

Project:

**“Mathematics of the entangled
q-bits”**

Advisors:

V. Gerdt and A. Khvedelidze

Laboratory of Information Technologies

The present project is devoted to a description of the so-called entanglement phenomenon, i.e., emergence in a composite quantum system correlations that do not have any classical correspondence. As basis for study the collection of two and more q-bits – the quantum analog of binary alternatives, bits, will be considered. It is aimed to investigate the algebraic and geometric properties of q-bits as well as the quantum gates allowing to manipulate them. These studies will be done within the physical model, where spins-1/2 play the role of q-bits and an external laser field is used to build the quantum gates. Within the model the possibility to control the degree of entanglement varying the laser characteristics will be analyzed.

The urgency and importance of the proposed issue is challenged by the fact that the entanglement phenomenon lies in the heart of the quantum computing and quantum communication.