PhD research topic proposal

BME, Doctoral School of Mathematics and Computer Science

Name of supervisor :

Mihály Weiner

Degree:

PhD

Title of the topic:

Quantum probability theory in many player games and matrix algebras

Short description:

Two members of a team - say Alice and Bob - receives one-one number drawn in a uniform, independent manner from the set {1,2,3}. Alice can send a bit to Bob who then needs to guess if he received the same number than Alice or not. Already in such a simple case the maximum winning probability is higher if the team can use a quantum bit instead of a classical one in the game. The aim of the proposed research is to study quantum probability theory through game setups like the explained one and to confront it with classical probability theory. A further aim is to study some matrix algebraic structures like that of MUB ("mutually unbiased bases") systems that appear frequently in quantum state tomography and quantum cryptographic protocols.

Requirements:

The applicant should have a strong basis in linear algebra and functional analysis. Knowledge of quantum physics is an advantage, but what is needed here can be also acquired during research.

Contact:

Phone:

E-mail:

mweiner@math.bme.hu

Place of work:

Institute of Mathematics, Budapest University of Technology and Economics

Statement*: The conditions of the research above are satisfied, the theme is confirmed by the Head of the Department/Institute*