



School of Nano Science



IPM Condensed Matter &
Statistical Physics Group

Weekly Seminar

Generation of high dimensional single photon quantum logic gates

Invited speaker: **Dr. Amin Babazadeh**

Institute for Advanced Studies in Basic Sciences, Zanjan

Abstract:

Transformations on quantum states form a basic building block of every quantum information system. From photonic polarization to two-level atoms, complete sets of quantum gates for a variety of qubit systems are well known. For multilevel quantum systems beyond qubits, the situation is more challenging. The orbital angular momentum modes of photons comprise one such high-dimensional system. We experimentally demonstrate a four-dimensional generalization of the Pauli X gate and all of its integer powers on single photons carrying orbital angular momentum. Together with the well-known Z gate, this forms the first complete set of high-dimensional quantum gates implemented experimentally. These logic gates can be used in quantum cryptography, quantum teleportation and quantum computing.

Wednesday, 7 Shahrivar 1397 (Aug 29, 2018), 14:00-15:00

Seminar Room (classroom A), Farmanieh Building, IPM