

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*[†] (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”,
Accepted at Phys. Rev. E
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

[†]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
- 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
 – Undergraduate research assistant in the group of Pr. Louis J. Dubé 2015
 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