GUILLAUME ST-ONGE

Ph.D. candidate in Physics studying Complex Systems

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

EDUCATION

Degrees

- PH.D. IN PHYSICS, Université Laval — 2018–2021 (expected)
  - MENTORS: Prof. Antoine Allard and Prof. Laurent Hébert-Dufresne (co-advisor)
  - THESIS TITLE: "*Contagion dynamics on complex networks: beyond pairwise interactions*"
- M.SC. IN PHYSICS, Université Laval — 2015–2017
  - MENTOR: Prof. 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
  - **Governor General's Academic Medal : Highest academic standing, B.Sc. degree** — 2016

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

Graduate Research Scholarships

- NSERC : Doctoral Scholarship – Alexander Graham Bell Canada ($105 000) — Jan. 2018–Dec. 2020
- FRQNT : Doctoral Scholarship* ($60 000) — Jan. 2018–Dec. 2020
- NSERC : Master Scholarship – Alexander Graham Bell Canada ($17 500) — Sept. 2015–Aug. 2016
- FRQNT : Master Scholarship ($30 000) — Sept. 2015–Aug. 2017
- Desjardins Foundation : Master Scholarship* ($3 000) — 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, Awarded 3 times) — 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*",
   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
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

*Awarded but declined
†Scientific communication prize

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

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
- B. J. M. Blake, **G. St-Onge**, L. Hébert-Dufresne
"*Emergence of multistrain epidemics with an underlying genotype network*",
arXiv:2007.07429
- E. Laurence, C. Murphy, **G. St-Onge**, X. Roy-Pomerleau, V. Thibeault
"*Detecting structural perturbations from time series with deep learning*",
arXiv:2006.05232
- H. Hartle, B. Klein, S. McCabe, A. Daniels, **G. St-Onge**, C. Murphy, L. Hébert-Dufresne
"*Network comparison and the within-ensemble graph distance*",
arXiv:2008.02415

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

Workshops

- "*Detecting structural perturbations from time series*", 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 Prof. P. Després 2016, 2018
  Tasks : guidance for students projects, marking
- PHY-3000: "*Statistical Physics*", teaching assistant for Prof. L. J. Dubé, Y. Sheng, and A. Allard 2016–2018
  Tasks : lectures, marking

SELECTED CONFERENCE CONTRIBUTIONS AND INVITED LECTURES

- **G. St-Onge**, A. Allard, L. Hébert-Dufresne 2020
  "*Localization, bistability and optimal seeding of contagions on higher-order networks*" (Talk with proceeding)
  Artificial Life Conference, Montreal, QC, Canada (virtual)
- **G. St-Onge**, V. Thibeault, L. Hébert-Dufresne, L. J. Dubé 2019
  "*Mesoscopic localization of spreading processes on networks*" (Talk)
  14th International School and Conference on Network Science, Burlington, VT, USA
- **G. St-Onge**, J.-G. Young, E. Laurence, C. Murphy, L. J. Dubé 2017
  "*SIS dynamics on time-varying random networks*" (Talk)
  Institute for Disease Modeling, Seattle, WA, USA
- **G. St-Onge**, J.-G. Young, E. Laurence, C. Murphy, L. J. Dubé 2017
  "*Susceptible-infected-susceptible dynamics on the rewired configuration model*" (Talk)
  12th International School and Conference on Network Science, Indianapolis, IN, USA
- **G. St-Onge**, E. Laurence, C. Murphy, J.-G. Young and L. J. Dubé 2016
  "*Co-evolution of Growth and Dynamics on Network*" (Poster)
  11th International School and Conference on Network Science, Seoul, Republic of Korea
- **G. St-Onge**, D. Panneton, M. Piché, S. Thibault 2014
  "*Modeling ultra-sharp needles of light using vector diffraction theory*" (Talk)
  50th Canadian Undergraduate Physics Conference, Kingston, ON, Canada

SERVICE

Reviewer : Nat. Commun., Chaos, IMA J. Appl. Math., J. Complex Netw.

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