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Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references at the end of each chapters.
Nota di contenuto	Introduction -- Background -- Nonlinear Optical Signals -- Excited State Distributions and Fluorescence Signals -- Pump-Probe Measurements with Entangled Photons -- Interferometric Setups -- Frequency Conversion -- Trapped Ion Spectroscopy -- Conclusions and Outlook.
Sommario/riassunto	This thesis focuses on nonlinear spectroscopy from a quantum optics perspective. First, it provides a detailed introduction to nonlinear optical signals; starting from Glauber’s photon counting formalism, it establishes the diagrammatic formulation, which forms the backbone of nonlinear molecular spectroscopy. The main body of the thesis investigates the impact of quantum correlations in entangled photon states on two-photon transitions, with a particular focus on the time-energy uncertainty, which restricts the possible simultaneous time and frequency resolution in measurements. It found that this can be

violated with entangled light for individual transitions. The thesis then presents simulations of possible experimental setups that could exploit this quantum advantage. The final chapter is devoted to an application of the rapidly growing field of multidimensional spectroscopy to trapped ion chains, where it is employed to investigate nonequilibrium properties in quantum simulations.