

# GUILLAUME ST-ONGE

Ph.D. candidate in Physics studying Complex Systems

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RESEARCH INTERESTS: Complex Networks, Dynamical Systems, Criticality, Bayesian Inference, Contagions

## EDUCATION

### Degrees

- PH.D. IN PHYSICS, Université Laval 2018–2021 (expected)
  - MENTORS: Pr. Antoine Allard and Pr. Laurent Hébert-Dufresne (co-advisor)
  - THESIS TITLE: “*Contagion dynamics in complex systems : beyond pairwise interactions*”
- M.SC. IN PHYSICS, Université Laval 2015–2017
  - MENTOR: Pr. Louis J. Dubé
  - THESIS TITLE: “*Propagation dynamics on random networks: characterization of the phase transition*”
  - Honor board mention (highest grade attributed unanimously by the jury)
- B.SC. IN PHYSICS, Theoretical physics concentration, Université Laval 2012–2015

### Summer and Winter Schools

- *Complex Systems Summer School*, Santa Fe (New Mexico), USA 2018
- *Complex Networks Winter Workshop*, Québec (Québec), Canada 2018

## SCHOLARSHIPS AND HONORS

### Academic Medal

- Governor General’s Academic Medal (Silver) : Highest academic standing, B.Sc. degree 2016

### Graduate Research Scholarships

- NSERC : Doctoral Scholarship – Alexander Graham Bell Canada (\$35 000/yr.) Jan. 2018–Dec. 2020
- FRQNT : Doctoral Scholarship\* (\$20 000/yr.) Jan. 2018–Dec. 2020
- NSERC : Master Scholarship – Alexander Graham Bell Canada (\$17 500/yr.) Sept. 2015–Aug. 2016
- FRQNT : Master Scholarship (\$15 000/yr.) Sept. 2015–Aug. 2017
- Desjardins Foundation : Master Scholarship\* (\$3 000/yr.) Oct. 2015

### Internship Research Grants

- FRQNT – International Internship Program (\$7 500) 2020
- NSERC – Michael Smith Foreign Study Supplements (\$6 000) 2019
- NSERC – Undergraduate Student Research Award (\$4 500) 2013–2014–2015

### Other Awards

- *Concours d’expression scientifique Pierre Amiot*<sup>†</sup> (3rd place), Université Laval 2017
- Student merit award–Direction mention, Université Laval 2015
- Pedagogue of the year, Physics Students Association, Université Laval 2014

## PUBLICATIONS AND PATENTS

### Articles Published or Accepted in a Peer-Reviewed Journal

8. G. T. Cantwell, Y. Liu, B. F. Maier, A. C. Schwarze, C. A. Serván, J. Snyder, **G. St-Onge** 2020  
“*Thresholding normally distributed data creates complex networks*”,  
Phys. Rev. E **101**, 062302
7. J.-G. Young, **G. St-Onge**, E. Laurence, C. Murphy, L. Hébert-Dufresne, P. Desrosiers 2019  
“*Phase transition in the recoverability of network history*”,  
Phys. Rev. X **9**, 041056

\*Awarded but declined

<sup>†</sup>Scientific communication prize

6. **G. St-Onge**, J.-G. Young, L. Hébert-Dufresne, L. J. Dubé 2019  
*"Efficient sampling of spreading processes on complex networks using a composition and rejection algorithm"*,  
 Comput. Phys. Commun. **240**, 30–37
5. J.-G. Young, **G. St-Onge**, P. Desrosiers, L. J. Dubé 2018  
*"Universality of the stochastic block model"*,  
 Phys. Rev. E **98**, 032309
4. **G. St-Onge**, J.-G. Young, E. Laurence, C. Murphy, L. J. Dubé 2018  
*"Phase transition of the susceptible-infected-susceptible dynamics on time-varying configuration model networks"*,  
 Phys. Rev. E **97**, 022305
3. C. Murphy, A. Allard, E. Laurence, **G. St-Onge**, L. J. Dubé 2018  
*"Geometric evolution of complex networks with degree correlations"*,  
 Phys. Rev. E **97**, 032309
2. D. Panneton, **G. St-Onge**, M. Piché, S. Thibault 2016  
*"Exact vectorial model for nonparaxial focusing by arbitrary axisymmetric surfaces"*,  
 J. Opt. Soc. Am. **33**, 801–810
1. D. Panneton, **G. St-Onge**, M. Piché, S. Thibault 2015  
*"Needles of light produced with a spherical mirror"*,  
 Opt. Lett. **4**, 419–422

#### Preprints Under Review

- **G. St-Onge**, V. Thibeault, A. Allard, L. J. Dubé, L. Hébert-Dufresne  
*"Master equation analysis of mesoscopic localization in contagion dynamics on higher-order networks"*,  
 arXiv:2004.10203
- **G. St-Onge**, V. Thibeault, A. Allard, L. J. Dubé, L. Hébert-Dufresne  
*"Social confinement and mesoscopic localization of epidemics on networks"*,  
 arXiv:2003.05924
- V. Thibeault, **G. St-Onge**, L. J. Dubé, P. Desrosiers  
*"Threefold way to the dimension reduction of dynamics on networks: an application to synchronization"*,  
 arXiv:2005.10922
- G. T. Cantwell, **G. St-Onge**, J.-G. Young  
*"Recovering the past states of growing trees"*,  
 arXiv:1910.04788

#### Patents

- C. Allen, S. Thibault, A. Talbot-Lanciault, P. Blais, **G. St-Onge**, P. Desaulniers 2017  
*"Hybrid nanocomposite materials, laser scanning system and use thereof in volumetric image projection"*,  
 CA Patent No. 2983656

## RESEARCH AND TEACHING EXPERIENCE

#### Internships

- Vermont Complex System Center, Burlington (VT), USA 2019-2020  
 – Visiting graduate student in the group of Pr. Laurent Hébert-Dufresne  
 PROJECT : *"Temporal reconstruction of networks with message-passing"*
- Université Laval, Québec (QC), Canada 2015  
 – Undergraduate research assistant in the group of Pr. Louis J. Dubé  
 PROJECT : *"Statistical physics of complex networks"*
- Undergraduate research assistant in the group of Pr. Michel Piché 2014  
 PROJECT : *"Highly focused laser beam modeling"*
- Undergraduate research assistant in the group of Pr. Claudine Allen 2013  
 PROJECT : *"Development of an optical system for biodetection"*

#### Workshops

- *"Detecting structural perturbations from time"*, Université Laval, Québec (QC), Canada 2019
- *"Network Reconstruction & Graph Distances"*, Northeastern University, Boston (MA), USA 2019
- *"Network Archaeology"*, Université Laval, Québec (QC), Canada 2016

#### Teaching

- PHY-3500: *"Computational Physics"*, teaching assistant for Pr. Philippe Després 2016, 2018  
 Tasks : guidance for students projects, marking
- PHY-3000: *"Statistical Physics"*, teaching assistant for Pr. L. J. Dubé and Pr. Y. Sheng 2016–2018  
 Tasks : lectures, marking

## SELECTED CONFERENCE CONTRIBUTIONS AND INVITED LECTURES

- **G. St-Onge**, V. Thibeault, L. Hébert-Dufresne, L. J. Dubé  
*"Mesoscopic localization of spreading processes on networks"* (Talk)  
14th International School and Conference on Network Science, Burlington, VT, USA

2019
- **G. St-Onge**, J.-G. Young, E. Laurence, C. Murphy, L. J. Dubé  
*"SIS dynamics on time-varying random networks"* (Talk)  
Institute for Disease Modeling, Seattle, WA, USA

2017
- **G. St-Onge**, J.-G. Young, E. Laurence, C. Murphy, L. J. Dubé  
*"Susceptible-infected-susceptible dynamics on the rewired configuration model"* (Talk)  
12th International School and Conference on Network Science, Indianapolis, IN, USA

2017
- **G. St-Onge**, E. Laurence, C. Murphy, J.-G. Young and L. J. Dubé  
*"Co-evolution of Growth and Dynamics on Network"* (Poster)  
11th International School and Conference on Network Science, Seoul, Republic of Korea

2016
- **G. St-Onge**, D. Panneton, M. Piché, S. Thibault  
*"Modeling ultra-sharp needles of light using vector diffraction theory"* (Talk)  
50th Canadian Undergraduate Physics Conference, Kingston, ON, Canada

2014

## SERVICE

**Reviewer :** Nature Communications, Chaos, IMA Journal of Applied Mathematics

**Projects Liaison :** *Complex Networks Winter Workshop* 2019

### Mentoring

- Physique mathématique III (undergraduate course) 2014
- Physique mathématique I et II (undergraduate courses) 2013

### Volunteering

- La Coupe de Science (youth science contest) 2016
- Festival de Sciences et Génies (science festival) 2015
- Les Jeux photoniques (youth science contest) 2012–2014