

JEAN-GABRIEL YOUNG

Assistant Professor

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RESEARCH INTERESTS: Computational Statistics, Complex Systems, Forecasting, Epidemiology

PROFESSIONAL EXPERIENCE

- *University of Vermont*, Assistant Professor, Department of Mathematics and Statistics* 2021–
- *Université Laval*, Professeur Associé Département de Physique 2020–
- *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[†]
 - *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[‡]
 - *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 “Altruistic stress, economic networks, and endogenous organizational change”* (\$399,653, co-PI) 2023
- *NSF “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

[†]Inference and complex networks

[‡]Of community structure detection on complex networks

PUBLICATIONS


Peer-reviewed journals

- | | |
|---|-----------------|
| 36. Reconstructing networks from simple and complex contagions
N. W. Landry, W. Thompson, L. Hébert-Dufresne, and J.-G. Young
Phys. Rev. E | <i>In press</i> |
| 35. Network compression with configuration models and the minimum description length
L. Hébert-Dufresne, J.-G. Young , A. Daniels, and A. Allard
Phys. Rev. E 110, 034305 | 2024 |
| 34. The simpliciality of higher-order networks
N. W. Landry, J.-G. Young , and N. Eikmeier
EPJ Data Sci. 13, 17 | 2024 |
| 33. Hypergraph reconstruction from uncertain data
S. Lizotte, J.-G. Young , and A. Allard
Sci. Rep. 13, 21364 | 2023 |
| 32. Accurately summarizing an outbreak using epidemiological models takes time
B. K. M. Case, J.-G. Young , and L. Hébert-Dufresne
R. Soc. Open Sci. 10, 230634 | 2023 |
| 31. Opposing responses to scarcity emerge from functionally unique sociality drivers
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 | 2023 |
| 30. Exact and rapid linear clustering of networks with dynamic programming
A. Patania, A. Allard, and J.-G. Young
Proc. R. Soc. A 479, 2275 | 2023 |
| 29. Compressing network populations with modal networks reveals structural diversity
A. Kirkley, A. Rojas, M. Rosvall, and J.-G. Young
Commun. Phys. 6, 148 | 2023 |
| 28. Latent network models to account for noisy, multiply-reported social network data
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 | 2023 |
| 27. Spatial epidemiology and adaptive targeted sampling to manage the Chagas disease vector <i>Triatoma dimidiata</i>
B. K. M. Case, J.-G. Young , D. Penados, L. Hébert-Dufresne, and L. Stevens
PLOS Negl. Trop. Dis. 16, e0010436 | 2022 |
| 26. Impact and dynamics of hate and counter speech online
J. Garland, K. Ghazi-Zahedi, J.-G. Young , L. Hébert-Dufresne, and M. Galesic
EPJ Data Sci. 11, 3 | 2022 |
| 25. Clustering of heterogeneous populations of networks
J.-G. Young , A. Kirkley, and M. E. J. Newman
Phys. Rev. E 105, 014312 | 2022 |
| 24. Reconstruction of plant–pollinator networks from observational data
J.-G. Young , F. S. Valdovinos, and M. E. J. Newman
Nat. Commun. 12, 3911 | 2021 |
| 23. Hypergraph reconstruction from network data[§]
J.-G. Young , G. Petri, and T. P. Peixoto
Commun. Phys. 4, 135 | 2021 |
| 22. A clarified typology of core-periphery structure in networks
R. J. Gallagher, J.-G. Young , and B. Foucault Welles
Sci. Adv. 7, eabc9800 | 2021 |
| 21. Bayesian inference of network structure from unreliable data
J.-G. Young , G. T. Cantwell, and M. E. J. Newman
J. Complex. Netw. 8, cnaa046 | 2021 |

[§]Appears in the Focus Collection on Higher-order Interaction Networks

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 [¶]](#) 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](#)  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

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 (3)

- [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
- [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*
- [Symmetry-driven embedding of complex networks in hyperbolic space](#)
S. Lizotte, **J.-G. Young**, and A. Allard
arXiv:2406.10711

TEACHING AND MENTORING

Instructor

- STAT-6300: *Bayesian Statistics* F2021, F2022, F2023, F2024
- STAT-6990: *Statistical Network Analysis* S2022, S023
- CS-3993: *Independent Study: Machine Learning with graphs* F2023
- STAT-2510: *Applied Probability* F2024
- CSYS-6993: *Independent Study: Information, Physics, and Computation* F2024

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 2022–2024
- Ph.D. students:
 - ◊ William H. Thompson, University of Vermont 2024–
 - ◊ Simon Lizotte, Université Laval (co-direction with Antoine Allard) 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 2022–2024
 - ◊ Erik Weis, University of Vermont 2021–2023
 - ◊ Simon Lizotte, Université Laval (co-direction with Antoine Allard) 2020–2022
- Undergraduate students:
 - ◊ Erin Silver (Research Intern), University of Vermont Summer 2024
 - ◊ 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

- “Message passing for intervention design in networks.” 2024
QMDN24, Los Alamos, NM (invited talk)
- “Bayesian framework for inference on heterogenous waste-water networks.” 2024
NetSci 2024, Québec, Canada (contributed talk)
- “Complex or simple? Determining a contagion's type from observational data.” 2024
WDPCN24, São Paulo, Brazil (invited talk)
- “What can we learn from low-dimensional representations of networks?” 2024
 - ▷ NetSI, Boston MA, USA (invited seminar)
 - ▷ Interaction Data Lab, Paris, France (invited seminar)
- “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”¹¹ 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

- *Program Chair, NetSci 2024* (School and Conference on Network Science) 2024
- *Co-director, CNWW2023*, Complex Networks Winter Workshop, Québec, Canada 2023
- *Chair, CCSS23* (Contagion on Complex Social Systems) 2023
- *Organizer, SINM* (Statistical Inference for Network Models) 2021, 2022, 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

Service

- *AUR Maintainer, Several python packages* ongoing
- *Contributor, Several open-source projects* ongoing
- *Seminar chair, STAT@UVM* 2022–
- *Seminar chair, Vermont Complex Systems Center* 2021–2023
- *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* (34): Science Advances, Nature Communications, SIAM Review, Physical Review X, Physical Review Letters, Psychological Methods, PLOS Computational Biology, JMIR Public Health Surveillance, The Annals of Applied Statistics, 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, NPJ Complexity, Scientific Reports, PLOS Complex Systems, PLOS ONE, Palgrave Communications, Journal of Complex Networks, Physics Letter A, Chaos Solitons & Fractals, Entropy, Network Science, Animal Behaviour, Applied Network Science, Knowledge and Information Systems, 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 committees

- *Damin Zhu*, Statistics. Advisor: Jeffrey S. Buzas 2023
- *Michael Arnolds*, Complex Systems. Advisor: Peter Dodds 2023

¹¹ Outstanding poster award

- *Samuel Rosenblatt*, Computer Science. Advisor: Laurent Hébert-Dufresne 2024
- *Mariah Bourdreau*, Mathematics. Advisor: Laurent Hébert-Dufresne 2024
- *Nicolò Ruggieri* (ETH), Machine Learning and Network Science. Advisor: Caterina de Bacco 2024

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