Development of photonic platforms and superconducting detectors for quantum technologies

Alessandro Gaggero
CNR - Istituto di Fotonica e Nanotecnologie

Quantum information science has the ambitious scope to harness quantum mechanical effects, exhibited by engineered quantum systems, to realize radically new technologies, gaining functionalities and power that cannot be provided by the classical approach. As quantum states are inherently fragile, the encoding of quantum information on the many degrees of freedom of non-classical state of light has been one of the most promising approach. Light is an optimal information carrier due to its extremely weak interaction with the external environment, the high data transmission capacity and the fast propagation speed.
CNR-IFN aims to realize a fully reconfigurable photonic platform operating at telecom wavelengths, able to generate, route and detect non classical states of light on a chip. To achieve these results, we are developing integrated photonic platforms based on both second order (aluminum nitride, AlN) and third order nonlinearity (silicon nitride, Si_3N_4) with integrated superconducting detectors.
We will show our recent results regarding the development of these platforms.