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**Cold ion beams in a storage ring as quantum computers.**

TIMUR SHAFTAN, Brookhaven National Laboratory

One of the promising directions in Quantum Computers (QC) is based on using ion traps. In a modern QC, several tens of ions are collected in a small electromagnetic trap, with their motion cooled down to micro K temperature level, leading to entanglement of their quantum states, controlled by the laser and RF fields. These ions become qubits and are used to run quantum computations at unprecedent rate using specialized codes (one example is QuTip, Quantum Toolbox in Python, http://qutip.org/). I will discuss a concept of a QC, which holds a potential to support much higher capacity of qubits as compared with the state-of-the-art devices on Paul traps. The idea is to use crystalline beams of ions in a storage ring as the medium for qubits. The crystalline beams have been demonstrated in accelerators since 1980s, when particles, being cooled, formed a revolving crystalline-like structure. Comparing this concept with the QC on a conventional ion trap, one might consider expansion of the QC to a small storage ring with high qubit capacity. The latter is important for evolution of the QC capabilities, including the processing power and robustness against errors due to decoherence. While it is very early to discuss a specific design of the QC on a storage ring, I will go over the concept and a few challenges that require proof-of-principal experiments, so that some basic aspects of this interesting concept are validated.