**Propositions**

attached to the thesis

“Stable single molecules for Quantum Optics and all-Optical switches”

I. The use of fluorescent probes in condensed-matter systems has brought new insights about the heterogeneity at the nanometer scale.
   - *Chapters 2, 3, 6 of this thesis*

II. Single molecules at low temperatures in non-perturbing media can be used as sensors to detect vibrational amplitudes and frequencies of different mechanical oscillators, down to picometer displacements.
   - *Chapter 5 of this thesis*

III. Methyl groups in the local environment of a single fluorescent molecule affect its excitation linewidth and frequency stability.
   - *Chapter 2 of this thesis*

IV. The spectral properties of a single molecule depend on the physico-chemical properties of the host solid in which it is embedded and therefore are a topic for the field of condensed-matter chemistry.
   - *Chapters 2, 3, 6 of this thesis*

V. The generalization of single-molecule techniques to the life sciences has blurred the meaning of the word
“molecule”. Therefore, we need a new definition of the term “single molecule”.

VI. Quantum technologies based on photons will likely require integrated optics architecture for improved performance, miniaturization, and scalability.

VII. Future quantum communication will rely on the integration of single-photon sources, quantum memories and systems with strong single-photon nonlinearities.

VIII. It is surprising that in the award of the Nobel Prize in Chemistry for the year 2014 the technique of single-molecule spectroscopy is seen as a mere tool for super-resolution imaging.

IX. Contrary to what is often stated, the future of the world is not in the hands of our kids.

Pedro Navarro,
Leiden, November 13, 2014