Florian Kolbl

Associate Professor

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Current position and responsabilities

Associate Professor at Bordeaux INP:

- **Teaching:** ENSEIRB-MATMECA (engineering school) - Electrical Engineering department, Head of first-year engineering studies
- **Research:** IMS Laboratory - BioElectronics group.

Experience

Bordeaux INP — *Talence - France*

Associate profressor — *Since Sept. 2023*

- Teaching: ENSEIRB-Matmeca, mostly in analog electronics
- Research: IMS lab, BioElectronique group - TIPS. keywords: bioelectronics, instrumentation for bio-sciences,multiphysics and modeling of bio-electronic interfaces

CY Cergy Paris Université — *Cergy - France*

Associate profressor — *Sept. 2016 - Sept. 2023*

- Teaching: IUT - GEII department (Electrical Engineering) ; mostly in electronics, control theory and mathematics
- Research: ETIS lab, CELL group

LIRMM lab — *Montpellier - France*

French CNRS sabatical year — *Sept. 2020 - Sept. 2021*

- Micro-électronique department
- SmartIES group

University of Essex — *Colchester - United Kingdom*

Research Officer - Brain Computer Interfaces and Neural Engineering Lab — *Sept. 2015 - Sept. 2016*

Multiphics modeling of micro-electrode implantation and electrical stimulation of peripheral nerve for sensorimotor rehabilitation.

University of Bordeaux — *Talence - France*

PhD student then Assistant Professor — *Sept. 2011 - Sept. 2015*

- Teaching: 2011-2012 ENSEIRB-Matmeca , 2012-2015 IUT GEII (Electrical Engineering department) University of Bordeaux
- Research: Design and modeling of circuits and systems for neural stimulation in different pathologic an experimental contexts.

Education

University of Bordeaux — *Talence, France*

PhD in Electronics — *2014*

- Design of electrical adaptive stimulators for different pathological contexts: a global approach
- Under the supervision of Sylvie RENAUD and Noëlle LEWIS

ENS Rennes — *Bruz - France*

French 'Agrégation Externe de Génie Électrique' — *2011*

- french national highest grade competitive examination for teaching - Electrical Engineering
- valedictorian

Master's Degree - Teaching — *2011*

- Electrical Engineering
- with honors

ENSEIRB-Matmeca — *Talence - France*

Master's Degree in Engineering — *2010*

- Electronics (specialisation in microelectronics)
- with honors

University of Bordeaux *Talence - France*

Master's Degree *2010*

- Electrical Engineering with specialisation in microelectronics
- with honors

Baccalaureate - High School Diploma in Sciences *2005*

with honors

Scientific Publications

Journals

[J01] Couppey, T., Regnacq, L., Giraud, R., Romain, O., Bornat, Y., & Kolbl, F. (2024). NRV: An open framework for in silico evaluation of peripheral nerve electrical stimulation strategies. PLOS Computational Biology, 20(7), e1011826.

[J02] Regnacq, L., Bornat, Y., Romain, O., & Kolbl, F. (2022). BIMMS: A versatile and portable system for biological tissue and electrode-tissue interface electrical characterization. HardwareX, e00387.

[J03] Kolbl, F., Bornat, Y., Castelli, J., Regnacq, L., N'kaoua, G., Renaud, S., & Lewis, N. (2021). Ic-based neuro-stimulation environment for arbitrary waveform generation. Electronics, 10(15), 1867.

[J04] Tibar, H., Naudet, F., Kölbl, F., Ribot, B., Faggiani, E., N'kaoua, G., ... & Benazzouz, A. (2020). In vivo validation of a new portable stimulator for chronic deep brain stimulation in freely moving rats. Journal of Neuroscience Methods, 333, 108577.

[J05] De Roux, E., Terosiet, M., Kölbl, F., Boissière, M., Histace, A., & Romain, O. (2019). OFDM-based electrical impedance spectroscopy technique for pacemaker-induced fibrosis detection implemented in an ARM microprocessor. Microprocessors and microsystems, 70, 38-46.

[J06] De Roux, E., Degache, A., Terosiet, M., Kölbl, F., Boissière, M., Pauthe, E., ... & Romain, O. (2019). Orthogonal Multitone Electrical Impedance Spectroscopy (OMEIS) for the Study of Fibrosis Induced by Active Cardiac Implants. Journal of Sensors, 2019.

[J07] Kölbl, F., N'Kaoua, G., Naudet, F., Berthier, F., Faggiani, E., Renaud, S., ... & Lewis, N. (2014). An embedded deep brain stimulator for biphasic chronic experiments in freely moving rodents. IEEE transactions on biomedical circuits and systems, 10(1), 72-84.

International Conferences with comity

[C01] Couppey, T., Romain, O., Français, O., & Kölbl, F. (2024, October). Frequency Analysis of Electrical Impedance Tomography for Peripheral Nerve Activity Recording. In 2024 IEEE Biomedical Circuits and Systems Conference (BioCAS) (pp. 1-5). IEEE.

[C02] Regnacq, L., Sanabria, A. O., Thota, A. K., Abbas, J. J., Romain, O., Bornat, Y., ... & Jung, R. (2024, July). An impedance model to estimate the effective active area of neuro-electrode for quality control. In 2024 46th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC) (pp. 1-4). IEEE.

[C03] Couppey, T., Kolbl, F., Quoy, M., Romain, O., Regnacq, L., & Giraud, R. (2022, July). Conduction block stimulation optimization by envelope modulation toward the reduction of onset response. In FENS.

[C04] Bailleul, A., Claudel, J., De Gannes, F. P., N'Kaoua, G., Kolbl, F., Soulier, F., ... & Renaud, S. (2021, November). In vitro impedance spectroscopy: A MEA-based measurement bench for myoblasts cultures monitoring. In 2021 XXXVI Conference on Design of Circuits and Integrated Systems (DCIS) (pp. 1-6). IEEE.

[C05] Regnacq, L., Giraud, R., Sanabria, A., Thota, A., Roversi, L., Rouhani, M., ... & Kolbl, F. (2021, October). Evaluation of Stimulation Waveforms for Safe and Efficient Peripheral Nervous System Activation. In 2021 Biomedical Circuits and Systems Conference (BioCAS 2021):" Restoring Vital Functions by Electronics–Achievements, Limitations, Opportunities, and Challenges".

[C06] Kölbl, F., Boulboul, N., Commereuc, M., & Bourdel, E. (2018, December). A microstrip resonator based sensor for GHz characterization of in vitro cell culture. In 2018 12th International conference on sensing technology (ICST) (pp. 319-323). IEEE.

[C07] Sotière, J., Terosiet, M., De Roux, E., Von Chong, A., Kölbl, F., Histace, A., & Romain, O. (2018, November). Versatile SAR-ADC for Biomedical Applications. In 2018 New Generation of CAS (NGCAS) (pp. 9-12). IEEE.

[C08] Regnacq, L., Degache, A., Castelli, J., N'Kaoua, G., Bornat, Y., de Gannes, F. P., ... & Bernus, O. (2018, September). Preliminary Investigation Towards Embedded Impedance Spectroscopy in Implanted Stimulators. In International Workshop on Impedance Spectroscopy (IWIS).

[C09] Degache, A., N'Kaoua, G., Lewis, N., Kolbl, F., & Bernus, O. (2018, September). Preliminary Study of Fibrotic Cardiac Tissues Characterization Using Impedance Spectroscopy. In International Workshop on Impedance Spectroscopy (IWIS).

[C10] De Roux, E., Terosiet, M., Kölbl, F., Boissière, M., Pauthe, E., Histace, A., & Romain, O. (2018, September). Toward an embedded OFDM-based system for living cells study by electrochemical impedance spectroscopy. In 2018 IEEE 20th International Conference on e-Health Networking, Applications and Services (Healthcom) (pp. 1-6). IEEE.

[C11] De Roux, E., Terosiet, M., Kölbl, F., Boissière, M., Histace, A., & Romain, O. (2018, August). Toward an OFDM-Based Technique for Electrochemical Impedance Spectroscopy. In 2018 21st Euromicro Conference on Digital System Design (DSD) (pp. 484-487). IEEE.

[C12] De Roux, E., Terosiet, M., Kölbl, F., Chrun, J., Aubert, P. H., Banet, P., ... & Romain, O. (2017, August). Wireless and portable system for the study of in-vitro cell culture impedance spectrum by electrical impedance spectroscopy. In 2017 Euromicro Conference on Digital System Design (DSD) (pp. 456-461). IEEE.

[C13] Capllonch-Juan, M., Kölbl, F., & Sepulveda, F. (2017, July). Unidirectional ephaptic stimulation between two myelinated axons. In 2017 39th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC) (pp. 230-233). IEEE.

[C14] Castelli, J., Kölbl, F., Siu, R., N'Kaoua, G., Bornat, Y., Mangalore, A., ... & Lewis, N. (2017, July). An IC-based controllable stimulator for respiratory muscle stimulation investigations. In 2017 39th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC) (pp. 1970-1973). IEEE.

[C15] Kolbl, F., Juan, M. C., & Sepulveda, F. (2016, October). Impact of the angle of implantation of transverse intrafascicular multichannel electrodes on axon activation. In 2016 IEEE Biomedical Circuits and Systems Conference (BioCAS) (pp. 484-487). IEEE.

[C16] Juan, M. C., Kölbl, F., & Sepulveda, F. (2016, September). Optimisation of the spatial discretisation of myelinated axon models. In 2016 8th Computer Science and Electronic Engineering (CEEC) (pp. 216-221). IEEE.

[C17] Kölbl, F., & Demosthenous, A. (2015, August). A figure of merit for neural electrical stimulation circuits. In 2015 37th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC) (pp. 2075-2078). IEEE.

[C18] Kölbl, F., Guillaume, R., Hasler, J., Joucla, S., Yvert, B., Renaud, S., & Lewis, N. (2014, October). A closed-loop charge balancing fpaa circuit with sub-nano-amp dc error for electrical stimulation. In 2014 IEEE Biomedical Circuits and Systems Conference (BioCAS) Proceedings (pp. 616-619). IEEE.

[C19] Kölbl, F., Sabatier, J., N'Kaoua, G., Naudet, F., Faggiani, E., Benazzouz, A., ... & Lewis, N. (2013, October). Characterization of a non linear fractional model of electrode-tissue impedance for neuronal stimulation. In 2013 IEEE Biomedical Circuits and Systems Conference (BioCAS) (pp. 338-341). IEEE.

[C20] Kölbl, F., Zbrzeski, A., Syed, E., & Renaud, S. (2010, November). In vivo electrical characterization of deep brain electrode and impact on bio-amplifier design. In 2010 Biomedical Circuits and Systems Conference (BioCAS) (pp. 210-213). IEEE.

[C21] Zbrzeski, A., Hasler, P., Kölbl, F., Syed, E., Lewis, N., & Renaud, S. (2010, November). A programmable bioamplifier on FPAA for in vivo neural recording. In 2010 Biomedical Circuits and Systems Conference (BioCAS) (pp. 114-117). IEEE.

National Conferences

[N01] Regnacq, L., Giraud, R., N'Kaoua, G., Renaud, S., Jung, R., Abbas, J., ... & Romain, O. A model/hardware framework for arbitrary waveform stimulation of peripheral nerve fibers. In Neuro France 2021.

[N02] Boulboul, N., Commereuc, M., Kölbl, F., & Bourdel, E. Conception d'un capteur in-vitro de permittivité des tissus biologiques. Gdr Soc2. 2018

[N03] Kölbl, F.; Guillaume, R.; Hasler, J.; Joucla, S.; Yvert, B.; Renaud, S.; Lewis, N. Circuit de stimulation nerveuse à contre-réaction d'équilibrage des charges sur FPAA. Gdr Soc-Sip 2014

Talks

Mai 2022 Colloque CY : The interplay of complex and coherent dynamics in brain function. Présentation : Stimulation of nervous system with complex waveform stimuli

FETCH 2018 Diagnostic, Impedance-Sensing for imaging

Scientific days of IJL Lab 2017 toward reconfigurable circuits and systems interacting with biology

FETCH 2017 Activ Neuroprostetics: toward adaptive circuits

Pas and current PhD Student supervision

L. Regnacq

- Funding: International joint French ANR-US NIH BIOTIFS project,
- Co-supervision: O. Romain (ETIS lab), Y. Bornat (IMS lab),
- Focus: Improving the selectivity of peripheral nervous system electrical stimulation using Intrafascicular electrodes and non-conventional waveforms,
- Defended on Sept. 6th, 2023.

T. Couppey

- Funding: CY Cergy Paris University doctoral school funding,
- Co-supervision: O. Romain (ETIS lab), O. Français (ESYCOM lab),
- Focus: Modeling and design of a an experimental setup for nervous activity tracking using Electrical Impedance Tomography,
- expected date of defence: December 2024.

L. Lecomte

- Funding: ANRt CIFRE funding, collaboration with FineHeart,
- Co-supervision: N. Lewis (IMS lab), M. Maldari (FineHeart), S. Garrigue (FineHeart)
- Focus: Feature extraction in cardioimpedance measurements,
- expected date of defence: January 2027.

PhD Commities

Houssein Mariam 'Caractérisation hyperfréquence par spectroscopie diélectrique de composés biologiques en environnement microfluidique'. University Paris East, defended on 16/12/2020 under the supervision of O. Français and E. Richalot.

Farad Khoyratee 'Conception d'une plateforme modulable de réseaux de neurones biomimétiques pour l'étude des maladies neurodégénératives'. University of Bordeaux, defended on 13/12/2019 under the supervision of S. Saïghi and T. Lévi.