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### PROFESSOR MARTIJN DE STERKE

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#### Biographical details

Qualifications B. Eng. Applied Physics, Delft (Netherlands), 1981. M. Eng. Applied Physics, Delft (Netherlands), 1982. Ph.D., Optics, Univ. Rochester (USA) 1988. Employment History Reader (1999-2002), Senior Lecturer (1995-1999), Lecturer (1991-1994), University of Sydney, Research Fellow (1987-1990), University of Toronto. Major Awards Pawsey Medal, Australian Academy of Sciences (1999); Fellow, Optical Society of America (2002); M. Eng awarded cum laude. Professional Association Editor, Optics Express. Technical Program Committee memberships: Workshop on Novel Solitons and Nonlinear Optics and Lasers (Victoria, Canada, 1998), Nonlinear Guided Wave Workshop (Dyon, France, 1999). Conference Organising Committee membership: IUTAM 99/4 (Sydney, 1999).

#### Research interests

Martijn de Sterke is a theoretical physicist, whose approach to his research is characterized by actively seeking collaborations with experimentalists. He has authored papers in the fields of optics and photonics, solid state physics, and acoustics, and these papers have appeared both in the physics and in the engineering literature. In optics he has worked on a variety of problems in the areas of nonlinear optics (soliton physics, nonlinear propagation, numerical methods, optical frequency conversion, parametric amplification), wave propagation in random media, guided-wave optics, coupling of co- and contra-propagating modes in one-dimensional periodic media, photonic crystals, microstructured optical fibres, self-written gratings and waveguides, and optical Bloch oscillations. Highlights of his publication record include: development of the theory of grating solitons, including the coupling of these solitons, the nonlinear theory of deep gratings; first experimental verification of these solitons, and the definitive experimental paper; definitive paper on the theory of Hill gratings; theory and first observation of self-writing of waveguides in glass; first calculation of local density of states in realistic photonic crystals for determining radiation dynamics; first study of birefringence, structural losses and the nature of modal cut-offs in microstructured optical fibres; first calculation of the modes of microstructured optical fibres with high-index inclusions; first general theory of frequency conversion in two-dimensionally poled structures, and the general optimization of these poling patterns; first general theory of dynamic localization in semiconductors under an applied uniform AC fields; and proposal and experimental verification of grating-dispersion inverted interference devices.

#### Selected grants

##### 2017

- *Ultra-compact highly-nonlinear hybrid plasmonic waveguides*; Tuniz A, de Sterke C; DVC Research/Postdoctoral Research Fellowship Scheme.

##### 2015

#### SEARCH PAGE




- *Hybrid plasmonic waveguide for integrated photonic signal processing*; Palomba S, de Sterke C, Novotny L, Zhang X; Australian Research Council (ARC)/Discovery Projects (DP).
- *Inductively-coupled plasma etcher*; Eggleton B, Reilly D, de Sterke C, Fleming S, Palomba S; Australian Research Council (ARC)/Linkage Infrastructure, Equipment and Facilities (LIEF).
- *AINST Accelerator Scheme - Project Officers Group (working title)*; Kuncic Z, de Sterke C, King N, Sukkarieh S; DVC Research/AINST Accelerator Scheme.

## 2013

- *Nanophotonics for strong absorption in extremely thin solar cells - moving beyond silicon*; de Sterke C; Australian Research Council (ARC)/Discovery Projects (DP).

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## Selected publications



- <http://www.vdmpublishinggroup.com/>  
**Bragg Grating Optical Add-drop Multiplexers: An Introduction into Bragg Grating Interference Devices** (<http://www.vdmpublishinggroup.com/>) (VDM Verlag Dr Muller, 2008)

Download citations: [PDF\(../publications/martijn.desterke.pdf\)](#) [RTF\(../publications/martijn.desterke.rtf\)](#) [Endnote\(../publications/martijn.desterke.txt\)](#)

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<b>Books</b>	<ul style="list-style-type: none"> <li>• Aslund, M., de Sterke, C., Poladian, L., Canning, J. (2008). <i>Bragg Grating Optical Add-drop Multiplexers: An Introduction into Bragg Grating Interference Devices</i>. Germany: VDM Verlag Dr Muller.</li> </ul>
<b>Book Chapters</b>	<ul style="list-style-type: none"> <li>• Kabakova, I., Uddin, I., Jeyaratnam, J., de Sterke, C., Malomed, B. (2013). Spontaneous Symmetry Breaking of Pinned Modes in Nonlinear Gratings with an Embedded Pair of Defects. In Boris Malomed (Eds.), <i>Spontaneous Symmetry Breaking, Self-Trapping, and Josephson Oscillations</i>, (pp. 149-165). Berlin, Germany: Springer-Verlag.</li> <li>• Botten, L., McPhedran, R., de Sterke, C., Nicorovici, N., Asatryan, A., Smith, G., Langtry, T., White, T., Fussell, D., Kuhlmei, B. (2005). From Multipole Methods to Photonic Crystal Device Modelling. In Kiyotoshi Yasumoto (Eds.), <i>Electromagnetic theory and applications for photonic crystals</i>, (pp. 47-122). Boca Raton, Florida: Taylor and Francis.</li> <li>• Aceves, A., de Sterke, C., Weinstein, M. (2003). Theory of nonlinear pulse propagation in periodic structures. In R. E. Slusher and B. J. Eggleton (Eds.), <i>Nonlinear Photonic Crystals</i>, (pp. 15-31). Germany: Springer.</li> </ul>
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<b>Journals</b>	<ul style="list-style-type: none"> <li>• Sturmberg, B., Dossou, K., Lawrence, F., Poulton, C., McPhedran, R., de Sterke, C., Botten, L. (2016). EMUstack: An open source route to insightful electromagnetic computation via the Bloch mode scattering matrix method. <i>Computer Physics Communications</i>, 202, 276-286. <a href="http://dx.doi.org/10.1016/j.cpc.2015.12.022">[More Information](http://dx.doi.org/10.1016/j.cpc.2015.12.022)</a></li> <li>• Fisher, C., Botten, L., Poulton, C., McPhedran, R., de Sterke, C. (2016). End-fire coupling efficiencies of surface plasmons for silver, gold, and plasmonic nitride compounds. <i>Journal of the Optical Society of America B</i>, 33(6), 1044-1054. <a href="http://dx.doi.org/10.1364/JOSAB.33.001044">[More Information](http://dx.doi.org/10.1364/JOSAB.33.001044)</a></li> </ul>

- Li, G., de Sterke, C., Palomba, S. (2016). Figure of merit for Kerr nonlinear plasmonic waveguides. *Laser and Photonics Reviews*, 10(4), 639-646. [\[More Information\]\(http://dx.doi.org/10.1002/lpor.201600020\)](http://dx.doi.org/10.1002/lpor.201600020)

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#### Conferences

- Smith, M., Kuhlmei, B., de Sterke, C., Wolff, C., Lapine, M., Poulton, C. (2016). Elastic modelling of electrostriction in dielectric composite materials. *Australian Conference on Optical Fibre Technology (ACOFT 2016)*, Washington, D.C.: OSA (Optical Society America). [\[More Information\]\(http://dx.doi.org/10.1364/ACOFT.2016.JM6A.21\)](http://dx.doi.org/10.1364/ACOFT.2016.JM6A.21)
- Li, G., de Sterke, C., Palomba, S. (2016). Kerr nonlinear characteristics of plasmonic waveguide devices. *16th International Conference on Numerical Simulation of Optoelectronic Devices (NUSOD 2016)*, Piscataway: (IEEE) Institute of Electrical and Electronics Engineers. [\[More Information\]\(http://dx.doi.org/10.1109/NUSOD.2016.7547057\)](http://dx.doi.org/10.1109/NUSOD.2016.7547057)
- Li, G., de Sterke, C., Palomba, S. (2016). Performance Comparison of Kerr Nonlinear Plasmonic Waveguide Configurations. *Australian Conference on Optical Fibre Technology (ACOFT 2016)*, Washington, D.C.: OSA (Optical Society America). [\[More Information\]\(http://dx.doi.org/10.1364/ACOFT.2016.JM6A.20\)](http://dx.doi.org/10.1364/ACOFT.2016.JM6A.20)

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#### Patents

- Austin, D., Eggleton, B., de Sterke, C., Steinvurzel, P., Bolger, J., Brown, T., Luan, F., Yeom, D. (2014). Tunable optical supercontinuum enhancement by spectral phase modification. *Patent No. 8718411*.

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**Authorised by:** Dean, Faculty of Science.