

# Maxime Chamberland

POST-DOCTORAL RESEARCH FELLOW · NEUROIMAGING

Cardiff, United Kingdom

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*"Experience does for the soul what education does for the mind."*

## Education

### PhD. in Radiation Sciences & Biomedical Imaging

UNIVERSITY OF SHERBROOKE - FACULTY OF MEDICINE AND HEALTH SCIENCES

- Diffusion and functional MRI visualisation for neurosurgical planning

Canada

2013-2017

### MSc. in Computer Science & Medical Imaging

UNIVERSITY OF SHERBROOKE - COMPUTER SCIENCE FACULTY

- Real-time fibre tractography using diffusion MRI

Canada

2011-2013

### BSc. in Digital Imaging Science

UNIVERSITY OF SHERBROOKE - COMPUTER SCIENCE FACULTY

- Cooperative program including 3 internships at the Canadian Space Agency (Web developer)

Canada

2007-2010

## Skills

<b>Computer Science</b>	Medical Image Analysis, Machine Learning, Visualisation
<b>Programming</b>	C/C++, Python, OpenGL, GLSL, R, Matlab, Bash, Git, LaTeX
<b>Softwares</b>	FiberNavigator, MRtrix, Dipy, FSL, ExploreDTI, AFNI, ANTs, FreeSurfer, Keras, SKlearn, Photoshop, Unity3D
<b>Reviewing</b>	Nature Communications, NeuroImage, Neuromage Clinical, Human Brain Mapping, Medical Image Analysis
<b>Languages</b>	French, English

## Experience

### Post-Doctoral Research Fellow

CARDIFF UNIVERSITY BRAIN RESEARCH IMAGING CENTRE

- Computational NeuroImaging [Medical Imaging methods development]

Cardiff, United Kingdom

2017-PRESENT

### Sessional Lecturer

UNIVERSITY OF SHERBROOKE

- Visual and Digital Interactions (IMN638) [Real-time rendering, GPU programming]

Sherbrooke, Canada

Fall 2013

### Teaching Fellow

UNIVERSITY OF SHERBROOKE

- Digital Medias Acquisition (IMN117) [Image analysis]

Sherbrooke, Canada

2011-2013

## Research Funding

### Postdoctoral Fellowship (\$90,000)

NATURAL SCIENCES AND ENGINEERING RESEARCH COUNCIL OF CANADA (NSERC)

- Ranked 1st across the Biomedical category.

2 years

2017-2019

### Alexander-Graham-Bell Post-graduate Scholarship (\$105,000)

NATURAL SCIENCES AND ENGINEERING RESEARCH COUNCIL OF CANADA (NSERC)

- High-caliber biomedical PhD fellowship.

3 years

2014-2017

### Doctoral Fellowship (\$40,000)

FONDS DE RECHERCHE DU QUÉBEC - NATURE AND TECHNOLOGY (FRQNT)

- Awarded but gratefully declined in favor of the above grant.

2 years

2014-2016

### Post-graduate scholarship (\$19,000)

FACULTY OF MEDICINE AND HEALTH SCIENCES, UNIVERSITY OF SHERBROOKE (CANADA)

1 year

2013

# Honors & Awards

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## TRAINING ABROAD GRANTS

2016	<b>\$4000</b> , Quebec Bio-Imaging Network Research Travel Grant [Cardiff University]	<i>Cardiff, UK</i>
2015	<b>\$6000</b> , Michael Smith Foreign Study Supplement (NSERC) [Harvard Medical School]	<i>Boston, USA</i>

## TRAVEL STIPENDS

2020	<b>£165</b> , Guarantors of Brain Conference Travel Grant	<i>United Kingdom</i>
2018	<b>£600</b> , Guarantors of Brain Conference Travel Grant	<i>United Kingdom</i>
2018	<b>\$500</b> , ISMRM Conference Educational Stipend	<i>Paris</i>
2016	<b>\$500</b> , ISMRM Conference Educational Stipend	<i>Singapore</i>
2016	<b>\$500</b> , Sherbrooke Neuroscience Center Travel Award	<i>Singapore</i>
2015	<b>\$500</b> , ISMRM Conference Educational Stipend	<i>Toronto</i>
2015	<b>\$500</b> , Sherbrooke Neuroscience Center Travel Award	<i>Honolulu</i>
2015	<b>\$500</b> , Québec BioImaging Network Travel Award	<i>Honolulu</i>
2014	<b>\$500</b> , Québec BioImaging Network Travel Award	<i>Hamburg</i>
2012	<b>\$500</b> , Sherbrooke Neuroscience Center Travel Award	<i>Beijing</i>
2012	<b>\$750</b> , University of Sherbrooke – Student Recognition Travel Award	<i>Beijing</i>

## PUBLICATIONS AWARDS

2017	<b>\$500</b> , Sherbrooke Neuroscience Center Publication Award (also awarded in 2015)	<i>Canada</i>
2016	<b>\$1000</b> , FRQNT Chercheurs Étoiles - Best Paper (Nature & Technology)	<i>Canada</i>
2014	<b>N/A</b> , Neurotechnix – Best Student Paper Award	<i>Rome</i>

## OTHERS

2014	<b>\$500</b> , Sherbrooke Neuroscience Center Scientific Day - Best Oral Presentation (People's choice)	<i>Canada</i>
2013	<b>\$300</b> , Molecular Imaging Center of Sherbrooke – Best Student Poster	<i>Canada</i>
2013	<b>\$1500</b> , ACFAS – Best Scientific Picture (Jury's and people's choice)	<i>Canada</i>
2012	<b>N/A</b> , National Science Foundation – Scientific Visualization Challenge (People's choice)	<i>USA</i>
2012	<b>N/A</b> , NeuroBureau – Best Educational Brain Art Illustration	<i>-</i>

# Oral Presentations

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## ISMRM 28th Annual Meeting

*Paris, France*

ORAL PRESENTATION: PEDIATRIC HIGH-END

*Fall 2020*

- Highlighting tract-specific microstructural abnormalities in single subjects using autoencoders

## ISMRM 27th Annual Meeting

*Montreal, Canada*

ORAL PRESENTATION: FIBER ORIENTATIONS & TRACTOGRAPHY SESSION

*Spring 2019*

- Improved statistical power to detect differences in tissue microstructure through dimensionality reduction

## Computational Brain Connectivity Mapping Winter School Workshop

*Juans-Les-Pins, France*

INVITED BY PROF. RACHID DERICHE

*Fall 2017*

- Interactive & Advanced Tractography Visualization

## ISMRM Workshop on Breaking the Barriers of Diffusion MRI

*Lisbon, Portugal*

POWER-PITCH: TRACTOGRAPHY SESSION

*Fall 2016*

- Exploring Geometrical Sheet-Like Structures in Real-Time

## Center for Brain Imaging, NYU

*New York, USA*

INVITED BY PROF. FERNANDO BOADA

*Fall 2015*

- Invited talk on Tractography and Neurosurgical planning

## Department of Mathematics and Computer Science, TU/e

*Eindhoven, The Netherlands*

INVITED BY PROF. LUC FLORACK

*Spring 2015*

- Invited FiberNavigator demonstration

## Image Sciences Institute, PROVIDIlab, UMC

*Utrecht, The Netherlands*

INVITED BY PROF. ALEXANDER LEEMANS

*Spring 2015*

- Invited talk on Exploring brain connectivity in real-time

- Invited talk on Diffusion & Functional MRI visualization

**Laboratory of Mathematics in Imaging, Harvard Medical School**

INVITED BY PROF. CARL-FREDRIK WESTIN

- Invited talk on Real-time Fiber Tractography

**Computational Radiology Laboratory, Harvard Medical School**

INVITED BY PROF. SIMON K. WARFIELD

- Invited talk on Real-time Fiber Tractography

## Projects

**FiberNavigator**[HTTPS://GITHUB.COM/CHAMBERM/FIBERNAVIGATOR](https://github.com/CHAMBERM/FIBERNAVIGATOR)

- Open-source neuroimaging visualization tool for diffusion MRI data

C++, OpenGL, GLSL

Main active developer

## Peer-reviewed Publications

**JOURNAL PAPERS**

1. Genc, S., Tax, C. M., Raven, E. P., **Chamberland, M.**, Parker, G. D., Jones, D. K., 2020. *Impact of b-value on estimates of apparent fibre density*. Human Brain Mapping.
2. Rheault, F., De Benedictis, A., Daducci, A., Maffei, C., Tax, C.M.W. et al., 2020. *Tractostorm: The what, why, and how of tractography dissection reproducibility*. Human Brain Mapping
3. St-Jean, S., **Chamberland, M.**, Viergever, M.A. and Leemans, A., 2019. *Reducing variability in along-tract analysis with diffusion profile realignment*. NeuroImage, 199, 663-679.
4. **Chamberland, M.**, Raven, E.P., Genc, S., Duffy, K., Descoteaux, M., Parker, G.D., Tax, C.M. and Jones, D.K., 2019. *Dimensionality reduction of diffusion MRI measures for improved tractometry of the human brain*. NeuroImage, 200, 89-100.
5. Schilling, K.G., Nath, V., Hansen, C., Parvathaneni, P., Blaber, J., Gao, Y., Neher, P., et al., 2019. *Limits to anatomical accuracy of diffusion tractography using modern approaches*. NeuroImage, 185, pp.1-11.
6. Zhang, Z., Descoteaux, M., Zhang, J., Girard, G., **Chamberland, M.**, Dunson, D., Srivastava, A. and Zhu, H., 2018. *Mapping population-based structural connectomes*. NeuroImage, 172, pp.130-145.
7. **Chamberland, M.**, Tax, C.M. and Jones, D.K., 2018. *Meyer's loop tractography for image-guided surgery depends on imaging protocol and hardware*. NeuroImage: Clinical, 20, pp.458-465.
8. Maier-Hein, K.H., Neher, P.F., Houde, J.C., Côté, M.A., Garyfallidis, E., Zhong, J., **Chamberland, M.** et al., 2017. *The challenge of mapping the human connectome based on diffusion tractography*. Nature communications, 8(1), p.1349.
9. **Chamberland, M.**, Girard, G., Bernier, M., Fortin, D., Descoteaux, M. and Whittingstall, K., 2017. *On the origin of individual functional connectivity variability: the role of white matter architecture*. Brain connectivity, 7(8), pp.491-503.
10. **Chamberland, M.**, Scherrer, B., Prabhu, S.P., Madsen, J., Fortin, D., Whittingstall, K., Descoteaux, M. and Warfield, S.K., 2017. *Active delineation of Meyer's loop using oriented priors through MAGNETic tractography (MAGNET)*. Human brain mapping, 38(1), pp.509-527.
11. Kaye, H.L., Peters, J.M., Gersner, R., **Chamberland, M.**, Sansevere, A. and Rotenberg, A., 2017. *Neurophysiological evidence of preserved connectivity in tuber tissue*. Epilepsy & behavior case reports, 7, pp.64-68.
12. Tax, C.M., **Chamberland, M.**, van Stralen, M., Viergever, M.A., Whittingstall, K., Fortin, D., Descoteaux, M. and Leemans, A., 2015. *Seeing more by showing less: orientation-dependent transparency rendering for fiber tractography visualization*. PloS one, 10(10), p.e0139434.

13. **Chamberland, M.**, Bernier, M., Fortin, D., Whittingstall, K. and Descoteaux, M., 2015. *3D interactive tractography-informed resting-state fMRI connectivity*. *Frontiers in neuroscience*, 9, p.275.
14. **Chamberland, M.**, Bernier, M., Houde, J.C., Descoteaux, M. and Whittingstall, K., 2014. *Using fMRI non-local means denoising to uncover activation in sub-cortical structures at 1.5 T for guided HARDI tractography*. *Frontiers in human neuroscience*, 8, p.715.
15. **Chamberland, M.**, Whittingstall, K., Fortin, D., Mathieu, D. and Descoteaux, M., 2014. *Real-time multi-peak tractography for instantaneous connectivity display*. *Frontiers in neuroinformatics*, 8, p.59.
16. Coupé, P., Manjón, J.V., **Chamberland, M.**, Descoteaux, M. and Hiba, B., 2013. *Collaborative patch-based super-resolution for diffusion-weighted images*. *NeuroImage*, 83, pp.245-261.

## SHORT PAPERS

1. **Chamberland, M.**, Genc, S., Raven, E., Parker, G., Tax, C.M.W., Cunningham, A., Doherty, J., van den Bree, M., Jones, D.K., 2020. *Tractometry-based Anomaly Detection for Single-subject White Matter Analysis*. *Proceedings of The 3rd International Conference on Medical Imaging with Deep Learning (MIDL)*, Montreal, 2020.
2. Girard, G., **Chamberland, M.**, Houde, J.C., Fortin, D. and Descoteaux, M., 2012. *Neurosurgical tracking at the sherbrooke connectivity imaging lab (SCIL)*. In *International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI'12)-DTI Challenge Workshop* (pp. 55-73).

## BOOK CHAPTERS

1. **Chamberland, M.**, St-Jean, S., Tax, C.M. and Jones, D.K., 2018, September. *Obtaining representative core streamlines for white matter tractometry of the human brain*. In *International Conference on Medical Image Computing and Computer-Assisted Intervention* (pp. 359-366). Springer, Cham.
2. **Chamberland, M.**, Gray, W., Descoteaux, M. and Jones, D.K., 2017, September. *Interactive Computation and Visualization of Structural Connectomes in Real-Time*. In *International Workshop on Connectomics in Neuroimaging* (pp. 35-41). Springer, Cham.
3. Vaillancourt, O., **Chamberland, M.**, Houde, J.C. and Descoteaux, M., 2015. *Visualization of diffusion propagator and multiple parameter diffusion signal*. In *Visualization and Processing of Higher Order Descriptors for Multi-Valued Data* (pp. 191-212). Springer, Cham.

## CONFERENCE ABSTRACTS

1. **Chamberland, M.**, Genc, S., Raven, E., Parker, G., Tax, C.M.W., Cunningham, A., Doherty, J., van den Bree, M., Jones, D.K., 2020. *Highlighting tract-specific microstructural abnormalities in single subjects using autoencoders*. *International Society for Magnetic Resonance in Medicine (ISMRM)*, Paris, France.
2. **Chamberland, M.**, Genc, S., Raven, E., Parker, G., Tax, C.M.W., Cunningham, A., Doherty, J., van den Bree, M., Jones, D.K., 2020. *Tract-specific microstructural anomaly detection using autoencoders for single subject analysis*. *Organization for Human Brain Mapping (OHBM)*, Montreal, Canada.
3. **Chamberland, M.**, Iqbal, N.S., Rudrapatna, S.U., Parker, G., Tax, C.M.W., Staffurth, J., Powell, J., Wise, R.G., Jones, D.K., 2019. *Characterising tissue heterogeneity in cerebral metastases using multi-shell multi-tissue constrained spherical deconvolution*. *International Society for Magnetic Resonance in Medicine (ISMRM)*, Montreal, Canada.
4. **Chamberland, M.**, Raven, E., Genc, S., Duffy, K., Parker, G., Tax, C.M.W., Descoteaux, M., Jones, D.K., 2019. *Metrics that Matter: Improved statistical power to detect differences in tissue microstructure through dimensionality reduction*. *International Society for Magnetic Resonance in Medicine (ISMRM)*, Montreal, Canada.
5. **Chamberland, M.**, and Jones, D.K., 2018. *Enhancing bundle topology for tractography visualization using silhouette rendering*. *International Society for Magnetic Resonance in Medicine (ISMRM)*, Paris, France.
6. **Chamberland, M.**, Descoteaux, D., Jones, D.K., 2018. *Advances in structural and functional connectivity visualization using the FiberNavigator*. *International Society for Magnetic Resonance in Medicine (ISMRM)*, Paris, France.
7. **Chamberland, M.**, Tax, C.M.W., Gray, W., Jones, D.K., 2018. *The neurosurgical implication of scanner, gradient performance and acquisition protocol on Meyer's loop reconstruction*. *International Society for Magnetic Resonance in Medicine (ISMRM)*, Paris, France.

8. **Chamberland, M.**, Tax, C.M.W., Fortin, D., Whittingstall, K., Descoteaux, M., 2016. *Exploring geometrical sheet-like structures in real time*. International Society for Magnetic Resonance in Medicine (ISMRM) – Breaking the barriers of diffusion MRI Workshop, Lisbon, Portugal.
9. **Chamberland, M.**, Scherrer, B., Prabhu, S., Fortin, D., Whittingstall, K., Descoteaux, D. and Warfield, S.K., 2016. *Magnetic ROIs enable improved tractography accuracy through oriented prior*. International Society for Magnetic Resonance in Medicine (ISMRM), Singapore.
10. **Chamberland, M.**, Girard, G., Bernier, M., Fortin, D., Descoteaux, M., and Whittingstall, K., 2016. *Association between structural and functional inter-subject variability of the motor and visual networks*. International Society for Magnetic Resonance in Medicine (ISMRM), Singapore.
11. **Chamberland, M.**, Bernier, M., Fortin, D., Descoteaux, M., and Whittingstall, K., 2015. *Tractography-driven resting-state fMRI for investigating inter-subject variability*. Organization for Human Brain Mapping (OHBM), Honolulu, Hawaii.
12. **Chamberland, M.**, Bernier, M., Fortin, D., Whittingstall, K., and Descoteaux, M., 2015. *Interactively computing and visualizing functional and structural brain connectivity in real time*. International Society for Magnetic Resonance in Medicine (ISMRM), Toronto, Canada.
13. **Chamberland, M.**, Descoteaux, M., Whittingstall, K., and Fortin, D., 2014. *Simultaneously probing functional and structural brain connectivity in real time: Fibernavigator: An interactive tool for brain visualization*. Neurotechnix, Rome, Italy.
14. **Chamberland, M.**, Bernier, M., Fortin, D., Descoteaux, M., and Whittingstall, K., 2014. *Uncovering a visuospatial network at rest*. Organization for Human Brain Mapping (OHBM), Hamburg, Germany.
15. **Chamberland, M.** and Descoteaux, M., 2013. *Explore the brain white matter networks in real-time: multi-sticks fiber tracking*. International Society for Magnetic Resonance in Medicine (ISMRM), Salt-Lake City, USA.
16. **Chamberland, M.**, Fortin, D. and Descoteaux, M., 2012. *Real-time fiber tractography: interactive parameter tuning for neurosurgical interventions*. Organization for Human brain mapping (OHBM), Beijing, China.

## THESES

1. **Chamberland, M.**, 2017. Développement d'outils neuroinformatiques spécialisés pour améliorer l'analyse individuelle en médecine personnalisée" (Ph.D thesis, Université de Sherbrooke).
2. **Chamberland, M.**, 2013. Visualisation en imagerie par résonance magnétique de diffusion: tractographie en temps réel des fibres de la matière blanche du cerveau (M.Sc thesis, Université de Sherbrooke).