



SUMMER SCHOOL

MODERN TRENDS IN QUANTUM SCIENCE AND TECHNOLOGIES:

FROM QUANTUM MATERIALS TO QUANTUM INFORMATION

September 22 – October 02, 2022

BAKU STATE UNIVERSITY | BAKU, AZERBAIJAN

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September 22, Thursday

Arrival of lecturers and participants

18:30 - 20:00	Welcome reception, dinner
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September 23, Friday

Opening Ceremony Baku State University, Main Hall

[Link to session](#)

08:30 - 10:00	Registration
10:00 - 10:30	Opening Ceremony/Group Photo

Morning session

Chair: George Japaridze (Georgia)

[Link to session](#)

10:30 - 11:30	AN EXACT SOLUTION TO THE NON-RECTANGULAR QUANTUM WELL NANOSTRUCTURES EXHIBITING ASYMMETRICAL CONFINEMENT EFFECT Elchin Jafarov <i>Institute of Physics, Azerbaijan</i>
11:30 - 12:00	Coffee Break
12:00 - 13:00	SUBGAP STATES IN SUPERCONDUCTORS Felix Von Oppen <i>Free University of Berlin, Germany</i>
13:00 - 14:00	Lunch

Afternoon session

Chair: Nazim Mamedov (Azerbaijan)

[Link to session](#)

15:00 - 16:00	QUANTUM CONTROL OF ELECTRONIC AND NUCLEAR SPIN QUBITS: MAXIMISING FIDELITY AND SPEED WITH MINIMAL RESOURCES Dieter Suter <i>TU Dortmund University, Germany</i>
16:00 - 16:30	Coffee Break
16:30 - 17:30	SUBGAP STATES IN SUPERCONDUCTORS Felix Von Oppen <i>Free University of Berlin, Germany</i>
17:30 - 18:00	INFORMAL DISCUSSIONS
18:30 - 20:00	Dinner

Morning session

Chair: Felix von Oppen (Germany)

[Link to session](#)

10:00 - 11:00	<p>ARTIFICIAL ATOMS IN GRAPHENE AS "TABLE TOP" FACILITY FOR TESTING OF ULTRARELATIVISTIC PHYSICS</p> <p>Davron Matrasulov <i>Turin Polytechnic University, Uzbekistan</i></p>
11:00 - 11:30	Coffee Break
11:30 - 12:30	<p>ARTIFICIAL ATOMS IN GRAPHENE AS "TABLE TOP" FACILITY FOR TESTING OF ULTRARELATIVISTIC PHYSICS</p> <p>Davron Matrasulov <i>Turin Polytechnic University, Uzbekistan</i></p>
12:30 - 13:00	<p>OPTICAL PROPERTIES OF GeSb₂Te₄ COMPOUND IN THE mid-IR REGION OF THE REFLECTION SPECTRUM</p> <p>Dunyamali Mammadov <i>Institute of Physics, Azerbaijan</i></p>
13:00 - 14:00	Lunch

Afternoon session

Chair: Iman Askerbeyli (Turkey)

[Link to session](#)

15:00 - 16:00	<p>QUANTUM CONTROL OF ELECTRONIC AND NUCLEAR SPIN QUBITS: MAXIMISING FIDELITY AND SPEED WITH MINIMAL RESOURCES</p> <p>Dieter Suter <i>TU Dortmund University, Germany</i></p>
16:00 - 16:30	Coffee Break
16:30 - 17:30	<p>INTRODUCTION TO TIME CRYSTALS (ONLINE)</p> <p>Rosario Fazio <i>The Abdus Salam International Centre for Theoretical Physics, Italy</i></p>
17:30 - 18:00	<p>METAMATERIALS - PERSPECTIVE OPTICAL FREQUENCY CONVERTERS</p> <p>Shahmardan Amirov <i>Baku State University, Azerbaijan</i></p>
18:30 - 20:00	Dinner

September 25, Sunday

Free day

Tour in Baku

September 26, Monday

Morning session

Chair: Giulio Casati (Italy)

[Link to session](#)

10:00 - 11:00	INTRODUCTION TO QUANTUM INFORMATION AND COMPUTATION Yasser Omar <i>University of Lisbon, Portugal</i>
11:00 - 11:30	Coffee Break
11:30 - 12:30	ON QUANTUM RESOURCE THEORIES Dagmar Bruss <i>Heinrich-Heine University Duesseldorf, Germany</i>
12:30 - 13:00	PLASMON RESONANCE IN THE IR SPECTRUM ON Bi_2Se_3 AND Sb_2Te_3 3D TOPOLOGICAL INSULATORS Elvin Alizade <i>Institute of Physics, Azerbaijan</i>
13:00 - 14:00	Lunch

Afternoon session

Chair: Dieter Suter (Germany)

[Link to session](#)

15:00 - 16:00	AN OVERVIEW ON QUANTUM COOLING FOR POTENTIAL QUANTUM TECHNOLOGIES DOWN TO mK RANGE Ali Gencer <i>Ankara University, Türkiye</i>
16:00 - 16:30	Coffee Break
16:30 - 17:30	TUNABLE QUANTUM TRANSPORT IN NETWORKS: FROM TRANSPARENT TO PT-SYMMETRIC QUANTUM GRAPHS Jambul Yusupov <i>Yeoju Technical Institute in Tashkent, Uzbekistan</i>
17:30 - 18:00	UNCONVENTIONAL ORDERED PHASES IN THE GROUND STATE PHASE DIAGRAM OF THE HALF-FILLED t-t' IONIC HUBBARD CHAIN Shota Garuchava <i>Ilia State University, Georgia</i>
18:30 - 20:00	Dinner

Morning session

Chair: Dagmar Bruss (Germany)

[Link to session](#)

11:00 - 12:00	<p>QUANTUM CHAOS AND THE CORRESPONDENCE PRINCIPLE</p> <p>Giulio Casati <i>University of Insubria, Italy</i></p>
12:00 - 13:00	<p>SELF-TRAPPED OPTICAL VORTICES AND QUANTUM DROPLETS: SIBLINGS IN THE SOLITON FAMILY</p> <p>Boris Malomed <i>Tel-Aviv University, Israel</i></p>
13:00 - 14:00	Lunch

Afternoon session

Chair: Boris Malomed (Israel)

[Link to session](#)

15:00 - 16:00	<p>INTRODUCTION TO QUANTUM INFORMATION AND COMPUTATION</p> <p>Yasser Omar <i>University of Lisbon, Portugal</i></p>
16:00 - 16:30	Coffee Break
16:30 - 17:30	<p>QUANTUM PHASE TRANSITION IN THE HALF-FILLED ZIG-ZAG LADDER WITH IMBALANCED LEGS</p> <p>George Japaridze <i>Ilya State University, Georgia</i></p>
17:30 - 18:00	<p>QUANTUM DYNAMICS OF A HYDROGEN-LIKE ATOM IN A TIME-DEPENDENT BOX</p> <p>Saparboy Rakhmonov <i>Chirchik State Pedagogical Institute, Uzbekistan</i></p>
18:30 - 20:00	Dinner

Morning session

Chair: Mikhail Kiselev (Italy)

[Link to session](#)

10:00 - 11:00	FROM ANOMALOUS TO TOPOLOGICAL JOSEPHSON EFFECTS-1 Reinhold Egger <i>Heinrich-Heine University Duesseldorf, Germany</i>
11:00 - 11:30	Coffee Break
11:30 - 12:30	MAJORANA EDGE MODES IN TOPOLOGICAL SUPERCONDUCTORS (ONLINE) Carlo Beenakker <i>Leiden University, Netherlands</i>
12:30 - 13:00	QUANTUM TRANSPORT AND BAND SPECTRA IN BRANCHED DISCRETE LATTICES Mashrab Akramov <i>National University of Uzbekistan, Uzbekistan</i>
13:00 - 14:00	Lunch

Afternoon session

Chair: Davron Matrasulov (Uzbekistan)

[Link to session](#)

15:00 - 16:00	FROM ANOMALOUS TO TOPOLOGICAL JOSEPHSON EFFECTS-2 Reinhold Egger <i>Heinrich-Heine University Duesseldorf, Germany</i>
16:00 - 16:30	Coffee Break
16:30 - 17:30	KONDO EFFECT IN NANOSTRUCTURES Mikhail Kiselev <i>The Abdus Salam International Centre for Theoretical Physics, Italy</i>
17:30 - 18:00	THE INFLUENCE OF PARAMETERS OF THE ENVIRONMENT ON THE PHYSICAL PROPERTIES OF NANOMATERIALS Lala Gahramanli <i>Baku State University, Azerbaijan</i>
18:30 - 20:00	Dinner

Morning session

Chair: Yasser Omar (Portugal)

[Link to session](#)

10:00 - 11:00	<p>QUANTUM OPTIMIZATION APPROXIMATE ALGORITHMS AS A MULTIPHOTON RAMAN EXCITATION OF A QUASI-CONTINUUM EDGE</p> <p>Aikaterini Mandilara <i>National and Kapodistrian University of Athens, Greece</i></p>
11:00 - 11:30	Coffee Break
11:30 - 12:30	<p>MAJORANA EDGE MODES IN TOPOLOGICAL SUPERCONDUCTORS (ONLINE)</p> <p>George Tsironis <i>University of Crete, Greece</i></p>
12:30 - 13:00	<p>PHOTOCATALYTIC PHENOMENA ON THE SURFACE OF DEFECT-STRUCTURAL CRYSTAL WITH ADSORBED NANOPARTICLES</p> <p>Fidan Ahmadova <i>Baku State University, Azerbaijan</i></p>
13:00 - 14:00	Lunch

Afternoon session

Chair: George Tsironis (Greece)

[Link to session](#)

15:00 - 16:00	<p>SUPERCONDUCTING QUBITS</p> <p>Iman Askerbeyli <i>Ankara University, Türkiye</i></p>
16:00 - 16:30	Coffee Break
16:30 - 17:30	<p>MULTISTAGE KONDO EFFECT IN MODULAR QUANTUM INTERFEROMETERS</p> <p>Mikhail Kiselev <i>The Abdus Salam International Centre for Theoretical Physics, Italy</i></p>
17:30 - 18:30	<p>LEARNING AND CONTROL FOR QUANTUM SYSTEMS (ONLINE)</p> <p>Barry Sanders <i>University of Calgary, Canada</i></p>
18:30 - 20:00	Dinner

Morning session

Chair: Reinhold Egger (Germany)

[Link to session](#)

10:00 - 11:00	<p>QUANTUM MEASUREMENT AND QUANTUM STEERING</p> <p>Yuval Gefen <i>Weizmann Institute of Science, Israel</i></p>
11:00 - 11:30	Coffee Break
11:30 - 12:30	<p>BLOCH OSCILLATIONS IN THE MAGNETOCONDUCTANCE OF TWISTED BILAYER GRAPHENE (ONLINE)</p> <p>Carlo Beenakker <i>Leiden University, Netherlands</i></p>
12:30 - 13:00	<p>THE EFFECTS OF THERMAL ANNEALING AND GAMMA RADIATION ON THE PHYSICAL PROPERTIES OF NANOCOMPOSITES BASED ON GO/PVA</p> <p>Mahammad Baghir Baghirov <i>Baku State University, Azerbaijan</i></p>
13:00 - 14:00	Lunch

Afternoon session

Chair: Ali Gencer (Turkey)

[Link to session](#)

15:00 - 16:00	<p>QUANTUM MEASUREMENT AND QUANTUM STEERING</p> <p>Yuval Gefen <i>Weizmann Institute of Science, Israel</i></p>
16:00 - 16:30	Coffee Break
16:30 - 17:30	<p>SUPPRESSION OF THE QUANTUM-MECHANICAL COLLAPSE BY REPULSIVE INTERACTIONS IN BOSONIC GASES</p> <p>Boris Malomed <i>Tel-Aviv University, Israel</i></p>
17:30 - 18:00	INFORMAL DISCUSSIONS
18:30 - 20:00	Dinner

October 01, Saturday

Morning session

Chair: Jambul Yusupov (Uzbekistan)

[Link to session](#)

10:00 - 11:00	LATTICE DYNAMICS OF Bi_2Te_3 AND VIBRATIONAL MODES IN RAMAN SCATTERING OF TOPOLOGICAL INSULATORS MnBi_2Te_4 (Bi_2Te_3) Nazim Mamedov <i>Institute of Physics, Azerbaijan</i>
11:00 - 11:30	Coffee Break
11:30 - 12:30	CONCLUDING REMARKS. CLOSING OF THE SCHOOL
13:00 - 14:00	Lunch
18:30 - 20:00	Dinner

October 02, Sunday

Departure of lecturers and participants
