List of publications

1. "Spin squeezed states in a two-dimensional system", Feng Peng and **Ding Dapeng**, *Physica B* 353, 116–120 (2004).

2. "Lithographic mechanical break junctions for single-molecule measurements in vacuum: possibilities and limitations", Christian A Martin, **Dapeng Ding**, Herre S J van der Zant, and Jan M van Ruitenbeek, *New Journal of Physics* 10, 065008 (2008).

3. "Fullerene-based anchoring groups for molecular electronics", Christian A. Martin, **Dapeng Ding**, Jakob Kryger Sørensen, Thomas Bjørnholm, Jan M. van Ruitenbeek, and Herre S. J. van der Zant, *Journal of the American Chemical Society* 130, 13198–13199 (2008).

4. "Tuning micropillar cavity birefringence by laser induced surface defects", Cristian Bonato, **Dapeng Ding**, Jan Gudat, Susanna Thon, Hyochul Kim, Pierre M. Petroff, Martin P. van Exter, and Dirk Bouwmeester, *Applied Physics Letters* 95, 251104 (2009).

5. "Fiber-connectorized micropillar cavities", Florian Haupt, Sumant S. R. Oemrawsingh, Susanna M. Thon, Hyochul Kim, Dustin Kleckner, **Dapeng Ding**, Donald J. Suntrup III, Pierre M. Petroff, and Dirk Bouwmeester, *Applied Physics Letters* 97, 131113 (2010) (Chapter 3).

6. "CNOT and Bell-state analysis in the weak-coupling cavity QED regime", Cristian Bonato, Florian Haupt, Sumant S. R. Oemrawsingh, Jan Gudat, **Dapeng Ding**, Martin P. van Exter, and Dirk Bouwmeester, *Physical Review Letters* 104, 160503 (2010).

7. "Fano resonances in a multimode waveguide coupled to a high-Q silicon nitride ring resonator", **Dapeng Ding**, Michiel J. A. de Dood, Jared F. Bauters, Martijn J. R. Heck, John E. Bowers, and Dirk Bouwmeester, *Optics Express* 22, 6778–6790 (2014) (Chapter 2).

Curriculum vitae

Personal information: male, born on October 23rd, 1981 in Anshan, China.

Educational background:

Department of Applied Physics, University of Science and Technology Beijing, China (Sep. 2000–Jul. 2004).
Department of Microtechnology and Nanoscience, Chalmers University of Technology, Sweden (Sep. 2006–May 2007).
Institute of Physics, Leiden University and Kavli Institute of Nanoscience, Delft University of Technology, The Netherlands (Sep. 2007–Oct. 2008).
Institute of Physics, Leiden University, The Netherlands (Jan. 2009–Present).

Academic degrees:

Bachelor of Science in Physics at the University of Science and Technology Beijing (2004). Thesis title: "Study on spin fluctuation in x-y model" (supervisor: Professor Feng Peng).
Master of Science in Nanoscience at Leiden University (2008). Thesis title: "Measurements of fullerene-anchored molecules" (supervisor: Professor Jan M. van Ruitenbeek).
PhD candidate at Leiden University (supervisor: Professor Dirk Bouwmeester).

Acknowledgement

First of all I would like to thank my supervisor, Professor Dirk Bouwmeester. His support and guidance have been encouraging and inspiring throughout the period of my PhD.

Another person who I am very grateful to is my second supervisor, Dr. Michiel de Dood. His broad knowledge and insightful thoughts have clarified many issues that arose during my PhD research.

There are a number of people who I would like to thank for their participation in the research presented in this thesis. I am very grateful to Professor John Bowers, Dr. Jared Bauters, and Dr. Martijn Heck at the University of California, Santa Barbara for the design and fabrication of the ring resonators investigated in this thesis, to Professor André Vantomme and Dr. Lino Pereira at the KU Leuven for the implantation of ytterbium ions into the ring resonators, and to Professor Tjerk Oosterkamp, Arthur den Haan, and Jelmer Wagenaar at Leiden University for allowing me to measure the ring resonators in their dilution refrigerator at very low temperature.

I would like to thank Dr. Martin van Exter and Professor Eric Eliel for their valuable advice, guidance, and detailed comments on my thesis. I very much enjoyed discussing physics with them.

During the research presented in this thesis, I have been facing significant technical challenges. By collaborating with two talented engineers, Fred Schenkel and Harmen van der Meer, we turned these challenges into excellence. Arno van Amersfoort helped me with electronics, computers, and networks. I would like to express my sincere gratitude and respect to them.

Ms. Daniëlle Verhoeff in the early days and afterwards Ms. Henriëtte van Leeuwen as secretaries in the group assisted me with all the management and administrative affairs. Their kindness and dedication made these affairs much easier for me so that I could fully concentrate on my research. I would like to express my sincere gratitude to them.

When I joined the group in 2009, my first research project was to study self-assembled quantum dots in micropillar cavities together with a senior PhD student, Jan Gudat. I gained a lot of knowledge from Jan, especially practical skills on optics, cryogenics, vacuum, and electronics, which turned out to be

very useful for my new project described in this thesis. Petro Sonin and Evan Jeffrey who worked on the optomechanics project joined the group also earlier than me. The state-of-the-art techniques required by their ultra-sensitive experiments such as laser frequency stabilization, ultra-low temperatures, vibration isolation, and low-noise measurements strongly influenced my perspective of experimental design. Some of the techniques were implemented in my project. The period with Jan, Petro (particularly at night), and Evan was my happiest time in the group.

Many thanks to my other colleagues both in Leiden and in Santa Barbara who helped me in different ways: Cristian Bonato, Sumant Oemrawsingh, Susanna Thon, Dustin Kleckner, Hyochul Kim, Florian Haupt, Brian Pepper, Jenna Hagemeier, Morten Bakker, Nemanja Markešević, Henk Snijders, Wolfgang Löffler, Jan Willem Dalhuisen, Professor Gerard Nienhuis, Professor Han Woerdman, Hedwig Eerkens, Frank Buters, Sven de Man, Kier Heeck, Frerik van Beijnum, Qiang Wang, Mengzi Huang, Chris Smiet, Vasco Tenner, Jelmer Renema, Flavio Mariani, Gesa Welker, Ke Liu, Lei Hou, Shuo Mi, Donny de Bruin, Roel Smit, Monica Morales, Manohar Kumar, Professor Jan van Ruitenbeek, Sense Jan van der Molen, Xiaohu Li, He Meng, Haifeng Yuan, Guocai Dong, Qian Liu, Zunfeng Liu, Ji Li, Yue Gao, and Jing Tu.

Many thanks to my friends outside the Faculty of Science for the wonderful time with them. Please forgive me that I can only list some of the names here: Zhongxiao Wang, Qinggang Hao, Yingchun Yu, Xiaoshuang Xia, Changjuan Geng, Shouen Zhu, Niek Span, Fedde de Vries, Chrysi Giannakoudi, Iman Augusta, and Piet de Kleijn.

Special thanks to IoChun Hoi, Zhixiang Sun, and Christian Martin.

I would like to thank my parents for their love, which is my ultimate source of power. Under their support, my fascination and curiosity for the nature around me as a child grew into interest in science and hobbies in electronics, physics, and chemistry, and eventually developed to my current career. This thesis is dedicated to my parents.

I want to thank Haojun Feng for her love and company. I have never felt lonely with her.