

**PhD research topic proposal**  
**BME, Doctoral School of Mathematics and Computer Science**

**Name and degree of supervisor :**

Milán Mosonyi, PhD

**Are you willing to supervise Stipendium Hungaricum applicants?**

No.

**Title of the topic:**

Quantum Information Theory

**Short description:**

Quantum information theory provides the mathematically rigorous theoretical foundations to quantum information science, which promises technological applications like unconditionally secure communication, ultraprecise measurements (used, e.g., in gravitational wave detection), and superfast computation with quantum computers.

The aim of the project is to study the ultimate efficiency that can be achieved in quantum communication problems by determining trade-off curves between the operational quantities characterizing the problems, and to study the related entropy-like quantities of quantum states.

The research is motivated by physics, but is mathematical in nature. The tools used include matrix analysis, functional analysis, convex analysis, operator algebras, and of course the diverse toolset specific to quantum information theory. Prospective candidates should ideally have a deep interest, and have followed courses with excellent results, in one or more of the above subjects. Since the relevant literature is in English, a good command of English is necessary.

**Requirements:**

**Contact:**

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**Place of work:**

BME, Institute of Mathematics, Department of Analysis