

Frédéric Sirois, Ing., Ph.D., Full Professor

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SHORT BIOGRAPHY Frédéric Sirois received the B.A.Sc. degree in electrical engineering from Université de Sherbrooke, Sherbrooke, QC, Canada, in 1997, and the Ph.D. degree in electrical engineering from Polytechnique Montréal, Montréal, QC, Canada, in 2003.

From 1998 to 2003, he was affiliated as a Ph.D. scholar with the Hydro-Québec's Research Institute (IREQ), where he was a Research Engineer from 2003 to 2005. In 2005, he joined Polytechnique Montréal, where he is currently Full Professor. He spent prolonged research sabbatical periods as Invited professor at various Institutes such as the KIT (Germany), EPFL (Switzerland), the Lawrence Berkeley National Laboratory (U.S.A.) and the Institut Néel (France).

His research is articulated around i) the characterization and modeling of electric and magnetic properties of materials, ii) the development of advanced numerical techniques applied to the design of electromagnetic and superconducting devices, and iii) the development of custom specialized instrumentation for high-current/high-field experiments in cryogenic environment. He is a regular reviewer for several international journals and conferences.

RESEARCH INTERESTS Composites materials, Magnetic materials, Superconductors, Metals, Coatings, Electronic devices and components, Power devices, Energy storage, Experimental methods and instrumentation, Heat transfer, Electromagnetics, Circuit theory, Mathematical modelling, Numerical analysis, Finite element method.

EDUCATION **Polytechnique Montréal**, Montréal, QC, Canada

Ph.D., Electrical Engineering – *Materials and Energy* May 2003

- Thesis Topic: *Characterization and modelling of superconducting materials used in power devices* → **Best Ph.D. thesis award of University in 2003**
- Advisors: Julian R. Cave, Ph.D. and Guy Olivier, Ph.D.

Polytechnique Montréal, Montréal, QC, Canada

M.A.Sc., Electrical Engineering – *Power Systems* April 1999

- Direct continuation to Ph.D. – See above for thesis topic and advisors

Université de Sherbrooke, Sherbrooke, QC, Canada

B.A.Sc., Electrical Engineering – *Electronics and Instrumentation* Dec. 1997

- *Summa Cum Laude* → **Medal of honor for being top student of promotion**

RESEARCH EXPERIENCE **Professor** Aug. 2005 to present
Assistant (2005), Associate (2010), Full Professor (2013)
Electrical Engineering Dept.
Polytechnique Montréal

	Industrial researcher	June 2003 to July 2005
	Electrical Apparatus Hydro-Québec Research Institute (IREQ)	
	Industrial scholar (during whole graduate studies)	May 1998 to May 2003
	Emerging Technologies Hydro-Québec Research Institute (IREQ)	
TEACHING EXPERIENCE (COURSES)	<ul style="list-style-type: none"> • Utilization of Energy (45 h. graduate course, taught 8 times) 2013 to present • Electric Circuits (45 h. ungrad. course, taught 11 times) 2009 to present • Power Engineering (45 h. undergrad. course, taught 10 times) 2006 to present • Power System Reliability (45 h. graduate course, taught 4 times) 2006 to 2012 	
STUDENT SUPERVISION	<p>Between 2005 and now, I supervised 24 Ph.D. students and 46 research master's students. I also supervised 11 postdoctoral fellows and more than than 100 full-time internships (4 to 8 months) of undergraduate students working in my laboratory.</p> <p>I currently supervise 6 Ph.D. students, 6 research master's students, 2 postdoctoral fellows and 1 research associate.</p>	
RESEARCH PRIZES AND AWARDS	<p>NSERC discovery grant accelerator (120,000\$) April 2011 Bonus research grant awarded to the top 5% young Canadian professors</p> <p>Van Duzer prize (500\$) July 2010 Best regular journal paper in <i>IEEE Trans. Appl. Supercond.</i></p> <p>Best Ph.D. thesis award (2000\$) March 2004 Best Ph.D. thesis (among ≈ 80) defended in 2003 at Polytechnique Montréal</p>	
COMMITTEES AND MEMBERSHIPS	<p>International Energy Agency 2014 to present Canada's representative, Workgroup on Superconducting technologies</p> <p>Superconductor Science and Technology 2013 to 2014 Guest Editor, Special issue on HTS modelling</p> <p>Polytechnique Montreal: Smart grids and Energetic systems 2013 to present Program director, Master's program</p> <p>European Applied Superconductivity Conference (EUCAS) 2012 to present Member, Program committee; Session chair</p> <p>International Workshops on Superconductor Modelling 2010 to present Webmaster, Steering committee (since 2013) President and co-founder, Steering committee (2010 to 2013)</p> <p>Applied Superconductivity Conference (ASC) 2010 to present Technical Editor; Session chair</p> <p>Regular reviewer for scientific journals 2006 to present Supercond. Sci. Techn. / IEEE Trans. Appl. Supercond. / IEEE Trans. Power Deliv. / Journal of Applied Physics / COMPEL / others</p>	
PUBLICATIONS (IN CAREER)	<p>Peer-reviewed journal articles 120</p> <p>Conference Proceedings 35</p> <p>Technical and scientific reports (totalling > 2000 pages) 35</p> <p>Book chapters 3</p> <p>Patents awarded/pending 3/4</p>	

Journal papers (last 5 years)

Frédéric Sirois, *Senior Member, IEEE*

List of journal papers: [1]–[49]

REFERENCES

- [1] G. Giard, F. Sirois, K. McMeekin, and M. Tousignant, “Experimental validation of a new power-equivalent magnetic permeability model for induction heating applications,” *IEEE Transactions on Magnetics*, vol. 59, no. 11, p. 6301509 (9 pp.), Nov. 2023. [\[url\]](#)
- [2] A. Arsenault, B. de Sousa Alves, G. Giard, and F. Sirois, “Magnetodynamic H-phi formulation for improving the convergence and speed of numerical simulations of superconducting materials,” *IEEE Transactions on Applied Superconductivity*, vol. 33, no. 7, p. 6801306 (6 pp.), Oct. 2023. [\[url\]](#)
- [3] A. Arsenault and F. Sirois, “Simulation of remote forces generated by superconducting bulks for magnetic drug delivery,” *IEEE Transactions on Applied Superconductivity*, vol. 33, no. 6, p. 4401409 (9 pp.), Sept. 2023. [\[url\]](#)
- [4] I. B. Yahya, J. Bellemare, G. Rousseau, N. Pouliot, D. Ménard, and F. Sirois, “Ultrasensitive lightweight magnetic probe for non-destructive inspection of high-voltage overhead lines,” *NDT & E International*, vol. 134, p. 102781 (12 pp.), Mar. 2023. [\[url\]](#)
- [5] A. Arsenault, B. Charpentier-Pépin, A. Forcier, J. Bellemare, C. Lacroix, F. Bernier, J.-M. Lamarre, D. Ménard, and F. Sirois, “Large-scale vibrating coil magnetometer for the magnetic characterization of bulk superconductors,” *Review of Scientific Instruments*, vol. 94, p. 085116 (9 pp.), 2023. [\[url\]](#)
- [6] P. Barusco, J. Giguère, C. Lacroix, F. Sirois, X. Granados, T. Puig, and X. Obradors, “A sulfidation method for creating a current flow diverter in REBaCuO coated conductors,” *Superconductor Science and Technology*, vol. 36, no. 12, p. 125005 (10 pp.), 2023. [\[url\]](#)
- [7] J. Langot, É. Gourcerol, A. Serbescu, D. Brassard, K. Chizari, M. Lapalme, A. Desautels, F. Sirois, and D. Theriault, “Performance of painted and non-painted non-woven nickel-coated carbon fibers for lightning strike protection of composite aircraft,” *Composites Part A*, vol. 175, p. 107772 (11 pp.), 2023. [\[url\]](#)
- [8] C. Messe, G. Giard, N. Riva, S. Viarengo, and F. Sirois, “BELFEM: a special purpose finite element code for the magnetodynamic modeling of high-temperature superconducting tapes,” *Superconductor Science and Technology*, vol. 36, no. 11, p. 114001 (12 pp.), 2023. [\[url\]](#)
- [9] A. Serbescu, D. Brassard, J. Langot, É. Gourcerol, K. Chizari, A. Desautels, M. Lapalme, F. Sirois, and D. Theriault, “Silver-based conductive coatings as scalable lightning strike protection for composite aircraft,” *Results in Materials*, vol. 19, p. 100427 (10 pp.), 2023. [\[url\]](#)
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- [11] G. Giard, M. Tousignant, K. McMeekin, F. Bellotto, P. Bocher, and F. Sirois, “Power-equivalent complex permeability model for nonlinear and hysteretic materials in the frequency domain,” *IEEE Transactions on Magnetics*, vol. 58, no. 6, p. 6300909 (9 pp.), June 2022. [\[url\]](#)
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