AGENTÚRA
NA PODPORU
VÝSKUMU A VÝVOJA

Agentúra na podporu výskumu a vývoja
Mýtna 23, P.O.BOX 839 04, 839 04 Bratislava 32

Formulár ZK

Záverečná karta projektu

Názov projektu **Optimalizačné metódy pre kvantové technológie**

Evidenčné číslo projektu **APVV-18-0518**

Zodpovedný riešiteľ **doc. Mario Ziman, PhD.**

Príjemca **Fyzikálny ústav SAV, v. v. i.**

Názov pracoviska, na ktorom bol projekt riešený

Fyzikálny ústav SAV, v. v. i.

Názov a štát zahraničného pracoviska, ktoré spolupracovalo pri riešení

n.a.

Udelené patenty/podané patentové prihlášky, vynálezy alebo úžitkové vzory, ktoré sú výsledkami projektu

n.a.

Najvýznamnejšie publikácie (knihy, články, prednášky, správy a pod.) zhrňujúce výsledky projektu – uveďte aj publikácie prijaté do tlače

David Davalos, Mário Ziman: Quantum dynamics is not strictly bidivisible, Phys. Rev. Lett. 130, 080801 (2023)
Mohd Asad Siddiqui, Sk Sazim: Mermin and Svetlichny inequalities for non-projective measurement observables, J. Phys. A: Math. Theor. 55 465301 (2022)
Saubhik Sarkar, Chiranjib Mukhopadhyay, Abhijeet Alase, Abolfazl Bayat: Free-Fermionic Topological Quantum Sensors, Phys. Rev. Lett. 129, 090503 (2022)
Hazhir Dolatkhah, Saeed Haddadi, Soroush Haseli, Mohammad Reza Pourkarimi, Mário Ziman: Tripartite quantum-memory-assisted entropic uncertainty relations for multiple measurements, The European Physical Journal Plus 137, 1163 (2022)
Teiko Heinosaari, Leevi Leppäjärvi: Random access test as an identifier of nonclassicality, J. Phys. A: Math. Theor. 55, 174003 (2022)
Jozef Genzor, Andrej Gendiar, Ying-Jer Kao: J1-J2 fractal studied by multirecursion tensor-network method, Phys. Rev. E 105, 024124 (2022)
Seyed Arash Ghoreishi, Mário Ziman: Minimum-error discrimination of thermal states, Phys. Rev. A 104, 062402 (2021) , DOI: 10.1103/PhysRevA.104.062402
Harry J. D. Miller, M. Hamed Mohammady, Martí Perarnau-Llobet, Giacomo Guarnieri: Thermodynamic uncertainty relation in slowly driven quantum heat engines, Physical Review Letters 126, 210603 (2021) , DOI: 10.1103/PhysRevLett.126.21060
Sk Sazim, Michal Sedlák, Kratveer Singh, and Arun Kumar Pati: Classical Communications with Indefinite Causal Order for N completely depolarizing channels, Phys. Rev. A 103, 062610 (2021) , DOI: 10.1103/PhysRevA.103.062610
Harry J. D. Miller, M. Hamed Mohammady, Martí Perarnau-Llobet, Giacomo Guarnieri: Joint

statistics of work and entropy production along quantum trajectories, Phys. Rev. E 103, 052138 (2021), DOI: 10.1103/PhysRevE.103.052138
Leevi Leppäjärvi, Michal Sedlák: Post-processing of quantum instruments, Phys. Rev. A 103, 022615 (2021), DOI: 10.1103/PhysRevA.103.022615
Daniel Nagaj, Dominik Hangleiter, Jens Eisert, Martin Schwarz: Pinned QMA: The power of fixing a few qubits in proofs, Physical Review A 103, 012604 (2021), DOI: 10.1103/PhysRevA.103.012604
Michal Sedlák, Mário Ziman: Probabilistic storage and retrieval of qubit phase gates, Physical Review A 102, 032618 (2020)
Martin Plávala, Mário Ziman: Popescu-Rohrlich box implementation in general probabilistic theory of processes, Physics Letters A 384, 126323 (2020)

Uplatnenie výsledkov projektu

Optimalizácie kvantových technológií a meraní.

Súhrn výsledkov riešenia projektu a naplnenia cieľov projektu v slovenskom jazyku (max. 20 riadkov)

Všetky ciele a aktivity projektu OPTIQUTE (Optimalizácie kvantových technológií) boli realizované a výsledkom je 25 publikovaných článkov. The project was divided into three work packages of research activities aiming to develop novel tools and methods for improving the performance of quantum measurement, simulation and optimization devices. Within the first workpackage we investigated the complexity of mathematical structures of quantum theory. The main result we achieved was on the divisibility of quantum processes, where we have shown that quantum processes are either indivisible, or can be expressed as concatenations of infinitely many processes. Second area of research was focused on higher-order quantum information processing tasks. The main results include investigation of optimal storage-and-retrieval protocols and investigation of thermodynamical limitations of measurements. Within the last workpackage we modified HOTRG simulation algorithm for systems of fractal dimension and employed it to analyze the thermodynamical quantities of such systems.

Súhrn výsledkov riešenia projektu a naplnenia cieľov projektu v anglickom jazyku (max. 20 riadkov)

Project OPTIQUTE (Optimalisation of quantum technologies) addressed all planned activities and objectives and resulted in 25 publications. The project was divided into three work packages of research activities aiming to develop novel tools and methods for improving the performance of quantum measurement, simulation and optimization devices. Within the first workpackage we investigated the complexity of mathematical structures of quantum theory. The main result we achieved was on the divisibility of quantum processes, where we have shown that quantum processes are either indivisible, or can be expressed as concatenations of infinitely many processes. Second area of research was focused on higher-order quantum information processing tasks. The main results include investigation of optimal storage-and-retrieval protocols and investigation of thermodynamical limitations of measurements. Within the last workpackage we modified HOTRG simulation algorithm for systems of fractal dimension and employed it to analyze the thermodynamical quantities of such systems.