

# JEAN-GABRIEL YOUNG

Research Assistant Professor

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RESEARCH INTERESTS: Statistical Inference, Epidemiology, Complex Networks, Complex Systems

## ACADEMIC POSITIONS

- *University of Vermont*, Research Assistant Professor, Department of Computer Science 2020–
- *Université Laval*, Affiliate Professor, *Département de Physique* 2020–
- *University of Michigan*, Postdoctoral Fellow, Center for the Study of Complex Systems 2018–2020
- *Université Laval*, Research Assistant, Group of Prof. Louis. J. Dubé 2012–2018

## EDUCATION

### Degrees

*Ph.D. in Physics*, Université Laval 2014–2018

- Thesis title: *Inférence et réseaux complexes* \*
- Advisors: Louis J. Dubé and Patrick Desrosiers
- ★ Thesis added to the *Board of Honour*.

*M.Sc. in Physics*, Université Laval 2012–2014

- Thesis title: *De la détection de la structure communautaire des réseaux complexes* †
- Advisors: Louis J. Dubé

*B.Sc. in Physics*, Theoretical Physics major, Université Laval 2009–2012

### Summer schools

- *Complex networks : Theory, methods and applications II*, Lake Como School of Advanced Studies 2016
- *Complex Systems Summer School*, Santa Fe Institute 2015

## SCHOLARSHIPS, GRANTS AND AWARDS

### Fellowships and Scholarships

- *Postdoctoral Fellowship in Studying Complex Systems*, James S. MacDonnell Foundation (\$200 000) 2017
- *Doctoral Research Scholarship*, *Fonds de recherche du Québec – Nature et Technologies* (\$60 000) 2014

### Awards

- *FOSS Award*, 2021 Mining Software Repositories Conference 2021
- *Zachary Karate Club award* 2021
- *Best oral presentation award*, *NERCCS 2020* 2020
- *Board of Honour* (Highest overall mark award by all committee members), Ph.D thesis, Université Laval 2018
- *YRNCs Bridge Grant*, *Young Researcher Network On Complex Systems*, joint award with Alice Patania 2016
- *Concours d'expression scientifique Pierre Amiot* ‡ (2nd place), Physics Department, Université Laval 2016

\*Inference and complex networks

†Of community structure detection on complex networks

‡Scientific communication prize

## PUBLICATIONS

### Peer-reviewed journals (22)

22. [A clarified typology of core-periphery structure in networks](#) 2021  
R. J. Gallagher, **J.-G. Young** and B. Foucault Welles  
Sci. Adv. 7, eabc9800
21. [Bayesian inference of network structure from unreliable data](#) 2021  
**J.-G. Young**, G. T. Cantwell and M. E. J. Newman  
J. Complex. Netw. 8, cnaa046
20. [Inference, model selection, and the combinatorics for growing trees](#) 2021  
G. T. Cantwell, G. St-Onge and **J.-G. Young**  
Phys. Rev. Lett. 126, 038301
19. [Networks beyond pairwise interactions: structure and dynamics \(review\)](#) 2020  
F. Battiston, G. Cencetti, I. Iacopini, V. Latora, M. Lucas, A. Patania, **J.-G. Young** and G. Petri  
Phys. Rep. 874
18. [Improved mutual information measure for classification and community detection](#) 2020  
M. E. J. Newman, G. T. Cantwell and **J.-G. Young**  
Phys. Rev. E 101, 042304
17. [Macroscopic patterns of interacting contagions are indistinguishable from social reinforcement](#) 2020  
L. Hébert-Dufresne, S. V. Scarpino and **J.-G. Young**  
Nat. Phys. 16, 426
16. [Phase transition in the recoverability of network history](#) 2019  
**J.-G. Young**, G. St-Onge, E. Laurence, C. Murphy, L. Hébert-Dufresne and P. Desrosiers  
Phys. Rev. X 9, 041056
15. [Efficient sampling of spreading processes on complex networks using a composition and rejection algorithm](#) 2019  
G. St-Onge, **J.-G. Young**, L. Hébert-Dufresne and L. J. Dubé  
Comput. Phys. Commun. 240, 30
14. [Universality of the stochastic block model](#) 2018  
**J.-G. Young**, G. St-Onge, P. Desrosiers and L.J.Dubé  
Phys. Rev. E 98, 032309
13. [Exact analytical solution of irreversible binary dynamics on networks](#) 2018  
E. Laurence, **J.-G. Young**, S. Melnik and L.J.Dubé  
Phys. Rev. E 97, 032302
12. [Phase transition of the susceptible-infected-susceptible dynamics on time-varying configuration model networks](#) 2018  
G. St-Onge, **J.-G. Young**, E. Laurence, C. Murphy and L. J. Dubé  
Phys. Rev. E 97, 022305
11. [Construction of and efficient sampling from the simplicial configuration model](#) 2017  
**J.-G. Young**, G. Petri, F. Vaccarino and A. Patania  
Phys. Rev. E 96, 032312
10. [Strategic tradeoffs in competitor dynamics on adaptive networks](#) 2017  
L. Hébert-Dufresne, A. Allard, P.-A. Noël, **J.-G. Young**, and E. Libby  
Sci. Rep. 7, 7576
9. [Finite size analysis of the detectability limit of the stochastic block model](#) 2017  
**J.-G. Young**, P. Desrosiers, L. Hébert-Dufresne, E. Laurence and L. J. Dubé  
Phys. Rev. E 95, 062304
8. [Growing networks of overlapping communities with internal structure](#) 2016  
**J.-G. Young**, L. Hébert-Dufresne, A. Allard and L. J. Dubé  
Phys. Rev. E 94, 022317
7. [Constrained growth of complex scale-independent systems <sup>§</sup>](#) 2016  
L. Hébert-Dufresne, A. Allard, **J.-G. Young** and L. J. Dubé  
Phys. Rev. E 93, 032304

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<sup>§</sup>Editors' suggestion

6. [Complex networks as an emerging property of hierarchical preferential attachment](#) 2015  
L. Hébert-Dufresne, E. Laurence, A. Allard, **J.-G. Young** and L. J. Dubé  
Phys. Rev. E 92, 062809
5. [General and exact approach to percolation on random graphs](#) 2015  
A. Allard, L. Hébert-Dufresne, **J.-G. Young** and L. J. Dubé  
Phys. Rev. E 92, 062807
4. [A shadowing problem in the detection of overlapping communities](#) 2015  
**J.-G. Young**, A. Allard, L. Hébert-Dufresne and L. J. Dubé  
PLoS ONE 10, e0140133
3. [Coexistence of phases and the observability of random graphs](#) § 2014  
A. Allard, L. Hébert-Dufresne, **J.-G. Young** and L. J. Dubé  
Phys. Rev. E 89, 022801
2. [Percolation on random networks with arbitrary  \$k\$ -core structure](#) 2013  
L. Hébert-Dufresne, A. Allard, **J.-G. Young** and L. J. Dubé  
Phys. Rev. E 88, 062820
1. [Global efficiency of local immunization on complex networks](#) 2013  
L. Hébert-Dufresne, A. Allard, **J.-G. Young** and L. J. Dubé  
Sci. Rep. 3, 2171

#### Peer-reviewed conference proceeding (3)

3. [Which contributions count? Analysis of attribution in open source](#) 2021  
**J.-G. Young**, A. Casari, K. McLaughlin, M. Z. Trujillo, L. Hébert-Dufresne and J. P. Bagrow  
MSR 2021, Proceedings of the 18th International Conference on Mining Software Repositories
2. [Countering hate on social media: Large scale classification of hate and counter speech](#) 2020  
J. Garland, K. Ghazi-Zahedi, **J.-G. Young**, L. Hébert-Dufresne and M. Galesic  
ACL 2020, Proceedings of the Fourth Workshop on Online Abuse and Harms, pp. 102–112.
1. [Connected graphs with a given degree sequence: Efficient sampling, correlations, community detection and robustness](#) 2020  
J. Ring IV, **J.-G. Young** and L. Hébert-Dufresne.  
NetSci-X 2020, Proceedings of NetSci-X 2020: Sixth International Winter School and Conference on Network Science, pp. 33–47.

#### Other edited works (1)

1. [Open Source Ecosystems Need Equitable Credit Across Contributions](#) 2021  
A. Casari, K. McLaughlin, M. Z. Trujillo, **J.-G. Young**, J. P. Bagrow and L. Hébert-Dufresne  
Nat. Comput. Sci. 1, 2

#### Preprints in submission (4)

- [Reconstruction of plant–pollinator networks from observational data](#)  
**J.-G. Young**, F. S. Valdovinos and M. E. J. Newman  
bioRxiv:2019/754077  
Accepted, *Nature Communications*.
- [Hypergraph reconstruction from network data](#)  
**J.-G. Young**, G. Petri and T. P. Peixoto  
arXiv:2008.04948  
Accepted, *Communication Physics*.
- [Changes in group size during resource shifts reveal drivers of sociality across the tree of life](#)  
A. B. Kao, A. K. Hund, F. P. Santos, **J.-G. Young**, D. Bhat, J. Garland, R. A. Oomen and H. F. McCreery  
bioRxiv:2020/994343  
Under review, *Proceedings of the Royal Society B*.
- [Impact and dynamics of hate and counter speech online](#)  
J. Garland, K. Ghazi-Zahedi, **J.-G. Young**, L. Hébert-Dufresne and M. Galesic  
arXiv:2009.08392  
Under review, *EPJ Data Science*.

## TEACHING AND MENTORING

### Teaching assistant

- PHY-2502: *Nonlinear Dynamics, Chaos and Complexity* Winter 2015 and 2017  
Assistant of Pr. Louis J. Dubé  
**Responsibilities:** Grading and programming course
- PHY-3000: *Statistical Mechanics* Winter 2013, 2014 and Fall 2015  
Assistant of Pr. Yulong Sheng (2016) and Pr. Louis J. Dubé (2013–2014)  
**Responsibilities:** Recitations and grading

### Schools and guest lectures

- CSYS/CS 302: Modeling Complex Systems, University of Vermont, Burlington VT 2020
- CNWW2020: Complex Networks Winter Workshop, Québec, Canada 2020
- CRM Summer School: Spectral Theory and Applications, Québec, Canada 2016

### Supervision

- Master Students:
  - ◊ Simon Lizotte, Université Laval (co-direction with Antoine Allard) 2020–

## INVITED TALKS AND SELECTED CONFERENCE CONTRIBUTIONS

- “Inference with growing networks” 2021  
CNWW2020, online (invited talk)
- “Bayesian approaches to network epidemiology” 2020  
TGIR Seminar, online (invited talk)
- “Hypergraph reconstruction from network data” 2020  
HONS 2020, online (invited talk)
- “Paper Unwind: Network archaeology” 2020  
School of the NERCCS 2020 conference, Buffalo, NY, USA (invited talk)
- “Efficient and fully bayesian inference of complex networks from noisy data” 2019-2020
  - ▷ Indiana University — CNETS, Bloomington, IN, USA (invited seminar)
  - ▷ Université Laval — CIMMUL, Québec, QC, Canada (invited seminar)
  - ▷ Netsci-X 2020, Tokyo, Japan (talk)
  - ▷ NERCSS 2020, Buffalo, NY, USA (talk, best presentation award)
  - ▷ University of Michigan — Jacobs Lab (UMSI), Ann Arbor MI, USA (invited seminar)
  - ▷ Indiana University — Betzel Lab, Bloomington, IN, USA (invited seminar)
  - ▷ Netsci 2020, online (talk)
- “Compression of treelike complex networks using layered configuration models” 2019  
Netsci 2019, Burlington, VT, USA (talk)
- “Bayesian inference of effective contagion models from population level data” 2019  
SINM 2019, Burlington, VT, USA (talk)
- “Universality of the stochastic block model” 2019  
SYNS Warm-up Event 2019, Burlington, VT, USA (invited talk)
- “The statistical physics of inference for Complex Networks” 2018  
Department of Physics Colloquium Oakland University, Rochester, MI, USA (invited seminar)
- “Network archaeology: phase transition in the recoverability of network history” 2018
  - ▷ Univeristy of Colorado Boulder — StatOptML seminar, Boulder, CO, USA (invited seminar)
  - ▷ Univeristy of Vermont — Vermont Complex Systems Center, Burlington, VT, USA (invited seminar)
  - ▷ Netsci 2018, Paris, France (talk)
  - ▷ Sentinel North 2018 Annual Meeting, Québec, Canada (plenary)
  - ▷ Univeristy of Bath — Centre for Networks and Collective Behaviour, Bath, UK (invited seminar)
  - ▷ Connected Past 2018, Oxford, UK (talk)
- “Construction of and efficient sampling from the simplicial configuration model” 2017
  - ▷ HONS 2017, Indianapolis, IN, USA (invited talk)
  - ▷ Indiana University — School of Informatics, Bloomington, IN, USA (invited seminar)

- ▷ University of Michigan — Center for the Study of Complex Systems, Ann Arbor, MI, USA (invited talk)
- “*Statistical mechanics of mesoscopic structure extraction*” 2017  
Netsci 2017, Indianapolis, IN, USA (talk)
- “*Finite size analysis of the detectability limit of the stochastic block model*” 2016
  - ▷ Netsci 2016, Seoul, Korea (lightning talk)
  - ▷ SINM 2016, Seoul, Korea (talk)
  - ▷ ISI Foundation, Torino, Italy (invited seminar)
- “*Structural preferential attachment: scale-free benchmark for overlapping community detection algorithms*” 2015  
Netsci 2015, Zaragoza, Spain (poster)
- “*Structural preferential attachment of community structure and its relation to Dunbar’s number*” 2014  
Netsci 2014, Berkeley, CA, USA (talk)
- “*Complex networks are an emerging property of hierarchical preferential attachment*”<sup>¶</sup> 2014  
NetSci 2014 Science, Berkeley, CA, USA (poster)
- “*Local and global solutions to community detection: when resolution matters*” 2013  
NetSci 2013, Copenhagen, Denmark (poster)

## LEADERSHIP AND SERVICE

### Organizer

- Organizer, SINM 2021 (Statistical Inference for Network Models), online 2021
- Organizer, SIAM DS 21 Mini-Symposium on Dynamics in Higher-Order Networks, online 2021
- Co-director, CNWW2021, Complex Networks Winter Workshop, Québec, Canada 2021
- Program co-chair, First OpenNetSci Hackathon, Burlington VT, USA 2019
- Adjacent Activities Committee, NetSci 2019, Burlington VT, USA 2019

### Service

- AUR Maintainer, Several python packages ongoing
- Contributor, Several open-source projects ongoing
- Elected Student Representative, Physics Faculty Meetings, Université Laval 2015–2016
- Board member, Student Investment Fund, Université Laval 2013–2016
- Technical Director, Coupe de Science (Science Cup), Université Laval 2011–2014
- Technical Director, Festival de Sciences et Génies (Science and Engineering Festival) 2010–2012

### Reviewer

- Grants: Panelist, NSF, IIS Division (2019).
- Journals (22): Science Advances, SIAM Review, Physical Review Letters, Physical Review X, PLOS Computational Biology, Physical Review E, Physical Review Research, EPJ Data Science, EPL, Journal of Open Source Software, Journal of Physics: Complexity, Journal of Physics A, Scientific Reports, Palgrave Communications, PLOS ONE, Journal of Complex Networks, Physics Letter A, Chaos Solitons & Fractals, Entropy, Animal Behaviour, Applied Network Science, Chaos.

### Program committee

- NERCCS 2021 – Northeast Regional Conference on Complex Systems 2021
- NetSci 2020 2020
- SIAM Workshop on Network Science 2020 2020
- NERCCS 2020 – Northeast Regional Conference on Complex Systems 2020
- NetSci 2019 2019
- SIAM Workshop on Network Science 2018 2018

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<sup>¶</sup>Outstanding poster award

## SELECTED SOFTWARE PACKAGES

(Complete list available online)

- Bayesian inference of networks from noisy data (stan)
- Bayesian inference of effective contagion models from population level data (stan)
- Reconstruction of plant–pollinator networks from observational data (stan + python)
- Sequential MC sampler for Network Archaeology (python + C++)
- MCMC sampler for the Simplicial Configuration Model (C++)
- MCMC sampler for the Stochastic Block Model (C++)
- Structural Preferential Attachment community detection benchmark (C++)

## VARIA

### Selected media coverage

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|--|------|
| • <i>"A selection of 2020's highlighted research."</i> Nature                        | 2021 |
| • <i>"To find the right network model, compare all possible histories."</i> Phys.org | 2021 |
| • <i>"Fighting Hate Speech with AI &amp; Social Science,"</i> Complexity Podcast     | 2020 |
| • <i>"How you talk about coronavirus actually impacts its spread,"</i> cnet          | 2020 |
| • <i>"Neue Studie zeigt Wirksamkeit von Gegenrede im Netz,"</i> netzpolitik.org      | 2020 |
| • <i>"When coronavirus is not alone,"</i> Phys.org                                   | 2020 |
| • <i>"The shape of randomness."</i> Physics Central                                  | 2017 |
| • <i>"What algae can tell us about political strategy."</i> Phys.org                 | 2017 |
| • <i>"L'univers complexe de Jean-Gabriel Young."</i> Le Soleil (French)              | 2017 |