

JEAN-GABRIEL YOUNG

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RESEARCH INTERESTS: Statistical Inference, Data Science, 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 (19)

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 §](#) 2016
L. Hébert-Dufresne, A. Allard, **J.-G. Young** and L. J. Dubé
Phys. Rev. E 93, 032304
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

§Editors' suggestion

3. Coexistence of phases and the observability of random graphs ^S 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 (2)

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
Proceedings of the Fourth Workshop on Online Abuse and Harms
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.
Proceedings of NetSci-X 2020: Sixth International Winter School and Conference on Network Science.

Preprints in submission (8)

- Open Source Ecosystems Need Equitable Credit Across Contributions
A. Casari, K. McLaughlin, M. Z. Trujillo, **J.-G. Young**, J. P. Bagrow and L. Hébert-Dufresne
Accepted, *Nature Computational Science*
(Draft available upon request)
- 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*.
- Inference for growing trees
G. T. Cantwell, G. St-Onge and **J.-G. Young**
arXiv:1910.04788
In revision, *Physical Review Letters*.
- A clarified typology of core-periphery structure in networks
R. J. Gallagher, **J.-G. Young** and B. Foucault Welles
arXiv:2005.10191
In revision, *Science Advances*.
- Robust Bayesian inference of network structure from unreliable data
J.-G. Young, G. T. Cantwell and M. E. J. Newman
arXiv:2008.03334
In revision, *Journal of Complex Networks*
- 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*.
- Hypergraph reconstruction from network data
J.-G. Young, G. Petri and T. P. Peixoto
arXiv:2008.04948
Under review, *Communication Physics*.
- 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
Submitted, *Nature Human Behavior*.

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

- [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

- “*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)
 - ▷ [NERCCS 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”
Netsci 2015, Zaragoza, Spain (poster) 2015
- “Structural preferential attachment of community structure and its relation to Dunbar’s number”
Netsci 2014, Berkeley, CA, USA (talk) 2014
- “Complex networks are an emerging property of hierarchical preferential attachment”[¶]
NetSci 2014 Science, Berkeley, CA, USA (poster) 2014
- “Local and global solutions to community detection: when resolution matters”
NetSci 2013, Copenhagen, Denmark (poster) 2013

LEADERSHIP AND SERVICE

Organizer

- Program co-chair, First OpenNetSci Hackathon, Burlington VT, USA 2019
- Adjacent Activities Committee, NetSci 2019, Burlington VT, USA 2019

Service

- Arch Linux Maintainer, Several python packages
- Contributor, Several open-source projects
- 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 (19): Science Advances, 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

- 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

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++)

[¶]Outstanding poster award

VARIA**Selected media coverage**

- *"Fighting Hate Speech with AI & Social Science,"* Complexity Podcast 2020
- *"How you talk about coronavirus actually impacts its spread,"* cnet 2020
- *"Neue Studie zeigt Wirksamkeit von Gegenrede im Netz,"* netzpolitik.org 2020
- *"When coronavirus is not alone,"* Phys.org 2020
- *"The shape of randomness."* Physics Central 2017
- *"What algae can tell us about political strategy."* Phys.org 2017
- *"L'univers complexe de Jean-Gabriel Young."* Le Soleil (French) 2017