Curriculum Vitae

Mathias VANWOLLEGHEM
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Academic Degrees and Education

March 4th 2024 — Habilitation à Diriger les Recherches (**HDR**) of the University of Lille
Specialty : Photonics, (Garant: Jean-François Lampin)

"Collective matter excitations at THz frequencies and their applications for innovative THz photonic devices"

Oct. 1999 - Jan. 2005 — **PhD** in Applied Sciences Doctor of Photonics Engineering
Photonics Research Group, Department of Information Technology (INTEC), Faculty of Engineering, Ghent University, Belgium

"*An integrated InP-based Optical Waveguide Isolator Using CoFe Contacts*"
(PhD advisor: Prof. dr. ir. Roel Baets)

Sep. 1992 - July 1999 — **MS** in Engineering Physics and Photonics Engineering
Faculty of Engineering, Ghent University, Ghent, Belgium

Research Positions

Since Oct. 2012 — **Chargé de Recherche CNRS** in the *THz Photonics* research group of the *Institut d'Electronique, de Microélectronique et des Nanotechnologies (IEMN), UMR 8520 du CNRS, Villeneuve d'Ascq*
Group Leader THz Photonics group since 1/12/2025
THz & MIR nonreciprocity, THz spintronics and THz integrated optics

Oct. 2006 - Sept 2012 — **Chargé de Recherche CNRS** in the *Magnetism, Micro- and nanoStructures* research group of the *Institut d'Electronique Fondamentale (IEF), UMR 8622 du CNRS, Orsay*
Magnetophotonics and magnetoplasmonics

2005 - Sept 2006 — **Postdoctoral Fellow** in the *Magnetism, Micro- and nanoStructures* research group of the *Institut d'Electronique Fondamentale (IEF), UMR 8622 du CNRS, Orsay*
2D magnetophotonic iron garnet crystals for enhanced (N)IR nonreciprocity

Research contributions and Impact

- Main research activities and expertise on light-matter interaction in the presence of magnetic materials and/or external magnetic fields at frequencies from the visble down to the sub-mm wave regime. Double speciality in *applied research* on innovative technologies of magneto-optical phenomena (nonreciprocal circuits, topological photonics, …) and more *fundamental research* on ultrafast picosecond timescale spin dynamics (THz spintronics, ultrafast nanomagnetism, …)
- since 2013 additional research axis on THz photonics with a focus on unconventional THz gain and emission media and integrated Si-based THz photonics
- Electromagnetic modelling applied (but not limited) to nonreciprocal photonic structures: 2D & 3D (a-)periodic, fully bi-anisotropic, free-space, guided or resonant. Numerical coding (Python, C++)

Publications 43 peer-reviewed international journal publications (**7 papers as last author;** 10 papers in last 5 years); 5 patents and over 100 conference contributions (including 16 invitations and 3 best paper awards).

Statistics: total citations over **2850** times; **4 papers cited over 100 times; one cited 1100 times;** h-index: 24; i10 index: 36 (as of 31/12/2025; source Google Scholar)

Research administration and management (RAM)

- as of 1/12/2025: **Group Leader** of **THz Photonics group** (18 members) comprising 5 CNRS/University permanent researchers, 6 postdoctoral researchers, 5 doctoral students and 2 contractual research engineers.
- **Board member of the GDR QUOTERAMIR** : “QUantique et Optoélectronique pour le TERAhertz et le Moyen-IR” labeled by CNRS INP & CNRS Ingénerie (2026-2030)
- **Coordinator or PI of 17 research projects** totalling a secured budget for my research unit close to 3**M€** among which 7 FR ANR [4 as consortium coordinator, 1 PEPR] and 3 European [1 INTERREG V as consortium coordinator, 1 FET Open & 1FP5 IST as PI]. ***Detailed list in research activity report***
- **active participant in 7 other projects** [among which 1 H2020 ERDF & 4 ANR]

TRAINING & TUTORING YOUNG RESEARCHERS

- **PhD students (12)**
    - Principal supervisor (7) (supervision >50%; present employment indicated)
        1. Liubov Magdenko (2007-2010) "Conception et réalisation de composants non-réciproques planaires à base de matériaux magnéto-optiques" (promotor : B. Dagens), IEF, Paris Sud ; defence 11/2010
           Grant: ANR MAGNETOPHOT
           (research engineer at Saint-Gobain)
        2. Lukáš Halagačka (2010-2014) "Theoretical and experimental study of novel integrated magnetoplasmonic nanostructures" (promotor B. Dagens & K. Postava) cotutelle IEF, Paris Sud & Dept Phyics, Technical University Ostrava, CZ **defence 10/11/2014**
           Grant: Bourse du Gouvernement Français Ministère Affaires Etrangers (Barrande Fellowship 2010)
           (research assistant Nanotechnology Center, Technical University Ostrava, CZ)
        3. Tomáš Horák (2014-2017) "Terahertz Nonreciprocal Effects Using Hexagonal Ferrites" (promotor: JF Lampin), IEMN, Université Lille **defence 12/12/2017**
           Grant: Doctoral grant Univ Lille1 **Project**: ANR TENOR
           (Optics Engineer Varroc Lighting Systems, CZ)
        4. Martin Mičica (2015-2019) "Solid-state terahertz laser material based on molecular crystals" (promotor: JF Lampin & K. Postava), cotutelle IEMN, Université Lille, & Nanotechnology Center, Technical University Ostrava, CZ, **defence 28/01/2020 Grant**: Bourse du Gouvernement Français Ministère Affaires Etrangers (Barrande Fellowship 2015) (postdoctoral researcher LPENS)
        5. Elias Akiki (2017-2021) "Integrated SOI photoacoustic gas sensor at THz frequencies for food quality control application" (promotor G. Ducournau), IEMN, Université Lille **defence 26/6/2021**
           Grant: INTERREG TERAFOOD
           (postdoctoral researcher C2N)
        6. Pierre Koleják (2020-2023) "Terahertz time-domain ellipsometry based on spintronic phenomena", promotor: M. Vanwolleghem & K. Postava, cotutelle IEMN, Université Lille, & Nanotechnology Center, Technical University Ostrava, CZ, **defence 10/12/2024**
           Grant: Bourse du Gouvernement Français Ministère Affaires

Etrangers (Barrande Fellowship 2020)
recipient of several awards: PhD Student Prize: Talent of Ostrava 2023; TUO Rector's Award 2023 (best doctoral project)

7. Jyoti Yadav *(2025-)* "Photonic-Spintronic Hybrid Terahertz Emitters", IEMN, Université Lille, promotor: M. Vanwolleghem
Grant: ANR PRCI 2024 SPINCHIP
(defence scheduled end 2028)

- Assisting co-supervision (5) (supervision <30%)

1. Wouter Van Parys (2004-2008) "Optimization of an Integrated Optical Isolator Based on a Semiconductor Amplifier with a Ferromagnetic Metal Contact", promotor: Roel Baets & Dries Van Thourhout, Photonics Research Group, Universiteit Gent, Belgium, **defence 17/02/2009**
(Global Head of Operational Technology & Energy Solutions at Barry Callebaut)
2. Wojciech Śmigaj (2007-2010) "Design and numerical modelling of integrated optical components", (promotor S. Enoch), Institut Fresnel, Université Aix-Marseille **defence 22/9/2010**
(research engineer UK Met Office, Exeter, UK)
3. Jan Chochol (2012-2017) "Semiconductor plasmonic nanostructures" (director Kamil Postava), Nanotechnology Center, Technical University Ostrava, CZ **defence 7/12/2017**
(research engineer ONsemi, Roznov, CZ)
4. Mattias Verstuyft (2017-2022) (promotor B. Kuyken) Photonics Research group, Ghent University, BE "A Silicon Photonics Based Terahertz Photoacoustic Gas Sensor" **defence 15/12/2024**
(R&D Project Leader, Photonics Research Group, Universiteit Gent)
5. Geoffrey Lézier (2020-2023) "Novel rapid continuous-wave THz sources exploiting broadband inverse spin Hall effect emitters" (promotor: N. Tiercelin) **defence 13/12/2023**
(postdoctoral researcher, Photonics Research Group, Universiteit Gent)

- **Posdoctoral researchers (5)**

- Oleksandr Stepanenko (2016-2018), postdoctoral researcher on the ANR JCJC TENOR project, IEMN
- Chengxin Pang (2008-2009), postdoctoral researcher on the ANR PNANO MAGNETOPHOT project, IEF, Orsay

- Cristiane Nascimento-Santos (2023-2024), postdoctoral researcher on the ANR 2021 PRCI TRAPIST project
- Nupur Ninad Khatu (2025-), postdoctoral researcher on the PEPR TOAST project
- *1 to be hired in ANR MOXSPIN (Spring 2027)*

- **Master students (4)**
  - P; Koleják, Spring Semester 2019
  - Geoffrey Lézier, Spring Semester 2019
  - Iva Hlobilkova, June-July 2024, Master1 Nanotechnology TU Ostrava, CZ
  - Filip Gaizura, Spring Semester 2025, M1 student Physical engineering and nanotechnology at Brno University of Technology
- **Visiting PhDs (3)**
  - Tomáš Kohut, May-July 2022
    presently: Research Engineer at Nanotechnology Center, Technical University Ostrava, CZ
  - Petr Liska, November 2024 (visit Barrande project with Brno, CZ)
    presently: Fulbright Scholar at Caltech USA (Brongersma Group) & last year PhD student at BUT (defence scheduled end 2026)
  - Pavel Klok, November 2024 and November 2025 (visit Barrande project with Brno, CZ)
    presently: 2nd year PhD student at BUT

Services to the research Community

Contributed to or co-organized several national and international workshop & symposia:

- MRS Fall 2010 Symposium J: Integrated Nonreciprocal Photonics–Materials, Phenomena, and Devices, Boston, USA:
  Symposium Organizer, Session Chair, & Proceedings Editor
- IEEE Summer Topicals 2013: Nonreciprocal Photonic Devices, Hawaii, USA
  Session Chair
- nanoOstrava 2017 THz Technology and nanostructures in photonics and electronics, Ostrava Czech Republic:
  Symposium Organizer, Session Chair, & Editor Special Issue
- Student Workshop of the 44th International Conference on Infrared, Millimeter and Terahertz Waves (IRMMW-THz 2019), Paris, France:
  Co-organizer & Lecturer at Student Workshop

- CLEO 2021 Special Symposia, Hot topics in THz Photonics: Spintronics and Biophotonics, 9 - 14 May 2021, San Jose, USA.
  Symposium Organizer & Session Chair
- MULTIMAG 2023, 1st international Workshop “Magnetism and Multiphysical Couplings”, IEMN, Villeneuve d’Ascq 22-24/3/2023
  Co-chair
- Barrande 4th CZ-FR workshop on Nanotechnologies - Photonics & Electronics 2023, 1-3/2/2023, IEMN, Villeneuve d’Ascq. (https://barrande2023.sciencesconf.org/)
  Chair
- 2023 Plenary Days GDR NanoTeraMir, 24-26 May, Dunkerque
  Co-organizer
- Barrande 5th CZ-FR workshop on Nanotechnologies - Photonics & Electronics, Charles University, 5-7 June 2024, Prague
  Co-organizer (with Martin Veis)
- Barrande 6th CZ-FR workshop on Nanotechnologies - Photonics & Electronics, Charles University, 26-28 November 2025, LNCMI, Grenoble,
  Co-organizer (with Milan Orlita)

Scientific Editorial Work:

- 2012-2023: co-editor of the Elsevier Journal "Photonics and Nanostructures – Fundamentals and Applications" (IF:3) ISSN: 1569-4410 ~40-50 papiers/yr/editor
  (5 editors in total)
- editor of proceedings symposium J MRS Fall 2010
  https://www-cambridge-org.ressources-electroniques.univ-lille.fr/core/journals/mrsonline-proceedings-library-archive/volume/4CA418332CFEC4879D96AB30842BE52A
- Editor of the Special Issue of PNFA collecting selected papers of the organized nanoOstrava 2017 Symposium. (10 papers)
  https://www-sciencedirect-com.ressources-electroniques.univ-lille.fr/journal/photonics-and-nanostructures-fundamentals-and-applications/special-issue/10X1G5K362R
- Co-editor of the PNFA Special Issue “Micro and nano structured mid-IR to Terahertz materials and devices” (published in September 24, https://www.sciencedirect.com/special-issue/10ZFK85MP3G)

Expertise

- expertises & HCERES:
  - **expert invité du comité HCERES du laboratoire ICube** UMR7357, Université de Strasbourg (31/01/2017-02/02/2017)

- **expert invité du comité HCERES du laboratoire IMEP-LaHC** UMR5130, Université de Grenoble-Alpes (26-28/11/2019)
- **président du comité HCERES de la fédération de recherche FMNT** « Fédération des Micro et Nanotechnologies » FR2542 (28/11/2019)
- member of the **Comité Scientifique Extérieur** (CSE) **IMEP-LaHC** UMR5130, Université de Grenoble-Alpes (20-21/11/2023)
- **invited member** of the **International Scientific Advisory Board (ISAB)** of a large-scale **CZ national structure** "Materials and Technologies for Sustainable Development (MATUR)" (19M€ budget)
- **invited external expert** for the CNRS Research Engineer competition "concours IR n° 21 BAP C" (12/9/2019 and 21−22/10/2019)
- **invited member** selection committee Assistant Professorship "Magnetooptics", laboratoire Hubert Curien, Université Jean-Monnet (UJM). (17/04/2024)

- reviewer or examinator in **9** PhD jurys and **1** HDR Jury:
  - Wouter Van Parys, "Optimization of an Integrated Optical Isolator Based on a Semiconductor Amplifier with a Ferromagnetic Metal Contact", (15/3/2009), Photonics Research Group, Ghent University, BE
    reviewer
  - Wojciech Smigaj, "Design and numerical modelling of integrated optical components", (22/9/2010) Institut Fresnel, Université Aix-Marseille
    examinator
  - Samir Ghosh, "Optical Isolators in Silicon Based Photonic Integrated Circuits" (26/8/2013), Photonics Research Group, Ghent University, BE
    reviewer
  - Laure Bsawmaii "Enhancement of Every Magneto-Optical Effect With All-Dielectric Guided-Mode Resonant Gratings Based on a Magnetic Sol-Gel Nanocomposite", (26/10/2020), Laboratoire Hubert Curien , Université de Lyon
    examinator
  - Sevag Abadian, "Guides d'onde non-réciproques à base d'effets magnéto-plasmoniques" (26/3/2021), Université Paris-Saclay, CNRS, Centre de Nanosciences et de Nanotechnologies
    examinator
  - Alexis Dufour, « Fonctionnalisation Magnéto-Optique d'une Fibre Optique Microstructurée par un Nanocomposite Sol-Gel », (16/12/2022), Laboratoire Hubert Curien , Université de Lyon
    examinator

- Mattias Verstuyft, « A Silicon Photonics Based Terahertz Photoacoustic Gas Sensor », (15/12/2023), Photonics Research Group, Universiteit Gent, **reviewer**
- Dennis Maes, « Bridging the Terahertz Gap: High-Speed Photodiodes on Silicon Nitride», (17/12/2024), Photonics Research Group, Universiteit Gent, **reviewer**
- Ondrej Novak, «Design and characterisation of topologically protected photonic edge modes», (2/2026), Cotutelle Institute of Physics of Charles University (Martin Veis), Prague and University of Barcelona (Gervasi Herranz)
  reviewer
- RNDr. Martin Veis, Ph.D. « Magneto-optical spectroscopy as a probe of the electronic structure and magnetism of materials and nanostructures » , **Habilitation** Thesis (7/1/2026) to obtain the academic title of Docent of Charles University , Prague.
  Committee member

- regular reviewer of main international journals of the community (Phys.Rev. Lett., Phys. Rev B, Opt. Expr., Opt. Lett., IEEE Trans. THz Sc. Technol., IEEE Photonics Journal, Nature Photon., ...), expert for research councils (ANR FR, FWO BE, ERC, Czech Academy of Sciences)

Committee membership elected member of Section8 of the French National Committee for Scientific Research (CoNRS) for the period Oct. 2016 - Sept. 2021
Co-author of the **"rapport de conjoncture 2018" for section 8**

SELECTED ACADEMIC COLLABORATIONS

- Center for Nanotechnology, Technical University Ostrava, CZ
  THz & MIR magneto-optic spectroscopy; ab-initio calculation THz spectra molecular crystals
- Photonics Research Group, Ghent University, BE
  integrated Si-based THz waveguides
- Laboratoire de Physico-Chimie de l'Atmosphère, ULCO, Dunkerque, FR
  THz gas spectroscopy
- Institut Fresnel, Marseille, FR
  numerical modeling of bi-anisotropic periodic structures
- Institute of Photonics and Electronics, Prague, CZ
  modeling of nonreciprocal structures

- Laboratoire Pierre Agrain, LPENS, FR
  THz-TDS spectroscopy & spin-based emitters
- Thales, UMPhy, FR
  THz spin physics
- Centre de Nanosciences et de Nanotechnologies, Orsay, FR
  magnetophotonics & -plasmonics
- Fraunhofer Institute for Industrial Mathematics ITWM, Kaiserslautern, DE
  fiber integrated THz emitters
- Institute of Physical Engineering, CEITEC Biophotonics Research Group, Brno, CZ
  THz graphene surface plasmonics
- Hybrid Photonics Lab, EPFL, Lausanne, CH
  SOI integrated THz spintronics