



ETTORE MAJORANA FOUNDATION AND CENTRE FOR SCIENTIFIC CULTURE

1963–2023

60th ANNIVERSARY OF ACTIVITIES



INTERNATIONAL SCHOOL OF NONEQUILIBRIUM PHENOMENA

3rd Workshop: WAVEGUIDE QUANTUM ELECTRODYNAMICS (WQED23)

ERICE-SICILY: 8 – 13 MAY 2023

Sponsored by the: • Italian Ministry of Education, University and Scientific Research • Sicilian Regional Government

PROGRAMME AND LECTURERS

Opportunities in waveguide QED simulators

- A. GONZALEZ-TUDELA, Instituto de Física Fundamental-CSIC, Madrid, ES

Waveguide QED with quantum dots

- P. LODAHL, Niels Bohr Institute, University of Copenhagen, Copenhagen, DK

Loophole-free bell inequality violation with superconducting circuits

- A. WALLRAFF, ETH Zurich, Zurich, CH

Controlling light using ordered atomic arrays

- J. ZEIJER, Max-Planck-Institute of Quantum Optics, Garching, DE

Quantum simulators in Josephson waveguides

- S. FLORENS, NEEL Institute – CNRS, Grenoble, FR

Chiral quantum optics in the bulk a photonic quantum Hall system

- D. DE BERNARDIS, Università di Trento, Trento, IT

Many-body decay in waveguide QED

- A. ASENJO-GARCIA, Columbia University, New York, US

Quantum information and energy exchange in cQED

- A. JORDAN, Chapman University, Orange, CA, US

Kardar-Parisi-Zhang universality in a one-dimensional polariton condensate

- S. RAVETS, Université Paris-Saclay, Palaiseau, FR

Optical nanofibres and nanofibre-based cavities

- S.N. CHORMAIC, OIST Graduate University, Okinawa, JP

Multiple-excited subradiant states

- A. PODDUBNY, Weizmann Institute of Science, Rehovot, IL

Topological amplification in quantum driven-dissipative chains

- D. PORRAS, Instituto de Física Fundamental-CSIC, Madrid, ES

Interacting photons in 2D waveguide QED

- G. CALAJO, INFN-Padova, Padova, IT

Waveguide QED in the dipole gauge

- D. ZUECO, CSIC-Universidad de Zaragoza, Zaragoza, ES

Quantum optics with photonic and atomic crystals

- A. GORSHKOV, NIST and University of Maryland, College Park, MD, US

Coupling single atoms to a nanophotonic whispering-gallery-mode resonator

- C.-L. HUNG, Purdue University, West Lafayette, IN, US

Intrinsic Purcell filters and their applications in cavity and waveguide QED

- Y. NAKAMURA, RIKEN Center for Quantum Computing, Tokyo, JP

Josephson waveguides: a new platform for quantum optics

- N. ROCH, Institut Néel, CNRS, Grenoble, FR

Waveguide QED with matter waves

- D. SCHNEBLE, Stony Brook University, Stony Brook, CA, US

Slowing down microwave photons with superconducting qubits

- A. USTINOV, Karlsruhe Institute of Technology, Karlsruhe, DE

Laser-driven superradiant atomic ensembles

- I. FERRIER-BARBUT, Institut d'Optique CNR, FR

Engineering Qubit-Qubit Interactions in Circuit QED Lattices

- A. KOLLAR, University of Maryland and JQI, College Park, MD, US

Giant Artificial Atoms and Waveguide QED

- W. OLIVER, MIT, Cambridge, CA, US

Many-qubit entanglement and dissipative spin chain physics using waveguide QED

- A. CLERK, University of Chicago, IL, US

Flying and stationary qubits – an open systems approach

- K. MOELMER, Niels Bohr Institute, Aarhus, DK

Waveguide-QED as quantum links between quantum computers

- J.J. GARCIA-RIPOLL, IFF-CSIC, Madrid, ES

Optical manipulation of topological and correlated states of electrons

- M. HAFEZI, University of Maryland, College Park, MD, US

Finite-size effects and multimerization in an array of emitters coupled to a waveguide

- S. PASCÁZIO, University of Bari, Bari, IT

Observation of superradiant bursts in waveguide quantum electrodynamics

- A. RAUSCHENBEUTEL, HU Berlin, Berlin, DE

Quantum optics with cold atoms trapped along nanowaveguides

- J. LAURAT, Sorbonne Université, Paris, FR

From Dipolar to Rydberg Photonics

- H. ALAEIAN, Purdue University, IN, US

PURPOSE OF THE WORKSHOP

The Course Waveguide Quantum Electrodynamics is the 2023 edition of the workshop series WQED. Waveguide Quantum ElectroDynamics (QED) is an emerging area of quantum optics that investigates the coherent coupling between one or more quantum emitters and a photonic waveguide or, more generally, an engineered photonic bath. Potential important applications fall within the general framework of quantum technologies as well as photonics. The workshop will bring together leading theoretical and experimental experts from variegated areas (such as circuit QED and quantum nanophotonics) and make them interact within an interdisciplinary environment in order to seed new ideas in this fertile field of research, including new trending paradigms such as photon bound states in 1D photonic waveguides, novel nonlinear phenomena, topological quantum photonics and atomic waveguides.

APPLICATIONS

Persons wishing to attend the Workshop should send an application, by electronic mail, to:
Professor Bernardo Spagnolo email: bernardo.spagnolo@unipa.it

Specifying: i) Date and place of birth together with present nationality ii) Present position and place of work iii) An abstract, if they wish to give a contribution (oral or poster)

• PLEASE NOTE

Participants must arrive in Erice no later than 12 a.m. on 8th May 2023.

POETIC TOUCH

According to legend, Erice, son of Venus and Neptune, founded a small town on top of a mountain (750 metres above sea level) more than three thousand years ago. The founder of modern history — i.e. the recording of events in a methodic and chronological sequence as they really happened without reference to mythical causes — the great Thucydides (~500 B.C.), writing about events connected with the conquest of Troy (1183 B.C.) said: «*After the fall of Troy some Trojans on their escape from the Achaei arrived in Sicily by boat and as they settled near the border with the Sicani all together they were named Elymi: their towns were Segesta and Erice.*»

This inspired Virgil to describe the arrival of the Trojan royal family in Erice and the burial of Anchises, by his son Aeneas, on the coast below Erice. Homer (~1000 B.C.), Theocritus (~300 B.C.), Polybius (~200 B.C.), Virgil (~50 B.C.), Horace (~20 B.C.), and others have celebrated this magnificent spot in Sicily in their poems. During seven centuries (XIII-XIX) the town of Erice was under the leadership of a local oligarchy, whose wisdom assured a long period of cultural development and economic prosperity which in turn gave rise to the many churches, monasteries and private palaces which you see today.

In Erice you can admire the Castle of Venus, the Cyclopean Walls (~800 B.C.) and the Gothic Cathedral (~1300 A.D.). Erice is at present a mixture of ancient and medieval architecture. Other masterpieces of ancient civilization are to be found in the neighbourhood: at Motya (Phoenician), Segesta (Elymian), and Selinunte (Greek). On the Aegadian Islands — theatre of the decisive naval battle of the first Punic War (264-241 B.C.) — suggestive neolithic and paleolithic vestiges are still visible: the grottoes of Favignana, the carvings and murals of Levanzo.

Splendid beaches are to be found at San Vito Lo Capo, Scopello, and Cornino, and a wild and rocky coast around Monte Cofano: all at less than one hour's drive from Erice.

More information about the activities of the Ettore Majorana Foundation

can be found on the WWW at the following address:

<https://ettoremajoranafoundation.it>