities from 4 EU Countries, each of them with specific roles within the project. The consortium is composed by 4 Universities, 2 Research Centers and 1 SME.

The kick-off meeting was held in Trieste, at the Coordinator's premises, with the participation of all project members and the EU Project Officer (Anne De Baas).

Project Partners

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