

# JEAN-GABRIEL YOUNG

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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

- *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](#)  
R. J. Gallagher, **J.-G. Young** and B. Foucault Welles  
Sci. Adv. (in press)
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  
In revision, *Nature Communications*.
- [Hypergraph reconstruction from network data](#)  
**J.-G. Young**, G. Petri and T. P. Peixoto  
arXiv:2008.04948  
In revision, *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, *Nature Communications*.

## 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

- Co-director, CNWW2021, Complex Networks Winter Workshop, Québec, Canada 2021
- Organizer, SINM 2021 (Statistical Inference for Network Models), online 2021
- Organizer, SIAM DS 21 Mini-Symposium on Dynamics in Higher-Order Networks, online 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 (20): Science Advances, SIAM Review, Physical Review Letters, Physical Review X, Physical Review E, 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

- |   |                    |      |
|---|--------------------|------|
| • <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 |