

# Curriculum Vitae

## Personal Information

Name: David Albert Immanuel Marpaung  
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Date of birth: 19 March 1979  
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## Education

2005 – 2009 **PhD** in Electrical Engineering, University of Twente, The Netherlands.  
Thesis: *High Dynamic Range Analog Photonic Links*. Advisors: Prof. Wim van Etten and Dr. Chris Roeloffzen.  
2002 – 2003 **MSc** in Applied Physics, University of Twente, the Netherlands  
Thesis: *Adiabatic Excitation of Slow Light Devices*. Advisor: Dr. Hugo J.W.M. Hoekstra  
1998 – 2002 **BSc** in Physics, Institut Teknologi Bandung (ITB), Indonesia  
Thesis: *Effective Index Method for Optical Waveguides*. Advisor: Dr. Alexander Iskandar and Prof. Tjia May On

## Current Position

2020 – present **Professor, Head of Nonlinear Nanophotonics group**, University of Twente, the Netherlands  
**Co-chairholder, Laser Physics and Nonlinear Optics**, University of Twente, the Netherlands

## Previous Positions

2018 – 2020 **Associate Professor**, University of Twente, the Netherlands  
2015 – 2017 **Senior Research Fellow (DECRA)**, School of Physics, University of Sydney, Australia  
Leading the research activities on Integrated Microwave Photonics and Integrated Brillouin Photonics (Group leader: Prof. Benjamin Eggleton)  
2012 – 2015 **Research Fellow**, School of Physics, University of Sydney, Australia  
Technical manager of the ARC Laureate Fellowship (2.91M AUD, PI: Prof. B. Eggleton):  
Initiated and led the research activities in nonlinear integrated microwave photonics  
2009 – 2012 **Postdoctoral Fellow**, Telecommunication Engineering group, University of Twente, the Netherlands  
Technical lead in a large-scale integrating EU FP7 project on integrated optical beamsteering circuits for phased array antenna

## Research Profile and Achievements

My field of expertise comprises the areas of microwave photonics (MWP), integrated optics, nonlinear optics, phononics, and signal processing. In 2012 I initiated a new research direction called integrated MWP and published the seminal paper in *Laser & Photonics Reviews* (LPR, impact factor 8.0). The paper has been cited 630 times (Google Scholar) and is the highest cited paper out of >4000 publications in my field published since 2010 (source statistics from Scopus) and is selected as Web of Science Highly cited paper (top 1% in the field of physics).

Currently, I am a professor leading a research group of a postdoctoral researcher, 5 PhD students, and 10 Master and bachelor students working on various aspects of nonlinear nanophotonics and phononics. The aim of my research is to harness coherent interactions between light, sound, and radiofrequency waves in an integrated platform for precision measurements and advanced information processing.

## Grants and Awards

To date I have raised more than 3 Million Euros in grants and was involved in a number of further projects.

During my time at the **University of Sydney**, I received an **ARC DECRA 2015** fellowship (AUD 357k) and **I proposed, wrote, and coordinated** projects with US Air Force, US Army, and Lockheed Martin Corporation. I initiated collaboration with Harris Corporation that led to a successful **ARC Linkage Grant** in 2018.

At **University of Twente**, I received two grants with a total amount of **1.6 million Euros in the first year of joining the University**. These are the **NWO Vidi grant** (the Dutch Equivalent of Future Fellowships) and the **NWO START UP grant** awarded to the most promising professors recently joining a Dutch university.

- 2019 – 2023 The Netherlands Organisation of Scientific Research (NWO) Physical Sciences Division START UP grant *On chip photonic control of gigahertz phonons*, EUR 800000
- 2018 – 2022 The Netherlands Organisation of Scientific Research (NWO) Applied and Engineering Sciences Division Vidi grant (success rate 14%) *Light and sound-based signal processing in silicon nitride*, EUR 800000
- 2018 – 2021 Australian Research Council (ARC) Linkage Grant *Integration of broadband microwave photonic frequency convertors*, AUD 540000
- 2017 – 2020 Lockheed Martin Co. research contract *Multiband tunable RF photonic filter*, USD 230000
- 2016 – 2018 Asian Office of Aerospace Research and Development (AOARD) - US Air Force Research Support, *Harnessing giant Brillouin gain for advanced integrated microwave photonic signal processing*, USD 100000
- 2016 ARC Linkage, Infrastructure, Equipment, and Facilities (LIEF 2016), *Ultra-fast optoelectronic characterisation for optical and wireless systems*, AUD 420000
- 2015 – 2017 Australian Research Council (ARC) Discovery Early Career Researcher Award (DECRA) (success rate 12%) *Smart radio-frequency filter in a tuneable optical circuit*, AUD 357000
- 2015 – 2016 Commercial Development and Industry Partnerships (CDIP) award - University of Sydney, *Ultra-portable and Programmable Microwave Photonic Filter*, AUD 35000
- 2014 – 2016 Asian Office of Aerospace Research and Development (AOARD) - US Air Force Research Support, *Frequency agile microwave photonic filter in a photonic chip*, USD 90000

### **Supervision, Mentoring, and Supporting the Career of Young Researchers**

I put care and importance into supervision, mentoring, and supporting young researchers. To date, I have mentored and supervised one tenure-track assistant professor, 4 postdoctoral fellows, 12 PhD students, and 15 bachelor, honours, and master students.

The PhD students and postdocs I supported went on to obtain some of the most prestigious fellowships and impressive career paths. Dr. Maurizio Burla received FNQRT (Canada) and Ambizione (Switzerland) fellowships and will take up a position as professor and Head of Institute at TU Berlin. Dr. Amol Choudhary received DECRA fellowship and now is a professor at IIT Delhi. Blair Morrison and Kang Tan are physicists at Xanadu, a Quantum AI company.

- Since 2018 University of Twente: 1 tenure-track assistant professor (L. Alic), 2 Postdoctoral fellows (R. Suryadharma, H. Zia), 6 PhD students (O. Daulay, R. Botter, Y. Klaver, G. Liu, S. Ye, N. Wu), 10 Master and Bachelor students (T. van Abkoude, X. Guo, M. Kiewiet, M. Eijkel, R. Braamhaar, J. van den Hoogen, B. Jongebloed, P. van Essen, T. Zeinstra, R. Adelerhof)
- 2012 – 2017 University of Sydney: 3 Postdoctoral fellows (Dr. A. Casas-Bedoya, Dr. A. Choudhary (now assistant professor at IIT Delhi), Dr. E. Giacomidis), 6 PhD students (M. Pagani, B. Morrison (now a physicist at Xanadu), I. Aryanfar, A. Zarifi, H.Y. Jiang, Y. Liu), 1 engineer (S. Shania), 3 Honours student (E-A. Haidar, J. Hotten, R. Thomas), 1 trainee (K. Tan)
- 2008 – 2012 University of Twente: 2 PhD students (M. Burla (now a professor at TU Berlin), M.R.H. Khan), 2 Master students (R.B. Timens (now a project manager at Satrax BV), R. Meijerink). 2 trainees (L. Chevalier, V. Koman)

### **Teaching and Education**

I'm striving to improve my quality as a teacher and an educator. At present I'm in the process of obtaining my Dutch University Teaching Qualification (UTQ), which is a qualification of pedagogical competences of university teachers that is nationally acknowledged.

I have performed and coordinated teaching both in Physics and Electrical Engineering departments. Currently

I'm the coordinator and a lecturer of a compulsory course in the Applied Physics Master programme "Small Signals and Detection" (5 European credits, 45 students). I received extremely positive feedback in the student survey for this course.

- Since 2018 **Course Coordinator and Lecturer** – Master in Applied Physics compulsory course "Small Signals Detection", University of Twente (4h/week), average of 40 students; highest-scored lecturer by the students  
**Lecturer** – Bachelor in Electrical Engineering compulsory course "Random Signals and Noise", University of Twente (4x 2 hr lectures), average of 50 students  
**Lecturer** – Master in Applied Physics elective course "Capita Selecta Laser Physics and Nonlinear Optics", University of Twente (4 hr/week), 4 students  
**Tutorial Instructor** – Bachelor in Applied Physics course "Electricity and Magnetism", University of Twente (4h/week), average of 50 students;  
**Student Project Advisor** – Bachelor in Applied Physics elective course "Technical Optics, University of Twente (4h/week), project on Surface Plasmons
- 2015 – 2017 **Lecturer** – Bachelor in Physics compulsory course "Waves and Oscillations", University of Sydney (2h/week), average 30 students
- 2011 – 2012 **Lecturer** – Master in Electrical Engineering elective course "Optical Fiber Communications", University of Twente (2h/week), average 5 students

### Organisation of Scientific Meetings

- 2020 **TPC member**, General Congress of the International Commission for Optics (ICO 2020), Dresden, Germany
- 2019 **TPC member**, OSA Nonlinear Photonics (NP 2020), Montreal, Canada
- 2019 **Sub-committee chair**, Asia Communications and Photonics Conference (ACP 2019)
- 2019 **TPC member**, CLEO Pacific Rim 2018, Hong Kong
- 2018 **TPC chair**, IEEE Topical meeting of Microwave Photonics 2018, Toulouse, France
- 2018 **Lead organizer**, Special symposium "Recent Advances in Integrated Microwave Photonics" at Conference on Lasers and Electro Optics (CLEO 2018), San Jose (6 invited speakers)
- 2018 **TPC member**, CLEO Pacific Rim 2018, Hong Kong
- Since 2017 **TPC member**, Asia Communications and Photonics Conference (ACP)
- Since 2016 **TPC member**, IEEE Topical meeting of Microwave Photonics
- Since 2015 **Steering committee member**, Workshop on Optomechanics and Brillouin Scattering (WOMBAT)
- 2015 **Lead Organizer**, Focus Session: "SC3: Microwave Photonics for Wireless Spectrum Management", Progress in Electromagnetics Research Symposium (PIERS 2015), Prague, (2 keynote speakers, 12 invited speakers).

### Institutional Responsibilities

- 2019 **Primary Guest Editor** for the special issue "Programmable Photonics", *IEEE Journal of Selected Topics in Quantum Electronics* (JSTQE)
- 2018 **Guest Editor** – *IEEE Photonics Technology Letters* (PTL), *Special Issue* on "Advances in Integrated Microwave Photonics"
- Since 2018 **Technical Group Leadership**, Fiber Optics Technology, The Optical Society (OSA)
- Since 2017 **Traveling Lecturer**, The Optical Society (OSA)
- Since 2015 **Grant Assessor** : ERC Consolidator Grants (ERC CoG), Marie Skłodowska Curie Fellowships, EPSRC New Investigator Award, Swiss National Science Foundation (SNF), Flanders Research Foundation (FWO), Natural Sciences and Engineering Research Council of Canada (NSERC), Israel Science Foundation, Australian Research Council (ARC) Discovery and Linkage grants
- Since 2008 **Journal reviewer** including *Nature Photonics*, *Science*, *Nature Communications*, *Optica*, *Light: Science and Applications*, *Laser and Photonics Reviews*, *APL Photonics*, *IEEE JSTQE*
- Since 2006 **PhD Thesis Examiner** at Optoelectronic Research Centre (ORC) University of Southampton, Universidad de Politecnica Valencia (UPV), Bar-Ilan University, University of Twente

## Major Collaborations

**Prof. Jose Capmany** Integrated microwave photonics, UPV/Spain  
**Prof. Klaus Boller**, Optical frequency combs, U. Twente/Netherlands  
**Dr. Richard DeSalvo**, RF photonic converters, Harris Corp./USA  
**Prof. Roel Baets** and **Prof. Wim Bogaerts**, Silicon photonics, Ghent University/Belgium  
**Prof. Radan Slavik**, Microwave photonics, ORC University of Southampton/UK  
**Prof. Arnan Mitchell**, Hybrid silicon-chalcogenide, RMIT University/Australia  
**Dr. Daniel Dolfi**, On-chip Brillouin laser, Thales Research and Technology/France  
**Prof. Benjamin Eggleton**, Nonlinear integrated MWP, University of Sydney/Australia  
**Prof. Steve Madden**, Chalcogenide waveguides, Australian National University/Australia  
**Prof. Christopher Poulton**, On-chip SBS, University Technology Sydney/Australia  
**Dr. Chris Roeloffzen**, Silicon nitride circuit, LioniX Int./Netherlands  
**Prof. Jonathan Bradley**, Tellurium Oxide waveguides, McMaster University/Canada,

## Publications

Overall, I have authored and co-authored **68 journal papers** (including 7 papers in *Optica* (IF~ 10) and 1 in *Nature Photonics* (IF~ 38)), more than **100 conference papers**, 2 book chapters, 2 patents, and delivered **40 invited talks** in international conferences and training schools.

My publications have received >4500 citations (Google Scholar) and my h-index is 34. The current number of citations for my publications is 2900 (Scopus)/ 3665 (Google Scholar) with an h-index of 27 (Scopus)/ 31 (Google Scholar).

Ten most important publications	Citations (GS)
<b>1. D. Marpaung</b> , J. Yao and J. Capmany, "Integrated microwave photonics," <i>Nature Photonics</i> , 13, 80, (2019) (IF: 38). <i>An invited review paper. Currently the third highest-cited paper of all papers published in Nature Photonics in 2019.</i> <b>★ Web of Science Highly cited paper (top 1% in the field of physics)</b>	230
<b>2. D. Marpaung</b> , B. Morrison, M. Pagani, D.-Y. Choi, B. Luther-Davies, S.J. Madden, and B.J. Eggleton, "Low power, chip-based stimulated Brillouin scattering microwave photonic filter with ultrahigh selectivity," <i>Optica</i> 2, 76 (2015) (IF: 9.2). <i>Reported the world record performance RF bandstop filter based on light-sound interactions in a photonic chip. Currently the 10<sup>th</sup> highest-cited paper in Optica of all time</i> <b>★ Web of Science Highly cited paper (top 1% in the field of physics)</b>	215
<b>3. D. Marpaung</b> , C. Roeloffzen, R. Heideman, A. Leinse, S. Sales and J. Capmany, "Integrated microwave photonics," <i>Laser and Photonics Reviews</i> , 7, 506, (2013) (IF: 8.0). <i>The seminal paper introducing the concept of integrated microwave photonics. Currently the 7<sup>th</sup> highest-cited paper in Laser and Photonics Reviews of all time</i> <b>★ Web of Science Highly cited paper (top 1% in the field of physics)</b>	636
<b>4. Y. Liu</b> , A. Choudhary, J. Hotten, B. J. Eggleton, and <b>D. Marpaung</b> "All-optimized integrated RF photonic notch filter", <i>Optics Letters</i> <b>42</b> , no. 22, p. 4631, (2017) (IF: 3.58, citations:12) <i>This paper reported the world's lowest noise figure and highest dynamic range integrated RF photonic tunable filter.</i> <b>★ Editor's pick</b> Web of Science Highly cited paper (top 1% in the field of physics)	64
<b>5. B. Morrison</b> , A. Casas-Bedoya, Y. Liu, A. Zarifi, G. Ren, T. Nguyen, K. Vu, D.Y. Choi, <b>D. Marpaung</b> , S. J. Madden, A. Mitchell, and B. J. Eggleton "Compact Brillouin devices through hybrid integration on Silicon", <i>Optica</i> <b>4</b> , 847 (2017) (IF: 9.2) <i>This paper reported the first hybrid silicon-chalcogenide integrated Brillouin laser and amplifier</i> <b>★ Highlighted by &gt; 15 News reports</b>	100
<b>6. Y. Liu</b> , A. Choudhary, <b>D. Marpaung</b> , and B. J. Eggleton "Gigahertz optical tuning of an on-chip RF photonic delay line", <i>Optica</i> <b>4</b> , 418 (2017) (IF: 9.2)	34

<i>This paper reported an optical delay line that can be tuned in nanoseconds, important for modern RF applications</i>		
<b>★ Highlighted by &gt; 15 News reports</b>		
7.	M. Pagani, B. Morrison, Y. Zhang, A.Casas-Bedoya, T. Aalto, M. Harjanne, M. Kapulainen, B. J. Eggleton, and <b>D. Marpaung</b> , " Low-error and broadband microwave frequency measurement in a silicon chip", <i>Optica</i> <b>2</b> , 751 (2015) (IF: 9.2)	50
8.	M. Burla, <b>D. Marpaung</b> , L. Zhuang, C. Roeloffzen, M.R. Khan, A. Leinse, M. Hoekman and R. Heideman, "On-chip CMOS compatible reconfigurable optical delay line with separate carrier tuning for microwave photonic signal processing," <i>Optics Express</i> 19(22), (2011). (IF: 3.5) <i>Reported a tunable wideband monolithic integrated optical signal processor.</i> <b>★ Highlighted in Nature Photonics Technology Focus 2011.</b>	136
9.	L. Zhuang, <b>D. Marpaung</b> , M. Burla, W.P. Beeker, A. Leinse and C. Roeloffzen, "Low loss, high-index-contrast Si <sub>3</sub> N <sub>4</sub> /SiO <sub>2</sub> optical waveguides for optical delay lines in microwave photonics signal processing," <i>Optics Express</i> , 19(23), (2011) (IF: 3.5)	142
10.	<b>D. Marpaung</b> , "On-chip photonic-assisted instantaneous microwave frequency measurement system", <i>IEEE Photonics Technology Letters</i> 25, 837 (2013). (IF: 2.1) <i>Reported the first ever integrated MWP instantaneous frequency measurement</i>	63

### Invited Presentations

I have given **40 invited talks**, workshop, special sessions and training schools. A list of selected talks is given below.

1. "Integrated microwave photonics", Tutorial at *Optical Fiber Communications Conference (OFC 2020)*, 8-12 March, San Diego, CA
2. "Integrated photonics for microwave photonics", Workshop on Optical Integration Beyond Silicon Photonics: Why, What and How? at *Optical Fiber Communications Conference (OFC 2018)*, March, San Diego, CA
3. "RF Photonic Filter with Record Low Noise and 116 dB Dynamic Range", *2018 AIM Photonics Spring Meeting at MIT*, March, Boston, MA
4. "Stimulated Brillouin Scattering and its Applications", ePIXfab Silicon Photonics Summer School (3<sup>rd</sup> Edition) June 2018, Ghent, Belgium
5. "Integrated microwave photonics", Tutorial at *Asia Communications and Photonics Conference (ACP 2017)*, November, Guangzhou
6. "On chip SBS for MWP Signal Processing Applications", *Optical Fiber Communication Conference and Exposition (OFC) 2016*, 20-24 March, Anaheim, CA
7. "Progress in integrated microwave photonics", Special workshop at *2015 European Conference on Optical Communications (ECOC)*, Valencia, Spain

### Patents

1. **D. Marpaung**, B. Morrison, R. Pant, "A device and a method for generating an electrical signal with a suppressed frequency band," US Patent 9,673,908. (2017)
2. **D. Marpaung**, M. Pagani, and S. Shahnian, "Microwave photonic filter notch filter," US Patent 10,084,542 (2018)