

# JEAN-GABRIEL YOUNG

Assistant Professor

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

## PROFESSIONAL EXPERIENCE

- *University of Vermont*, Assistant Professor, [Department of Mathematics and Statistics](#)\* 2021–
- *Université Laval*, Professeur Associé [Département de Physique](#) 2020–
- *Hive.one*, Scientific Advisor 2023–
- *University of Vermont*, Research Assistant Professor, [Department of Computer Science](#) 2020–2021
- *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

- Ph.D. in Physics*, *Université Laval* 2014–2018
- Thesis title: Inférence et réseaux complexes <sup>†</sup>
  - Advisors: Louis J. Dubé and Patrick Desrosiers
- M.Sc. in Physics*, *Université Laval* 2012–2014
- Thesis title: De la détection de la structure communautaire des réseaux complexes <sup>‡</sup>
  - Advisors: Louis J. Dubé
- B.Sc. in Physics*, Theoretical Physics major, *Université Laval* 2009–2012

## 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

### Grants

- [NSF-DMS](#). “Contagion on Complex Social Systems Conference” (\$47,838, PI) 2023
- *James Jeffords Grant*, [University of Vermont](#). “Vermont Open Source Connector” (\$4,600, PI) 2023
- *OVPR Express Grant*, [University of Vermont](#). “Choice Theory in Networks Workshop” (\$3,000, PI) 2021
- *YRNCS Bridge Grant*, [YRCSS](#). “Simplicial Configuration Models” (€1,000, PI) 2016

### Awards

- *FOSS Award*, 2021 Mining Software Repositories Conference 2021
- *Zachary Karate Club 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
- *Concours d'expression scientifique Pierre Amiot*, [Physics Department, Université Laval](#) 2016

\*Secondary appointment with: Vermont Complex Systems Center, Larner College of Medicine, Department of Computer Science

<sup>†</sup>Inference and complex networks

<sup>‡</sup>Of community structure detection on complex networks

## PUBLICATIONS

## Peer-reviewed journals

33. [Hypergraph reconstruction from uncertain data](#) 2023  
S. Lizotte, **J.-G. Young**, and A. Allard  
Sci Rep 13, 21364
32. [Estimating epidemiological parameters takes time](#) 2023  
B. K. M. Case, **J.-G. Young**, and L. Hébert-Dufresne  
R. Soc. Open Sci. 10, 230634
31. [Opposing responses to scarcity emerge from functionally unique sociality drivers](#) 2023  
A. B. Kao, A. K. Hund, F. P. Santos, **J.-G. Young**, D. Bhat, J. Garland, R. A. Oomen, and H. F. McCreery  
Am. Nat. 202, 3
30. [Exact and rapid linear clustering of networks with dynamic programming](#) 2023  
A. Patania, A. Allard, and **J.-G. Young**  
Proc. R. Soc. A 479, 2275
29. [Compressing network populations with modal networks reveals structural diversity](#) 2023  
A. Kirkley, A. Rojas, M. Rosvall, and **J.-G. Young**  
Commun. Phys. 6, 148
28. [Latent network models to account for noisy, multiply-reported social network data](#) 2023  
C. De Bacco, M. Contisciani, J. Cardoso-Silva, H. Safdari, D. Theuerkauf, T. Sweet, **J.-G. Young**, J. Koster, C. Ross, R. McElreath, D. Redhead, and E. A. Power  
J. R. Stat. Soc. A 186, 355–375
27. [Spatial epidemiology and adaptive targeted sampling to manage the Chagas disease vector \*Triatoma dimidiata\*](#) 2022  
B. K. M. Case, **J.-G. Young**, D. Penados, L. Hébert-Dufresne, and L. Stevens  
PLOS Negl. Trop. Dis. 16, e0010436
26. [Impact and dynamics of hate and counter speech online](#) 2022  
J. Garland, K. Ghazi-Zahedi, **J.-G. Young**, L. Hébert-Dufresne, and M. Galesic  
EPJ Data Sci. 11, 3
25. [Clustering of heterogeneous populations of networks](#) 2022  
**J.-G. Young**, A. Kirkley, and M. E. J. Newman  
Phys. Rev. E 105, 014312
24. [Reconstruction of plant–pollinator networks from observational data](#) 2021  
**J.-G. Young**, F. S. Valdovinos, and M. E. J. Newman  
Nat. Commun. 12, 3911
23. [Hypergraph reconstruction from network data<sup>§</sup>](#) 2021  
**J.-G. Young**, G. Petri, and T. P. Peixoto  
Commun. Phys. 4, 135
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

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<sup>§</sup>Appears in the Focus Collection on Higher-order Interaction Networks

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
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](#) <sup>¶</sup> 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

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<sup>¶</sup>Editors' suggestion

**Peer-reviewed conference proceeding**

5. [Cutting through the noise to infer autonomous system topology](#) 2022  
K. G. Leyba, J. J. Daymude, **J.-G. Young**, M. E. J. Newman, J. Rexford, and S. Forrest  
INFOCOM 2022, Proceedings of the 2022 IEEE International Conference on Computer Communications, pp. 1609–1618.
4. [The OCEAN mailing list data set: Network analysis spanning mailing lists and code repositories](#) 2022  
M. Warrick, S. F. Rosenblatt, **J.-G. Young**, L. Hébert-Dufresne, and J. P. Bagrow  
MSR 2022, Proceedings of the 19th International Conference on Mining Software Repositories
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**

2. [Book review: Advances in Network Clustering and Blockmodeling](#) 2022  
**J.-G. Young**  
J. Soc. Struct. 23, 47
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)**

- [The network epidemiology of an Ebola epidemic](#)  
L. Hébert-Dufresne, **J.-G. Young**, J. Bedson, L. Skrip, D. Pedi, M. F. Jalloh, B. Raulier, O. Lapointe-Gagné, A. Jambai, A. Allard, and B. Althouse  
arXiv:2111.08686  
In revision, *Nature*
- [The promise of trans-species coexpression analysis in studying the coevolution and ecology of host-parasite interactions.](#)  
A. Hund, P. Tiffin, **J.-G. Young**, and D. Bolnick  
arXiv:2206.12711  
In revision, *Evolution*
- [Network Onion Divergence: Network representation and comparison using nested configuration models with fixed connectivity, correlation and centrality pattern](#)  
L. Hébert-Dufresne, **J.-G. Young**, A. Daniels, and A. Allard  
arXiv:2204.08444
- [The simpliciality of higher-order networks](#)  
N. W. Landry, **J.-G. Young**, and N. Eikmeier  
arXiv:2308.13918  
Submitted, *EPJ Data Science*

**TEACHING AND MENTORING****Instructor**

- STAT-6300: *Bayesian Statistics* F2021, F2022, F2023
- STAT-6990: *Statistical Network Analysis* S2022, S023
- CS-3993: *Independent Study: Machine Learning with graphs* F2023

**Schools and guest lectures**

- [CSYS/CS 302: Modeling Complex Systems](#), University of Vermont, Burlington VT , 2020, 2021
- [CNWW2020: Complex Networks Winter Workshop](#), Québec, Canada 2020
- [CRM Summer School: Spectral Theory and Applications](#), Québec, Canada 2016

**Supervision**

- Postdoctoral fellows:
  - ◊ Nicholas W. Landry, University of Vermont 2022–
- Ph.D. students:
  - ◊ Simon Lizotte, Université Laval (co-direction with Antoine Allard) 2022–
  - ◊ A. Daniels, University of Vermont 2022–
  - ◊ Jonathan St-Onge, University of Vermont 2022–
  - ◊ Nicholas J. Robert, University of Vermont 2021–
  - ◊ B. K. M. Case, University of Vermont 2021–2023
- Master's students:
  - ◊ Aviral Chawla, University of Vermont 2022–
  - ◊ Erik Weis, University of Vermont 2021–2023
  - ◊ Simon Lizotte, Université Laval (co-direction with Antoine Allard) 2020–2022
- Undergraduate students:
  - ◊ Nathan Blanchard (Honors Thesis), University of Vermont AY 24/25
  - ◊ Trevor Blanchard (Honors Thesis), University of Vermont AY 22/23

**INVITED TALKS AND SELECTED CONFERENCE CONTRIBUTIONS**

- *"Modeling the Spread of Clostridioides Difficile in Hospitals"* 2023  
[SIAM DS23](#), Portland, OR, USA (talk)
- *"Quantifying Contagion Complexity"* 2023  
[Dynamics of Interacting Contagions – Santa Fe Institute](#), NM, USA (talk)
- *"Statistical Modeling and Inference for Higher-Order Network Science"* 2023  
[KAIS-Vermont Workshop](#), Seoul, Korea (invited talk)
- *"Uncertain Network Science"* 2021–2023
  - ▷ [Channing Network Science Seminar](#), Boston MA, USA (invited seminar)
  - ▷ [NERCCS 2022 conference](#), Buffalo, NY, USA (invited plenary)
  - ▷ University of Vermont — Mechanical Engineering Seminars, Burlington VT, USA (invited seminar)
  - ▷ [Central European University–Department of Network and Data Science](#), online (invited seminar)
  - ▷ [CNRS, Centre d'Écologie Fonctionnelle et Évolutive](#), Montpellier, France (invited talk)
  - ▷ [University of Maastricht – Department of Data Analytics and Digitalisation](#), Maastricht, Netherlands (invited seminar)
- *"Which contributions count? Analysis of attribution in open source"* 2021–2022
  - ▷ [MSR2021](#), online (talk)
  - ▷ [BTV Data Science Meet-up](#), Burlington, VT, USA (talk)
- *"Inference with growing networks"* 2021  
[CNWW2020](#), online (invited talk)
- *"Bayesian approaches to network epidemiology"* 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”* 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, [CNWW2023](#), Complex Networks Winter Workshop, Québec, Canada 2023
- Program Chair, [NetSci 2024](#) (School and Conference on Network Science) 2024
- Chair, [CCSS23](#) (Contagion on Complex Social Systems) 2023
- Organizer, [SINM](#) (Statistical Inference for Network Models) 2021–2023
- Satellite location organizer ([UVM](#)), [NERCCS 2022](#) 2022
- 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

<sup>||</sup> Outstanding poster award

**Service**

- *AUR Maintainer*, Several python packages ongoing
- *Contributor*, Several open-source projects ongoing
- *Seminar chair*, STAT@UVM 2022–
- *Seminar chair*, Vermont Complex Systems Center 2021–
- *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* (30): Science Advances, Nature Communications, SIAM Review, Physical Review X, Physical Review Letters, Psychological Methods, PLOS Computational Biology, JMIR Public Health Surveillance, Physical Review E, Physical Review Research, EPJ Data Science, Scientific Data, Cambridge Elements, EPL, Journal of Open Source Software, Journal of Physics: Complexity, Journal of Physics A, Journal of Applied and Computational Topology, Scientific Reports, Palgrave Communications, PLOS ONE, Journal of Complex Networks, Physics Letter A, Chaos Solitons & Fractals, Entropy, Network Science, Animal Behaviour, Applied Network Science, Journal of Computational Science, Chaos.

**Program committee**

- Northeast Regional Conference on Complex Systems (NERCCS) 2020, 2021, 2022
- International School and Conference on Network Science (NetSci) 2019, 2020, 2023, 2024(X)
- International Conference on Complex Networks and their Applications 2023
- SIAM Workshop on Network Science (SIAM NS) 2018, 2020

**PhD thesis comittees**

- *Damin Zhu*, Statistics. Advisor: Jeffrey S. Buzas 2023
- *Tung-Lin Liu*, Food Systems. Advisor: Christopher Koliba 2023
- *Michael Arnolds*, Complex Systems. Advisor: Peter Dodds 2023
- *Lucy Greenberg*, Statistics. Advisor: Jeffrey S. Buzas 2025

**SELECTED SOFTWARE**

(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**

- “A selection of 2020’s highlighted research.” Nature 2021
- “To find the right network model, compare all possible histories.” Phys.org 2021
- “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