

**NanoICT Small or medium-scale focused research project:
Nano-Optics for Molecules on Chips
CHIMONO**

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CHIMONO aims at the demonstration of detailed control of molecules realized by means of integrated electric, magnetic, radio frequency, micro wave and optical fields. The possibility of integrating all these components on a microchip and scaling down to the micro-meter scale and beyond will be combined with the ability of preparing and storing molecules in the electronic ground state in close proximity of the microchip surface or adsorbed on dielectric waveguides. Such a combination will offer unrivalled possibilities for the transfer of information between molecular (and/or atomic) states and optical or microwave fields or charged currents. The devices we will realise in this project will be a paradigm for future integrated machines able to control the external and internal degrees of freedom of individual molecules.

The continuous progress of research in the field of ultracold atoms has led to spectacular developments in the past two decades well illustrated by the increasing number of laboratories all over the world engaged in this research, and by the appearance of dedicated Journals and Conferences. The last five years have seen the emergence of two new and important novelties that brought the field of ultracold-atoms in even greater contact with Information and Communication Technology. On the one hand, ultracold atoms have connected to microelectronic technology thanks to the development of the “AtomChip”, on the other hand new methods have been demonstrated to extend the trapping and control techniques from atoms to molecules. At the same time huge progress has been achieved in the detection and control of single atoms.

The objective of CHIMONO is to bring together all the new methodologies in the fields of molecular cooling and control with the innovative technological developments brought forward by “AtomChips” as well as nano-optics. What we aim for is a robust and integrable system that would be able to routinely produce, trap, control and detect of molecules in their electronic and vibrational ground state with the ultimate goal manipulating, addressing and functionalizing the individual molecules.

This ambitious goal will establish a new class of instruments and techniques perfectly fulfilling the pathfinder role that is at the heart of the proactive initiative which states that “...research will establish the scientific and technological foundations of the technologies and innovations of tomorrow, in terms of knowledge, know-how and the readiness of a vibrant research community”.

List of Beneficiaries			
	Beneficiary name	Beneficiary short name	Country
1(coordinator)	Laboratorio Europeo Spettroscopia Non-lineare	LENS	Italy
2	Imperial College London	Imperial	UK
3	Technische Universitaet Wien	TUW	Austria
4	Fritz-Haber-Institut der Max-Planck-Gesellschaft	MP	Germany
5	Johannes Gutenberg-Universität Mainz	JOGU MAINZ	Germany
6	Rheinische Friedrich-Wilhelms-Universität Bonn	UBONN	Germany