TÜBİTAK TBAE **RESEARCH INSTITUTE FOR FUNDAMENTAL SCIENCES**

School on Quantum Photonics: Principles and Applications

March 13 – 16 2023 Gebze, TÜRKİYE

Program

March 13, Monday

09:00 – 09:50	*Breakfast*	*Breakfast*
10:00 – 10:15	**Hasan Mandal (President of TÜBİTAK)**	**Welcome Speech**
10:20 – 11:10	**Angelo Bassi**	**Quantum Mechanics and its Foundations:** The axioms of quantum mechanics and the role of the wave function. The measurement problem, Bohmian mechanics and Collapse Models.
11:10 – 12:00	**Vahid Karimipour**	**Classical Computation:** Theorems and proofs in mathematics, the need for and meaning of algorithms, Turing machines.
12:00 – 14:00	*Lunch*	*Lunch*
14:00 – 14:50	**Angelo Bassi**	**Quantum Mechanics and its Foundations:** The axioms of quantum mechanics and the role of the wave function. The measurement problem, Bohmian mechanics and Collapse Models.
15:10 – 16:00	**Vahid Karimipour**	**Quantum Computation:** Quantum algorithms and quantum Turing machines, Models of quantum computation.

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Program

March 14, Tuesday

09:00 – 09:50	*Breakfast*	*Breakfast*
10:00 – 10:50	**Vahid Karimipour**	**Classical Information:** The intuitive meaning of information, Shannon entropy, compression and transmission of information.
11:10 – 12:00	**Angelo Bassi**	**Quantum Non-locality:** Completeness and incompleteness in quantum mechanics. The EPR paradox. Bell's theorem.
12:10 – 13:00	**Vahid Karimipour**	**Public Lecture:** A Short Review of Cryptography from Ancient Times to the Modern Day
13:00 – 14:00	*Lunch*	*Lunch*
14:00 – 14:50	**Angelo Bassi**	**Quantum Non-locality:** Completeness and incompleteness in quantum mechanics. The EPR paradox. Bell's theorem
15:10 – 16:00	**Vahid Karimipour**	**Quantum Information:** What is quantum information? von-Neumann entropy, compression and transmission of quantum information.

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Program

March 15, Wednesday

09:00 – 09:50	*Breakfast*	*Breakfast*
10:00 – 10:50	**Angelo Bassi**	**From Non-locality to Quantum Cryptography:** Non faster-than-light signalling and teleportation, No cloning theorem and BB84 protocol for quantum cryptography.
11:10 – 12:00	**Vahid Karimipour**	**Quantum Error Correction - I:** Classical and quantum errors, Simple quantum error correcting codes, General theorems.
12:10 – 13:00	**Angelo Bassi**	**Public Lecture:** We Live in a Quantum World
13:00 – 14:00	*Lunch*	*Lunch*
14:00 – 14:50	**Vahid Karimipour**	**Quantum Error Correction - II:** The Shor code, The stabilizer formalism, The 5 qubit code.
15:10 – 16:00	**Angelo Bassi**	**From Non-locality to Quantum Cryptography:** Non faster-than-light signalling and teleportation, No cloning theorem and BB84 protocol for quantum cryptography.

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Program

March 16, Thursday

10:00 – 12:00	**Vahid Karimipour**	**General Discussions**
12:00 – 12:15	Closing	