PHYSICS

INRiM - Quantum enhanced measurements and innovative quantum measurement paradigms

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Context of the research activity	In the recent years, fundamental aspects of quantum mechanics have become the core of many (quantum) technologies outperforming their classical counterparts (e.g., quantum information, metrology and sensing), some of them being already marketed. We aim to develop and implement on optical platforms new quantum measurement paradigms in various regimes, not just for academic purposes, but also for innovative applications in the field of (photonic) quantum technologies.
Objectives	The activities aim at developing new quantum measurement paradigms, overcoming the current limits of quantum measurements, for innovative applications in the field of quantum photonics technologies. Thanks to the recent advances in quantum photonics systems generation, manipulation and measurement, the new millennium witnessed the passage from the first to the second quantum revolution. Today, fundamental aspects of quantum theory, such as entanglement and the superposition principle, are at the core of many technologies able to outperform their classical counterparts (e.g., quantum information, metrology and sensing). The PhD activities will focus on contributing to this effort by developing and experimentally realizing new quantum measurement paradigms in various regimes, from strong (projective) to “weak” measurements characterized by peculiar properties overcoming the current limits of traditional quantum measurements, paving the way for new research on the foundations of physics and innovative applications in the field of quantum (photonic) technologies.
Skills and competencies for the development of the activity	The ideal candidate should have an experimental background in the generation, manipulation and detection of single-photon and two-photon states. Theoretical background in quantum optics and quantum information is also considered as a preferential title. Good aptitude for team work is required.