

# Tim Hugo Taminiau

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## PERSONAL

NATIONALITY Netherlands  
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ADDRESS QuTech - Delft University of Technology  
PO Box 5046  
2600 GA Delft, the Netherlands

## PROFESSIONAL EXPERIENCE

CURRENT Group Leader (tenured)  
QuTech and Kavli Institute of Nanoscience  
Delft University of Technology  
2015-2017 Group Leader (tenure track)  
QuTech, Delft University of Technology  
2011-2014 Postdoc at the Kavli Institute of Nanoscience  
Marie Skłodowska Curie and Veni fellowships  
Delft University of Technology with Prof. Ronald Hanson  
2010 Visiting researcher  
Brown University with Prof. Rashid Zia  
2009 Visiting researcher  
California Institute of Technology (Caltech) with Prof. H. Atwater  
2004 Internship  
Korea Institute of Machinery and Materials (KIMM), Daejeon, Korea

## EDUCATION

2012 PhD - Supervisor Prof. Niek van Hulst  
ICFO - Institut de Ciències Fotòniques, Barcelona, Spain  
2005 Master of Science in applied physics, major in nano-optics  
University of Twente, the Netherlands  
2004 Minor in international management  
University of Twente, the Netherlands

## SELECTED AWARDS AND PERSONAL GRANTS

2020 Kavli Delft Publication Prize (biennial)  
for Abobeih et al., Nature 576, 411 2019.  
2019 ERC starting grant.  
2017 VIDI career grant.  
2016 Kavli Delft Publication Prize (biennial)  
for Hensen et al., Nature 526, 682, 2015.  
2015 Fresnel Prize, career award by the European Physical Society for researchers  
under 35.

- 2015 Ehrenfest Prize.  
For the best publication in the foundations of quantum mechanics:  
Hensen et al., Nature 526, 682, 2015.
- 2014 VENI career grant
- 2012 Marie Skłodowska Curie - Intra-European Fellowship (IEF)
- 2012 Best PhD Thesis Award - ICFO Institut de Ciències Fotòniques
- 2010 FPI Estancias Breves 2010 by the Spanish Ministry of Education  
3-month research stay at Brown University
- 2009 FPI Estancias Breves 2009 by the Spanish Ministry of Education  
3-month research stay at the California Institute of Technology (CALTECH)
- 2007 Ayuda Predoctoral de Formaciòn de personal investigador (FPI)  
Comprehensive 4-year PhD fellowship by the Spanish Ministry of Education

### TEACHING AND SUPERVISION, TU DELFT

- 2019 - NOW Quantum Optics (MSc, AP3112)
- 2019 Electromagnetism for Quantum Technology (BSc, TN3115)
- 2018 - NOW Electronics for physicists (supporting teacher, MSc, AP3652)
- 2018 - NOW Quantum hardware (supporting teacher, MSc, AP3292)
- 2016-2020 Hot topics in quantum nanoscience (coordinator, PhD level).
- 2015-NOW Supervision of 8 PhD students, 3 postdocs, 9 MSc students, and 7 BSc students.

### SELECTED PROFESSIONAL SERVICE

- 2020 Physics@Veldhoven organisational committee.
- 2020 - NOW NNV AMO Lunteren organizational committee (postponed due to COVID).
- 2020 Organizer for QDiamond 2020 (postponed due to COVID).
- 2019 The Delft quantum vision team (magazine 'The Quantum Internet').
- 2018-NOW Board member of the Casimir Research School.
- 2017-2018 Chair of the QuTech faculty.
- 2016 Committee for EPS thesis and Fresnel prizes.
- CONTINUOUS Referee for: Nature, Science, Nature Photonics, Nature Physics, Nature Communications, Physical Review Letters, Physical Review X, Physical Review A, NPJ Quantum info, Quantum Science and Technology, Nano Letters, New Journal of Physics, Optics Letters, Optics Express.
- CONTINUOUS Reviewer for the Lise Meitner program by the Austrian Science Fund, the french ANR, QuantERA 2019, QuantERA 2017, FET-OPEN, the Deutsche Forschungsgemeinschaft.

## PUBLICATIONS & PRESENTATIONS

**SUMMARY** 35 peer-reviewed or preprint publications with more than 9900 citations (Google scholar).

### PUBLICATIONS

- ARTICLES**
- [35] Coherence and entanglement of inherently long-lived spin pairs in diamond. H. P. Bartling, M. H. Abobeih, B. Pingault, M. J. Degen, S.J.H. Loenen, H. P. Bartling, C. E. Bradley, J. Randall, M. Markham, D. J. Twitchen, T. H. Taminiau.  
**arXiv:2103.07961**.
- [34] Entanglement of dark electron-nuclear spin defects in diamond. M. J. Degen, S.J.H. Loenen, H. P. Bartling, C. E. Bradley, A.L. Meinsma, M. Markham, D. J. Twitchen, T. H. Taminiau  
**arXiv:2011.09874** (accepted in *Nature Commun.*).
- [33] Deep learning enhanced individual nuclear-spin detection. Kyunghoon Jung, M.H. Abobeih, Jiwon Yun, Gyeonghun Kim, Hyunseok Oh, Henry Ang, T.H. Taminiau, Dohun Kim.  
**npj Quantum Information** 7, 41 (2021).
- [32] Orbital and Spin Dynamics of Single Neutrally-Charged Nitrogen-Vacancy Centers in Diamond. S. Baier, C. E. Bradley, T. Middelburg, V. V. Dobrovitski, T. H. Taminiau, R. Hanson.  
**Phys. Rev. Lett.** 125, 193601 (2020).  
*Highlighted by APS Physics.*
- [31] Algorithmic decomposition for efficient multiple nuclear spin detection in diamond. Hyunseok Oh, Jiwon Yun, M.H. Abobeih, Kyung-Hoon Jung, Kiho Kim, T.H. Taminiau, Dohun Kim.  
**Scientific reports** 10:14884 (2020).
- [30] Atomic-scale imaging of a 27-nuclear-spin cluster using a quantum sensor. M. H. Abobeih, J. Randall, C. E. Bradley, H. P. Bartling, M. A. Bakker, M. J. Degen, M. Markham, D. J. Twitchen, T. H. Taminiau.  
**Nature** 576, 411 (2019).  
*Featured in the Volkskrant and NRC.*
- [29] A 10-qubit solid-state spin register with quantum memory up to one minute. C. E. Bradley, J. Randall, M. H. Abobeih, R. C. Berrevoets, M. J. Degen, M. A. Bakker, M. Markham, D. J. Twitchen, T. H. Taminiau.  
**Phys. Rev. X** 9, 031045 (2019).  
*Highlighted in Nature and APS Physics.*
- [28] Multipartite entanglement generation and contextuality tests using non-destructive three-qubit parity measurements. S. B. van Dam, J. Cramer, T. H. Taminiau, R. Hanson.  
**Phys. Rev. Lett.** 123, 050401 (2019).
- [27] Optical coherence of diamond nitrogen-vacancy centers formed by ion implantation and annealing. S. B. van Dam, M. Walsh, M. J. Degen, E. Bersin, S. L. Mouradian, A. Galiullin, M. Ruf, M. IJspeert, T. H. Taminiau, R. Hanson, D. R. Englund.  
**Phys. Rev. B** 99, 161203 (2019).

- [26] One-second coherence for a single electron spin coupled to a multi-qubit nuclear-spin environment.  
M. H. Abobeih, J. Cramer, M. A. Bakker, N. Kalb, D. J. Twitchen, M. Markham, T. H. Taminiau.  
**Nature Commun.** 9:2552 (2018).
- [25] Repeated quantum error correction on a continuously encoded qubit by real-time feedback.  
J. Cramer, N. Kalb, M. A. Rol, B. Hensen, M. S. Blok, M. Markham, D. J. Twitchen, R. Hanson and T. H. Taminiau.  
**Nature Commun.** 7:11526 (2016).  
*Featured in the Volkskrant and Radio BNR.*
- [24] Experimental creation of quantum Zeno subspaces by repeated multi-spin projections in diamond.  
N. Kalb, J. Cramer, M. Markham, D. J. Twitchen, R. Hanson and T. H. Taminiau.  
**Nature Commun.** 7:13111 (2016).
- [23] Robust quantum-network memory using decoherence-protected subspaces of nuclear spins.  
A. Reiserer, N. Kalb, M. S. Blok, K. J. M. van Bemmelen, D. J. Twitchen, M. Markham, T. H. Taminiau and R. Hanson.  
**Phys. Rev. X** 6, 021040 (2016).  
*Highlighted in Phys. Rev. X.*
- [22] Loophole-free Bell test using electron spins in diamond: second experiment and additional analysis.  
B. Hensen, N. Kalb, M.S. Blok, A. Dreau, A. Reiserer, R.F.L. Vermeulen, R.N. Schouten, M. Markham, D.J. Twitchen, K. Goodenough, D. Elkouss, S. Wehner, T. H. Taminiau and R. Hanson  
**Scientific Reports** 6:30289 (2016).
- [21] Loophole-free Bell inequality violation using electron spins separated by 1.3 kilometres.  
B. Hensen, H. Bernien, A. E. Dreau, A. Reiserer, N. Kalb, M. S. Blok, J. Ruitenber, R. F. L. Vermeulen, R. N. Schouten, C. Abellan, W. Amaya, V. Pruneri, M. W. Mitchell, M. Markham, D. J. Twitchen, D. Elkouss, S. Wehner, T. H. Taminiau and R. Hanson.  
**Nature** 526, 682 (2015)  
*Highlighted in Nature and Science*  
*Featured in the Economist, New York Times, Time, the Daily Mail, Zeit, Le Monde, the Volkskrant (6x), NRC (3x), Trouw (2x) and more.*
- [20] Towards quantum networks of single spins: analysis of a quantum memory with an optical interface in diamond.  
M. S. Blok, N. Kalb, A. Reiserer, T. H. Taminiau and R. Hanson.  
**Faraday Discuss.** 184, 173 (2015)
- [19] Unconditional quantum teleportation between distant solid-state quantum bits.  
W. Pfaff, B. J. Hensen, H. Bernien, S. B. van Dam, M. S. Blok, T. H. Taminiau, M. J. Tiggeleman, R. N. Schouten, M. Markham, D. J. Twitchen and R. Hanson.  
**Science** 345, 532 (2014)  
*Highlighted in Science.*
- [18] Universal control and error correction in multi-qubit spin registers in diamond.  
T. H. Taminiau, J. Cramer, T. van der Sar, V. V. Dobrovitski and R. Hanson.  
**Nature Nanotech.** 9, 171 (2014)  
*Highlighted in Nature Nanotechnology.*  
*Featured in the New York Times, The Huffington Post, Time, CBS news, The*

*Independent, BBC, De Telegraaf, NOS and more.*

[17] Heralded entanglement between solid-state qubits separated by 3 meters. H. Bernien, B. Hensen, W. Pfaff, G. Koolstra, M. S. Blok, L. Robledo, T. H. Taminiau, M. Markham, D. J. Twitchen, L. Childress and R. Hanson. **Nature** 497, 86 (2013)

*Highlighted in Nature.*

*Featured in the NRC and nu.nl .*

[16] Multipolar Radiation of Quantum Emitters with Nanowire Optical Antennas.

A. G. Curto, T. H. Taminiau, G. Volpe, M. P. Kreuzer, R. Quidant and N. F. van Hulst.

**Nature Commun.** 4:1750 (2013)

[15] Demonstration of entanglement-by-measurement of solid state qubits.

W. Pfaff, T. H. Taminiau, L. Robledo, H. Bernien, M. L. Markham, D. J. Twitchen and R. Hanson.

**Nature Phys.** 9, 29 (2013)

[14] Detection and control of individual nuclear spins using a weakly coupled electron spin.

T. H. Taminiau, J. J. T. Wagenaar, T. van der Sar, F. Jelezko, V. V. Dobrovitski and R. Hanson.

**Phys. Rev. Lett.** 109, 137602 (2012)

*Highlighted in Science.*

[13] Quantifying the magnetic nature of light emission.

T. H. Taminiau, S. Karaveli, N. F. van Hulst and R. Zia.

**Nature Commun.** 3:979 (2012)

*Highlighted in Nature Physics and Nature Photonics.*

[12] Decoherence-protected quantum gates for a hybrid solid-state spin register.

T. van der Sar, Z. H. Wang, M. S. Blok, H. Bernien, T. H. Taminiau, D. M. Toyli, D. A. Lidar, D. D. Awschalom, R. Hanson, and V. V. Dobrovitski.

**Nature** 484, 82 (2012)

*Featured in the Volkskrant.*

[11] Optical Nanorod Antennas Modeled as Cavities for Dipolar Emitters: Evolution of Sub- and Super-Radiant Modes.

T. H. Taminiau, F. D. Stefani, and N. F. van Hulst.

**Nano Lett.** 11, 1020 (2011)

[10] Unidirectional Emission of a Quantum Dot Coupled to a Nanoantenna.

A. G. Curto, G. Volpe, T. H. Taminiau, M. P. Kreuzer, R. Quidant, and N. F. van Hulst.

**Science** 329, 930 (2010)

*Featured in El Pais.*

[9] Visualizing and controlling vibrational wave packets of single molecules.

D. Brinks, F. D. Stefani, F. Kulzer, R. Hildner, T. H. Taminiau, Y. Avlasevich, K. Mullen, and N. F. van Hulst.

**Nature** 465, 905 (2010)

*Featured in NRC Handelsblad and La Nation (Argentina).*

[8] Single emitters coupled to plasmonic nano-antennas: angular emission and collection efficiency.

T. H. Taminiau, F. D. Stefani, and N. F. van Hulst.

**New J. Phys.** 10, 105005 (2008)

[7] Spectroscopic Mode Mapping of Resonant Plasmon Nanoantennas.

P. Ghenuche, S. Cherukulappurath, T. H. Taminiau, N. F. van Hulst and R. Quidant.

**Phys. Rev. Lett.** 101, 116805 (2008)

*Highlighted in Nature.*

[6] Spectroscopic Mode Mapping of Resonant Plasmon Nanoantennas.

T. H. Taminiiau, F. D. Stefani, and N. F. van Hulst.

**Optics Express** 16, 10858 (2008)

[5] Optical Antennas Direct Single Molecule Emission.

T. H. Taminiiau, F. D. Stefani, F. B. Segerink and N. F. van Hulst.

**Nature Photon.** 2, 234 (2008)

[4] Reversible Polarization Control of Single Photon Emission.

R. J. Moerland, T. H. Taminiiau, L. Novotny, N. F. van Hulst and L. Kuipers.

**Nano Lett.** 8, 606 (2008)

[3]  $\lambda/4$  Resonance of an Optical Monopole Antenna Probed by Single Molecule Fluorescence.

T. H. Taminiiau, R. J. Moerland, F. B. Segerink, L. Kuipers and N. F. van Hulst.

**Nano Lett.** 7, 28 (2007)

*Highlighted in Nature Photonics*

[2] Near-Field Driving of an Optical Monopole Antenna.

T. H. Taminiiau, F. B. Segerink, R. J. Moerland, L. Kuipers and N. F. van Hulst.

**J. Opt. A: Pure Appl. Opt.** 9, S315 (2007)

[1] A Monopole Antenna at Optical Frequencies: Single-Molecule Near-Field Measurements.

T. H. Taminiiau, F. B. Segerink, N. F. van Hulst.

**IEEE Trans. Antennas Propag.** 55, 3010 (2007)

BOOKS *Directionality, polarization and enhancement by optical antennas*

**T. H. Taminiiau**, A. G. Curto and N. F. van Hulst.

Book chapter in *Optical Antennas* edited by: Mario Agio and Andrea Alù  
Cambridge University Press (2013)

## PRESENTATIONS

INVITED & KEYNOTE *Presented 51 keynote and invited presentations in leading (inter)national conferences and workshops.*

51. APS March Meeting

Online, 2021

50. Machine Learning for Quantum (MLQ) 2021

Online, 2021

49. QTech2020 conference,

Online 2020

48. CiS Quantum Workshop

Online, 2020

47. Diamond Quantum Metrology Techniques for Bio-Sensing

Online (Chicago University), 2020

46. OSA Quantum 2.0

Online, 2020

45. NanoMRI 7

Online, 2020

44. Physics colloquium at KIT

Karlsruhe 2019

43. QIS workshop at Advanced Materials  
San Jose 2019
42. SPIE optics + photonics 2019  
San Diego 2019
41. YAO 2019  
Hamburg, 2019
40. Spintech X  
Chicago, 2019
39. QDiamond2019  
Tel Aviv, Israel, 2019
38. International Workshop on Solid-State Qubits  
Daejeon, Korea, 2019
37. APS March meeting  
Boston 2019
36. Bilateral International Meeting (UK-NL)  
Chicheley Hall, 2018
35. QDiamond2018  
Tel Aviv, Israel, 2018
34. CEMS International Symposium on Dynamics  
Tokyo, 2018
33. Quantum Computing workshop  
Saclay, 2017
32. Engineering needs and challenges in Quantum Technology  
London, 2017
31. Spin qubit 3  
Sydney, Australia, 2017
30. Frontiers in Quantum Nanophotonics  
Monte Verita, Switzerland, August 2017.
29. SSSP - Single Photons Single Spins  
Oxford, United Kingdom, September 2016.
28. Ehrenfest prize talk  
Vienna, 2016
27. If A Tree Falls: the Physics of What Happens and Who is Listening - FQXi  
5th International conference  
Banff, Canada, August 2016.
26. Aspen Conference on Advances in Quantum Algorithms and Computation  
Aspen, US, March 2016.
25. SBDD XXI  
Hasselt, Belgium, March 2016.
24. Physics@FOM  
Veldhoven, Netherlands, January 2016.
23. PQE - Physics of quantum electronics  
Snowbird, US, January 2016.
22. AMOLF general colloquium  
Amsterdam, Netherlands, November 2015.
21. Third Conference on Quantum Thermodynamics  
Porquerolles, France, October 2015.

20. META 2015  
New York, US, August 2015.
19. International Frontiers in Quantum Materials and Devices  
Cambridge, US, May 2015.
18. ICTP-ECAR Advanced Workshop  
*Quantum Networks with Spins in Diamond*. Izmir, Turkey, September 2014.
17. Quantum Optics and Quantum Information 2014  
*Quantum Networks with Spins in Diamond*. Beijing, China, July 2014.
16. CLEO 2014  
*Optical Quantum Networks with Spins in Diamond*. San Jose, US, June 2014.
15. International conference on Quantum Optics 2014  
*Optical Quantum Networks with Spins in Diamond*.  
Obergurgl, Austria, February 2014.
14. ICONO/LAT 2013  
*Long-distance quantum networks built from spin registers in diamond*.  
Moscow, Russia, June 2013.
13. Workshop on Diamond - Spintronics, Photonics, Bio-applications  
*Quantum Registers and Networks with Spins in Diamond*.  
Hong Kong, April 2013.
12. 54th ENC Conference  
*Polarization, Control and Quantum Entanglement of Individual Nuclear Spins  
in Diamond*. Pacific Grove, US, April 2013.
11. QDiamond12  
*Entanglement of quantum registers in diamond*.  
Bonamanzi, South Africa, December 2012.
10. Frontiers in Optics 2012  
*Control of hybrid quantum registers in diamond*. Rochester, US, October 2012.
9. SPP5 - 5th International Conference on Surface Plasmon Photonics  
*Optical antennas for single quantum emitters*. Busan, Korea, May 2011.
8. Villa Conference on Metamataterials 2011  
*Quantifying the magnetic nature of light emission*. Las Vegas, US, April 2011.
7. 2nd International workshop on fundamentals of light matter interaction  
*Optical antennas for single emitters*. Porto de Galinhas, Brazil, February 2011.
6. SPIE Optics and Photonics  
*From antenna theory to plasmonics: 1D resonator theory for optical antennas  
and dipolar emitters*. San Diego, US, August 2009.
5. SPIE Optics and Photonics  
*Enhanced rates and high directivity for single emitters with optical antennas*.  
San Diego, US, August 2009.
4. MRS Spring Meeting  
*Optical antennas for single molecules*. San Francisco, US, April 2009.
3. NanoMeta2009  
*Optical Antennas Direct Single Molecule Emission*.  
Seefeld Tirol, Austria, January 2009.
2. NFO10 - Near Field Optics 10  
*Optical antennas for single molecules*.  
Buenos Aires, Argentina, September 2008.
1. EOS Topical Meeting on Molecular Plasmonic Devices  
*Probing the local field of a resonant optical nano antenna by single molecule*



*detection*. Engelberg, Switzerland, April 2006.

SELECTED POPULAR  
PRESENTATIONS  
AND ARTICLES

Magazine: ‘the quantum internet’  
(by the quantum vision team, 2019)

Young Atom Opticians (YAO) 2019  
Hamburg, Germany, 2019

Danum investor day at FreedomLab  
Amsterdam, Netherlands, 2019

The Hague Security Delta HSD Cafe  
Den Haag, Netherlands, 2016

WND conferentie 2016.  
Noordwijk, Netherlands 2016

INASCON 2016  
Enschede, Netherlands, August 2016

Pioneers of Physics  
Nijmegen, Netherlands, May 2016

Infosecurity 2015  
*Quantum computing: big troubles and opportunities for cybersecurity*  
Utrecht, Netherlands, November 2015

“Weird” science lectures at the Mediamatic  
(*Quantum*) *teleportation*. Amsterdam, Netherlands, October 2014

Physics Symposium 2014, University of Groningen  
*The quantum computer*. Groningen, Netherlands, May 2014

T. H. Taminau and R. Hanson  
*Door meten tot quantumverstremgeling (in dutch)*  
Nederlands tijdschrift voor natuurkunde, 79, 430 (2013)

Physics Symposium 2013, Eindhoven University  
*The quantum computer*. Eindhoven, Netherlands, December 2013