

# 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, Photoshop, Unity3D
<b>Languages</b>	French, English

## Experience

### Post-Doctoral Research Fellow

CARDIFF UNIVERSITY BRAIN RESEARCH IMAGING CENTRE

- Computational NeuroImaging [Tractography & Tractometry 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

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|------|---|--------------------|
| 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

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|------|--|-----------------------|
| 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 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

## INRIA Research Institute

*Sophia-Antipolis, France*

INVITED BY PROF. RACHID DERICHE

*Fall 2014*

- Invited talk on Diffusion & Functional MRI visualization

## Laboratory of Mathematics in Imaging, Harvard Medical School

*Boston, USA*

INVITED BY PROF. CARL-FREDRIK WESTIN

*Spring 2013*

- Invited talk on Real-time Fiber Tractography

- Invited talk on Real-time Fiber Tractography

## Projects

### FiberNavigator

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

C++, OpenGL, GLSL

Main active developer

- Open-source neuroimaging visualization tool for diffusion MRI data

## Publications

### JOURNAL PAPERS (REFEREED)

1. St-Jean, S., **Chamberland, M.**, Viergever, M.A. and Leemans, A., 2019. *Reducing variability in along-tract analysis with diffusion profile realignment*. NeuroImage.
2. **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.
3. 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.
4. 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.
5. **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.
6. 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.
7. **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.
8. **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.
9. 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.
10. 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.
11. **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.
12. **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.
13. **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.
14. 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.

## 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.
4. 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).

## CONFERENCE ABSTRACTS (PEER-REVIEWED)

1. **Chamberland, M.**, Iqbal, NS., Rudrapatna, SU., Parker, G., Tax, C.M.W., Staffurth, J., Powell, J., Wise, RG., 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.
2. **Chamberland, M.**, Raven, E., Genc, S., Duffy, K., Parker, G., Tax, C.M.W., Descoteaux, M., Jones, DK., 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.
3. **Chamberland, M.**, and Jones, DK., 2018. *Enhancing bundle topology for tractography visualization using silhouette rendering*. International Society for Magnetic Resonance in Medicine (ISMRM), Paris, France.
4. **Chamberland, M.**, Descoteaux, D., Jones DK., 2018. *Advances in structural and functional connectivity visualization using the FiberNavigator*. International Society for Magnetic Resonance in Medicine (ISMRM), Paris, France.
5. **Chamberland, M.**, Tax, CMW., Gray, W., Jones, DK., 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.
6. **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.
7. **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.
8. **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.
9. **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.
10. **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.
11. **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.

12. **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.
13. **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.
14. **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).