
Research interests

- Optimization Non-convex optimization, stochastic optimization, online algorithms, proximal algorithms, distributed asynchronous algorithms.
- Bayesian inference Statistical modeling, hierarchical Bayesian models, MCMC algorithms.
- Applications Blind source separation, hyperspectral imaging, remote sensing, radio-interferometric imaging.

Scientific experience

- Sep. 2019 – today **Assistant professor at Centrale Lille**, *Centre de Recherche en Informatique, Signal et Automatique de Lille (CRISTAL)*, Villeneuve d'Ascq, France
Section CNU 61 (Génie informatique, Automatique et Traitement du Signal).
- Sep. 2017 – Aug. 2019 **Research associate at Heriot-Watt University**, *Institute of Sensors, Signals and Systems (ISSS)*, Edinburgh, United-Kingdom
Research conducted within the Biomedical and Astronomical Signal Processing (BASP) group led by Prof. Yves Wiaux.
- Keywords Primal-dual algorithm, variable metric block-coordinate forward-backward algorithm, joint calibration and imaging, radio-interferometry, C++ programming
- Jan. 2018 **Qualification aux fonctions de maître de conférence**, *section CNU 61 (Génie informatique, Automatique et Traitement du Signal)*
French qualification to serve as an assistant professor in Signal Processing.
- 2014 – Oct. 2017 **PhD degree in Signal and Image Processing**, *IRIT*, University of Toulouse, France
- Advisors Prof. Nicolas DOBIGEON and Prof. Jean-Yves TOURNERET
- Title Modeling spatial and temporal variabilities in hyperspectral image unmixing
- Keywords Hyperspectral unmixing, source separation, non-convex optimization, online algorithm, Bayesian inference, MCMC algorithms, distributed algorithms.
- 2014 (6 months) **Research internship**, *IRIT*, University of Toulouse, France
- Advisors Dr. Nicolas DOBIGEON and Prof. Jean-Yves TOURNERET
- Title Modeling spatial endmember variability in hyperspectral image unmixing
- Keywords Hyperspectral unmixing, spectral variability, Alternating Direction Method of Multipliers.

Teaching experience

- 2019– today **Assistant professor**, *Centrale Lille*, Lille, France
- Field Data science.
- Details Signal processing, Image processing, Models for machine learning, Signal representations and inverse problems, \LaTeX , Python programming.
- 2017–2019 **Teaching assistant**, *Heriot-Watt University*, Edinburgh, United Kingdom
- Field Signal processing: continuous-time linear time-invariant system modeling, Fourier analysis, Laplace transform.
- Details Supervision of MATLAB programming sessions and tutorials (L2 students).
- 2014–2017 **Teaching assistant, department of Electronics and Signal Processing**, *INP-ENSEEIH*, Toulouse, France

- Fields Digital signal processing, digital filtering, audio signal processing, algorithm implementation on Blackfin DSPs (C/assembly language).
- Details Supervision of practical sessions and projects (first and third year engineering students, equivalent to L3 and M2 level).
- 2014–2015 **Personal tutor**, Toulouse, France
Self-employed personal tutor in mathematics and physics (undergraduate level).

Education

- 2014 – 2017 **PhD degree in Signal and Image Processing**, *Institut de Recherche en Informatique de Toulouse (IRIT)*, Toulouse, France
Funding from the French Ministry of Defence (Direction Générale de l'Armement).
- 2011 – 2014 **Electrical engineering degree**, *École Nationale Supérieure d'Électronique, d'Électrotechnique, d'Informatique, d'Hydraulique et des Télécommunications (INP-ENSEEIH)*, Toulouse, France
Major in Signal and Image processing.
- 2009 – 2011 **Classes préparatoires scientifiques**, *Lycée Kléber*, Strasbourg, France
Two year special undergraduate classes in Mathematics and Physics to prepare the competitive entrance examinations for admission in engineering schools.
- 2009 **Baccalauréat scientifique**, *Lycée Schwilgué*, Sélestat, France

Distinctions

- Dec. 2017 **Léopold ESCANDE Award**, *Institut National Polytechnique de Toulouse (INPT)*, France
Distinction awarded to the best PhD theses defended at INPT between Nov. 2016 and Nov. 2017.
- Oct. 2014 **Award from the Institut National Polytechnique de Toulouse (INPT)**, France
Distinction awarded for outstanding academic achievement during the engineering degree.

Professional activities

- Refereeing IEEE Trans. Computational Imaging, IEEE Trans. Geoscience and Remote Sensing.
- Conference organization International BASP Frontiers workshop 2019 (webmaster), IEEE IPAS 2018 (member of the technical program committee).

Programming and languages

- Programming Matlab, Python, Julia, C/C++, \LaTeX
- Softwares MS office, ADS, OrCAD/PSpice
- French native
- English C1 level (CEFRL level) *fluent, Toeic 980/990 obtained in June 2013*
- German C1 level (CEFRL level) *advanced level, Goethe-Zertifikat C1 obtained in June 2009*

List of publications

► International journals

- [J1] P. Palud, P.-A. Thouvenin, P. Chainais, E. Bron, and F. Le Petit, "Efficient sampling of non log-concave posterior distributions with mixture of noises," *IEEE Trans. Signal Process.*, Jun. 2023, to appear. arXiv: 2211.12915 [stat.ME].
- [J2] P.-A. Thouvenin, A. Abdulaziz, A. Dabbech, A. Repetti, and Y. Wiaux, "Parallel faceted imaging in radio interferometry via proximal splitting (Faceted HyperSARA): I. Algorithm and simulations," *Monthly Notices of the Royal Astronomical Society*, vol. 521, no. 1, pp. 1–19, May 2023. DOI: 10.1093/mnras/stac1521. arXiv: 2003.07358 [astro-ph.IM].
- [J3] P.-A. Thouvenin, A. Dabbech, M. Jiang, *et al.*, "Parallel faceted imaging in radio interferometry via proximal splitting (Faceted HyperSARA): II. Code and real data proof of concept," *Monthly Notices of*

the Royal Astronomical Society, vol. 521, no. 1, pp. 20–34, May 2023. DOI: 10.1093/mnras/stac3175. arXiv: 2209.07604 [astro-ph.IM].

- [J4] P.-A. Thouvenin, N. Dobigeon, and J.-Y. Tournet, “Partially asynchronous distributed unmixing of hyperspectral images,” *IEEE Trans. Geosci. Remote Sens.*, vol. 57, no. 4, pp. 2009–2021, Apr. 2019. DOI: 10.1109/TGRS.2018.2870486.
- [J5] P.-A. Thouvenin, N. Dobigeon, and J.-Y. Tournet, “A hierarchical Bayesian model accounting for endmember variability and abrupt spectral changes to unmix multitemporal hyperspectral images,” *IEEE Trans. Comput. Imag.*, vol. 4, no. 1, pp. 32–45, 2018. DOI: 10.1109/TCI.2017.2777484.
- [J6] P.-A. Thouvenin, N. Dobigeon, and J.-Y. Tournet, “Hyperspectral unmixing with spectral variability using a perturbed linear mixing model,” *IEEE Trans. Signal Process.*, vol. 64, no. 2, pp. 525–538, Jan. 2016. DOI: 10.1109/TSP.2015.2486746.
- [J7] P.-A. Thouvenin, N. Dobigeon, and J.-Y. Tournet, “Online unmixing of multitemporal hyperspectral images accounting for spectral variability,” *IEEE Trans. Image Process.*, vol. 25, no. 9, pp. 3979–3990, Sep. 2016. DOI: 10.1109/TIP.2016.2579309.

► International conferences

- [C1] P. Palud, P. Chainais, F. Le Petit, *et al.*, “Mixture of noises and sampling of non-log-concave posterior distributions,” in *Proc. European Signal Process. Conf. (EUSIPCO)*, Belgrade, Serbia, Aug. 2022, pp. 2031–2035. DOI: 10.23919/EUSIPCO55093.2022.9909559.
- [C2] P.-A. Thouvenin, A. Repetti, and P. Chainais, “A versatile distributed MCMC algorithm for large scale inverse problems,” in *Proc. European Signal Process. Conf. (EUSIPCO)*, Belgrade, Serbia, Aug. 2022, pp. 2016–2020. DOI: 10.23919/EUSIPCO55093.2022.9909580.
- [C3] P.-A. Thouvenin, A. Abdulaziz, M. Jiang, A. Repetti, A. Dabbech, and Y. Wiaux, “A faceted prior for scalable wideband imaging: Application to radio astronomy,” in *Proc. IEEE Int. Workshop Comput. Adv. Multi-Sensor Adaptive Process. (CAMSAP)*, Le Gosier, Guadeloupe, West Indies, Dec. 2020.
- [C4] P.-A. Thouvenin, A. Abdulaziz, M. Jiang, A. Repetti, and Y. Wiaux, “A faceted prior for scalable wideband computational imaging,” in *Signal Process. with Adaptive Sparse Structured Representations (SPARS) Workshop*, Toulouse, France, Jul. 2019, pp. 1–5.
- [C5] P.-A. Thouvenin, A. Repetti, A. Dabbech, and Y. Wiaux, “Time-regularized blind deconvolution approach for radio interferometry,” in *Proc. IEEE Sensor Array and Multichannel Signal Process. Workshop (SAM)*, Sheffield, U.-K., Jul. 2018, pp. 475–479. DOI: 10.1109/SAM.2018.8448891.
- [C6] P.-A. Thouvenin, N. Dobigeon, and J.-Y. Tournet, “Unmixing multitemporal hyperspectral images accounting for smooth and abrupt variations,” in *Proc. European Signal Process. Conf. (EUSIPCO)*, Kos, Greece, Sep. 2017, pp. 2378–2383. DOI: 10.23919/EUSIPCO.2017.8081636.
- [C7] P.-A. Thouvenin, N. Dobigeon, and J.-Y. Tournet, “Unmixing multitemporal hyperspectral images with variability: An online algorithm,” in *Proc. IEEE Int. Conf. Acoust., Speech, and Signal Processing (ICASSP)*, Shanghai, China, Mar. 2016, pp. 3351–3355. DOI: 10.1109/ICASSP.2016.7472298.
- [C8] P.-A. Thouvenin, N. Dobigeon, and J.-Y. Tournet, “A perturbed linear mixing model accounting for spectral variability,” in *Proc. European Signal Process. Conf. (EUSIPCO)*, Nice, France, Sep. 2015, pp. 819–823. DOI: 10.1109/EUSIPCO.2015.7362496.

► National conferences

- [NC1] L. Einig, P. Palud, J. Chanussot, *et al.*, “Réduction d’un modèle astrophysique par réseaux de neurones,” in *Actes du XXIX ième Colloque GRETSI*, in French, to appear, Grenoble, France, Sep. 2023.
- [NC2] P. Palud, P. Chainais, F. Le Petit, *et al.*, “Mélange de bruits et échantillonnage de posterior non log-concave,” in *Actes du XXVIIIème Colloque GRETSI*, in French, Nancy, France, Sep. 2022, pp. 705–708.
- [NC3] P.-A. Thouvenin, A. Repetti, and P. Chainais, “Un algorithme MCMC distribué pour la résolution de problèmes inverses de grande dimension,” in *Actes du XXVIIIème Colloque GRETSI*, in French, Nancy, France, Sep. 2022, pp. 697–700.
- [NC4] P.-A. Thouvenin, N. Dobigeon, and J.-Y. Tournet, “Une approche distribuée asynchrone pour la factorisation en matrices non-négatives – application au démelange hyperspectral,” in *Actes du XXVème Colloque GRETSI*, in French, Juan-les-Pins, France, Sep. 2017, pp. 1065–1068.

- [NC5] P.-A. Thouvenin, N. Dobigeon, and J.-Y. Tourneret, “Estimation de variabilité pour le démixage non-supervisé d’images hyperspectrales,” in *Actes du XXVIème Colloque GRETSI*, in French, Lyon, France, Sep. 2015, pp. 601–604.