Philippe Ciuciu

Curriculum Vitae (Nov. 2021)

CEA/NeuroSpin - Bât 145
91191 Gif-sur-Yvette, France
☎ (+33) 169087785
✉ philippe.ciuciu@cea.fr
https://philippeciuciu.fr
Philippe_Ciuciu
philippe-ciuciu-7747a418/
ORCID ID: 0000-0001-5374-962X

2022– **CEA Research Director**, co-Head of the future Inria-CEA MIND team at NeuroSpin, Gif-sur-Yvette, France.

2018–21 **CEA Research Director**, Head of the Compressed Sensing group in the Inria-CEA Parietal team at NeuroSpin, Gif-sur-Yvette, France.

2013-18 **CEA Senior Expert**, in the Inria-CEA Parietal team at NeuroSpin.

2012-13 **Visiting Scientist (2 months)**, in Biyu J. He's NIH group, Bethesda (DC, USA).

2012-13 **Invited Professor (5 months)**, at the University of Toulouse III Paul-Sabatier, Institut of Maths (CNRS UMR 5219), Toulouse, France.

2007-12 **Senior Research Scientist**, at NeuroSpin, Gif-sur-Yvette, France.

2000-06 **Postdoc Fellow (2000-02), then Junior Research Scientist**, at SHFJ, Orsay, France.

Education and Diploma

2008 **Habilitation degree (HDR):**, *Ultimate French academic degree requested to officially serve as PhD advisor*, Paris-Sud University, Orsay, France.

2000 **PhD thesis**, in *Signal processing* (cum laude), Lab of Signals & Systems (L2S), Paris-Sud University, Orsay (1-year break for military service in Sep. 1998).

1996 **MSc**, in *Signal processing and automatic control* (summa cum laude), Paris-Sud University.

1996 **MScEng**, in in signal & image processing (summa cum laude) at ESIEA, Paris.

Honors & Awards

2020 **Finalist**, at the 2020 brain fastMRI challenge organized by Facebook AI Research and NYU.

2019 **Maupertuis Fellowship**, from the Finish academy of sciences and letters to visit Palva Lab, University of Helsinki.

2019 **Vice-chair (elected)**, of the Biomedical Image & Signal Analytics special area team of the European Signal Processing Society (EURASIP).

2013 **Visiting Professor Fellowship**, to spend 5 months at University of Toulouse.

2009-2010 **Best paper awards**, at IEEE MLSP (Grenoble) and ISABEL (Roma) workshops.

Scientific Production

- **Scientific Publications:** H-index: 32, citations: 4422 (Google Scholar, 03.11.2021)
  - 57 research articles in international peer-reviewed journals;
  - 6 scientific mediation articles/5 peer-reviewed book chapters;
  - 153 communications in peer-reviewed international conferences.
- **Invited Lectures:** 20 keynotes/invited lectures in France or from abroad since 2017. Distinguished lecture at Collège de France (Apr 2019) on Deep learning for MR image reconstruction (FR).
- **Sharewares:** Python software: software architect of `PyHRF`, scientific leader of `PySAP`.
- **3 Patents:** cf [P1] in MRI reconstruction (US Patent 10,551,461), cf [P2] in MRI acquisition (US Patent App. 16/639,725) and in B_0 field inhomogeneity estimation (US Patent App. 63/124,911).

Graduate & post-graduate Mentoring, Evaluation Committees

- **8 Post-Doctoral Fellows (2007–):** : Since 2019, two postdocs in collaboration with DRT/LIST and DRT/LETI in the context of PTC projects on compressed sensing (e-tomography, US imaging).
- **20 PhD students (2003–):** Currently, **PhD director** of 5 doctoral students (Z. Ramzi, G. Daval-Frérot, A. Waguet, C. Giliyar-Radhakrisna, M. Dumeur) at EOBE (Paris-Saclay Univ., ADUM ID: N°32589) and **co-supervisor** of two additional ones (Z. Amor, A. Artiges).
  Outstanding PhD students who have recently contributed to my research on Compressed Sensing in MRI: Zaccharie Ramzi (2019-), Carole Lazarus (2015-18) and Nicolas Chauffert (2012-15).
- **24 MSc students (2002–)**: **Supervisor** of two MSc students in 2021 (P.A. Comby, K. Pooja).

Institutional Responsibilities

- **2020–:** Member of the CEA steering committee on HPC, AI and numerical simulation.
- **2020:** CEA/DRF imaging expert in the PhD program focusing on numerical experimentation/twin.
- **2016–19:** Member of the Inria Saclay scientific Committee (elected), Palaiseau, FR.
- **2016–18:** Member of the national PhD Award in Signal & Image processing delivered by both CNRS/GdR ISIS and the French Electrical Engineering society, Paris, FR.
- **2009–:** Member of PhD/HDR committees: **33** (FR: 25, CH: 2, CA: 2, BE: 1, UK: 2, FI:1)/**2**.

Commissions of Trust and Administration of International Research

- **2019–:** Representative of the IEEE Signal Processing Society at the ISBI conference in Venice (2019), Iowa City (2020, virtual) and Nice (2021, virtual).
- **2019–20:** European expert reviewer for the H2020 WIDESPREAD-05-2020 – Twinning actions.
- **2017–18:** Member of ANR Scientific Evaluation Committee (CES45) in charge of selecting grant proposals submitted to the track: *Mathematics, Computer science and signal processing methods to address challenges in biology and healthcare*, Paris, FR.
- **2017:** Reviewer for hiring and promoting Professors, Montreal Polytechnic school, CA.
- **2015–19:** Grant reviewer for i) the Research Foundation Flanders (FWO), Brussel, BE, ii) the Swiss National Science Foundation, Div. Maths., Phys. and Eng. Sci, Bern, CH iii) the Natural Sci. & Eng. Research Council of Canada, CA and iv) Dutch Research Council (NWO), NL.

International Scientific Activities

- **Organizer of recent National/International Workshops/Conferences:**
  - **Jul 2023:** *Harmonic and Multifractal analyses: From Mathematics to Quantitative Neurosciences* (50 people), 3 weeks, Montreal, CA.
  - **2021-2022:** Thematic program on "AI for Signal and Image Processing", sponsored by Institut Pascal (IPa, Paris-Saclay University). Teasing day on Sep, 10 2021
  - **2020-2021:** Member of the Congress Planning Committee for ESRMBM 2021 .
  - **Jan 2018:** *CEA Compressed Sensing day* (60 people), Gif-sur-Yvette, FR.
- **Chairman of scientific sessions at international conferences:** IEEE ISBI'18/'19, EUSIPCO'18/20'/21'.
- **Senior Area Editor (2019–):** IEEE Open access Journal of Signal Processing.
- **Associate Editor (2020–):** Frontiers in Neuroscience and Neurology, section Brain imaging methods.
- **Associate Editor/Area chair in conferences:** EUSIPCO'18-'21, ISBI'19, ICCON'20, ESMRMB'21.
- **Reviewer:** for high IF journals (Nature Comm., PNAS, Scient. Rep., Plos. Comp. Biol) and technical journals in signal processing (IEEE TSP/TIP), medical imaging (MedIA, IEEE TMI), MRI (MRM), neuroimaging (NeuroImage, HBM) and neuroscience (J. Neurosci, J. Neurosci Meth).

Funding and Management (Recent activities)

– **2021-25: Co-Investigator** of the **ANR VLFMRI** project (610k€) aiming at developing low field MRI for neonatal imaging.
– **2020-24: Co-Investigator** of the **ANR DARLING** project (450k€) aiming at developing new adaptive distributed and collaborative learning-based methods for dynamic graphs in high-dimension.
– **2020: Coordinator** of the BaBAR project submitted to the H2020 FET Open call (Not funded).
– **2019-22: Industrial collaboration** with Siemens AI lab (Princeton, NJ, USA) on machine learning techniques for correction of the B0 inhomogeneities effects in susceptibility weighted imaging.
– **2016-20: Principal Investigator** of the **CEA/DRF impulsion & PTC-SN** COSMIC projects (350k€) aiming at improving CS-MRI reconstruction methods and developing the `PySAP` software.
– **2016-20: Co-Investigator** of the **ANR MultiFracs** project (360 k€) aiming at developing new complexity measures for analyzing brain activity using multifractal analysis.

Teaching (Recent activities)

– **2020– : Lecturer** at the M2 ATSI (CentraleSupélec, ENS Paris-Saclay): Medical imaging course (MRI part): 9 hours of course + 6 hours of hands-on session, 20 students.
– **2019– : Lecturer** at Institut d'Optique Graduate School, 4 hours on "MRI: from data acquisition to image reconstruction and interpretation", 35 students.
– **2019: Tutorial presenter** at the 2019 IEEE ISBI conference given on *Recent advances in acquisition and reconstruction for Compressed Sensing MRI* (Venice, Italy, 50 attendees).
– **2016: Instructor** at the IEEE NSS MIC on *Medical image reconstruction* (Strasbourg, France).

Selected Publications

- Cherkaoui H, ..., **Ciuciu P**. Multivariate semi-blind deconvolution of fMRI time series. NeuroImage. 2021 Nov 1;241:118418.
- Muckley MJ, ..., **Ciuciu P**, ... Results of the 2020 fastMRI challenge for machine learning MR image reconstruction. IEEE Transactions on Medical Imaging. 2021 Apr 30;40(9):2306-17.
- El Gueddari L, ..., **Ciuciu P**. Calibration-Less Multi-Coil Compressed Sensing Magnetic Resonance Image Reconstruction Based on OSCAR Regularization. Journal of Imaging. 2021 Mar;7(3):58.
- La Rocca D, ..., **Ciuciu P**, Abry P. Revisiting functional connectivity for infraslow scale-free brain dynamics using complex wavelets. Frontiers in Physiology. 2021 Jan 7;11:1651.
- Lazarus C, ..., **Ciuciu P**. 3D variable-density SPARKLING trajectories for high-resolution T2*-weighted magnetic resonance imaging. NMR in Biomedicine. 2020 Sep;33(9):e4349.
- Farrens S, ..., **Ciuciu P**, Starck JL. PySAP: Python Sparse Data Analysis Package for multidisciplinary image processing. Astronomy and Computing. 2020 Jul 1;32:100402.
- Ramzi Z, **Ciuciu P**, Starck JL. Benchmarking MRI reconstruction neural networks on large public datasets. Applied Sciences. 2020 Jan;10(5):1816.
- La Rocca D, **Ciuciu P**, Engemann DA, van Wassenhove V. Emergence of β and γ networks following multisensory training. NeuroImage. 2020 Feb 1;206:116313.
- Lazarus C, ..., **Ciuciu P**. SPARKLING: variable-density k-space filling curves for accelerated T2*-weighted MRI. Magnetic Resonance in Medicine. 2019 Jun;81(6):3643-61.
- La Rocca D, ..., **Ciuciu P**. Self-similarity and multifractality in human brain activity: A wavelet-based analysis of scale-free brain dynamics. Journal of Neuroscience Methods. 2018 Nov 1;309:175-87.
- Chauffert N, **Ciuciu P**, ... A projection method on measures sets. Constructive Approximation. 2017 Feb 1;45(1):83-111.
- Boyer C, ..., **Ciuciu P**, .. On the generation of sampling schemes for magnetic resonance imaging. SIAM Journal on Imaging Sciences. 2016;9(4):2039-72.

- Chauffert N, ..., **Ciuciu P**. A projection algorithm for gradient waveforms design in Magnetic Resonance Imaging. IEEE Transactions on Medical Imaging. 2016 Mar 21;35(9):2026-39.
- Chauffert N, **Ciuciu P**, Kahn J, Weiss P. Variable density sampling with continuous trajectories. SIAM Journal on Imaging Sciences. 2014;7(4):1962-92.
- **Ciuciu P**, et al. Interplay between functional connectivity and scale-free dynamics in intrinsic fMRI networks. NeuroImage. 2014 Jul 15;95:248-63.
- Badillo S, Vincent T, **Ciuciu P**. Group-level impacts of within-and between-subject hemodynamic variability in fMRI. NeuroImage. 2013 Nov 15;82:433-48.
- Chaari L, ..., **Ciuciu P**. Fast joint detection-estimation of evoked brain activity in event-related fMRI using a variational approach. IEEE Transactions on Medical Imaging. 2012 Oct 19;32(5):821-37.
- **Ciuciu P**, et al. Scale-free and multifractal properties of fMRI signals during rest and task. Frontiers in Physiology. 2012 Jun 15;3:186.
- Chaâri L, ..., **Ciuciu P**. A wavelet-based regularized reconstruction algorithm for SENSE parallel MRI with applications to neuroimaging. Medical image analysis. 2011 Apr 1;15(2):185-201.
- Vincent T, Risser L, **Ciuciu P**. Spatially adaptive mixture modeling for analysis of fMRI time series. IEEE Transactions on Medical Imaging. 2010 Mar 25;29(4):1059-74.
- **Ciuciu P**, et al. Log wavelet leaders cumulant based multifractal analysis of EVI fMRI time series: evidence of scaling in ongoing and evoked brain activity. IEEE Journal of Selected Topics in Signal Processing. 2008 Dec;2(6):929-43.
- Makni S, ..., **Ciuciu P**. A fully Bayesian approach to the parcel-based detection-estimation of brain activity in fMRI. NeuroImage. 2008 Jul 1;41(3):941-69.
- **Ciuciu P**, et al. Unsupervised robust nonparametric estimation of the hemodynamic response function for any fMRI experiment. IEEE Transactions on Medical Imaging. 2003 Sep 29;22(10):1235-51.
- **Ciuciu P**, Idier J. A half-quadratic block-coordinate descent method for spectral estimation. Signal Processing. 2002 Jul 1;82(7):941-59.
- **Ciuciu P**, Idier J, Giovannelli JF. Regularized estimation of mixed spectra using a circular Gibbs-Markov model. IEEE Transactions on Signal Processing. 2001 Oct;49(10):2202-13.

Invited Talks/Lectures (Selection)

Keynote Lecture: 8^{th} Inter. Conf. on New Comput. Meth. for Inverse Problems (FR, 2018, .www)

4 Conference Tutorials/Educational Course:

- 14th IEEE EMBS Summer School on Biomedical Imaging: (St Jacut de la Mer, FR, 2022 .www)
- IEEE ISBI'19: *"Optimal acquisition & reconstruction in MRI"* (Roma, IT, 2019, .www)
- IEEE MIC'16, *"MRI reconstruction course"* (Strasbourg, FR, 2016, .www)
- MICCAI'04: *"fMRI data analysis"* (St Malo, FR, 2004, .www)

Selection of Invited or Distinguished Lectures since 2014:

- ABC Seminar Talk, Aalto University, (Aalto, FI, 2021, .www)
- EPS Seminars, Heriot Watt University, (Edinburgh, UK, 2018, .www)
- PERFORM Colloquium, Concordia Univ. (Montreal, CA, 2017, .www)
- H2020 Dedale WS on *"Dictionary learning on Manifold"* (Nice, FR, 2017, .www)
- Biomed Imaging Dpt Lecture, Stony Brook Univ. (Stony Brook, US, 2017, .www)
- IEEE Lecture at Univ. of British Columbia (Vancouver, CA, 2016, .www)
- EUSIPCO, *"Unraveling Brain Nets from Neuroimaging Data"* (Budapest, CZ, 2016, .www)
- Brain and Cognition Seminar, Univ. Geneva (Geneva, CH, 2016, .www)
- *"Power laws and scale invariance in neural systems"*, EITN (Paris, FR, 2015, .www)
- NeuroStats workshop, Univ. of Warwick (Warwick, UK, 2014, .www)
- *"Multifractal Analysis: From Theory to Applications and back"* (Banff, CA, 2014, .www)