

Cover Page



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Stellingen

behorende bij het proefschrift

Cavity Quantum Electrodynamics
with Quantum Dots in Microcavities

I

A scalable hybrid quantum information scheme can be based on entanglement between photons and optical emitters in optical resonators. Quantum-dot confined electron spins in micropillar cavities form a promising system for implementing such a scheme.

Chapters 1, 3, 4 and 5 of this thesis.

II

The Purcell factor in a micropillar cavity can be evaluated by measuring the splitting between neighboring spectral modes of the cavity.

Chapter 3 of this thesis.

III

Using laser light to locally damage the sample surface provides a delicate tool for fine tuning the spectral and polarization properties of a single quantum dot in a micropillar cavity.

Chapter 4 of this thesis.

IV

The quantum Zeno effect can be used to distinguish exponential electron spin decoherence from nuclear-induced decoherence.

Chapter 6 of this thesis.

V

It is possible to use a single interaction-free measurement of an absorber to conduct a quantum CNOT gate operation.

Chapter 7 of this thesis.

VI

Self-assembled quantum dots have the advantage over nitrogen vacancy centers in diamond that they are easily integrated with optoelectronics technology, which is essential for scalable quantum information processing.

VII

It is likely that evolution resulted in a form of signal processing in the brain that takes advantage of quantum effects.

VIII

Progress in physics is an interplay between experimentalists and theoreticians with the common aim to establish a fundamental theory based on a minimum of *a priori* structure.

IX

The current monetary system is based on the belief of an equivalent of a perpetual motion machine.

X

Massive brute-force computation cannot be the answer to the search for artificial intelligence because one still needs to tell the computer what to look for.

XI

Communication is good, no communication is sometimes better.

XII

Sleeping in a car is not only economical but also healthy (at least when the car is a stationary object).

Jan Gudat
Leiden, 19 juni 2012