

# JEAN-GABRIEL YOUNG

Assistant Professor

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

## ACADEMIC POSITIONS

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|--|-----------|
| • <i>University of Vermont</i> , Assistant Professor, <a href="#">Department of Mathematics and Statistics</a> * | 2021–     |
| • <i>Université Laval</i> , Affiliate Professor, <a href="#">Département de Physique</a>                         | 2020–     |
| • <i>University of Vermont</i> , Research Assistant Professor, <a href="#">Department of Computer Science</a>    | 2020–2021 |
| • <i>University of Michigan</i> , Postdoctoral Fellow, <a href="#">Center for the Study of Complex Systems</a>   | 2018–2020 |
| • <i>Université Laval</i> , Research Assistant, <a href="#">Group of Prof. Louis. J. Dubé</a>                    | 2012–2018 |

## EDUCATION

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

## SCHOLARSHIPS, GRANTS AND AWARDS

### Fellowships and Scholarships

- |   |      |
|---|------|
| • <i>Postdoctoral Fellowship in Studying Complex Systems</i> , James S. MacDonnell Foundation (\$200 000)                 | 2017 |
| • <i>Doctoral Research Scholarship</i> , <a href="#">Fonds de recherche du Québec – Nature et Technologies</a> (\$60 000) | 2014 |

### Grants

- |   |      |
|---|------|
| • <i>OVPR Express Grant</i> , <a href="#">University of Vermont</a> (\$3000, PI)                      | 2021 |
| • <i>YRNCS Bridge Grant</i> , <a href="#">Young Researcher Network On Complex Systems</a> (€1000, PI) | 2016 |

### Awards

- |   |      |
|---|------|
| • <i>FOSS Award</i> , 2021 Mining Software Repositories Conference  | 2021 |
| • <i>Zachary Karate Club Club</i> award   | 2021 |
| • <i>Best oral presentation award</i> , <a href="#">NERCCS 2020</a>   | 2020 |
| • <i>Board of Honour</i> (Highest overall mark award by all committee members), Ph.D thesis, Université Laval   | 2018 |
| • <i>Concours d'expression scientifique Pierre Amiot</i> , <a href="#">Physics Department, Université Laval</a> | 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 (27)

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
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

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

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

#### Peer-reviewed conference proceeding (5)

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.

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<sup>¶</sup>Editors' suggestion

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 (6)

- [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  
Based on: bioRxiv:2020/994343  
Under review, *Am. Nat.*
- [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  
Under review, *Nature*
- [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, E. A. Power  
arXiv:2112.11396  
Under review, *J. R. Stat. Soc. A*
- [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  
Submitted, *Evolution*
- [Hypergraph reconstruction from noisy data](#)  
S. Lizotte, **J.-G. Young**, and A. Allard  
arXiv:2208.06503  
Submitted, *Communication Physics*.
- [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

## TEACHING AND MENTORING

#### Instructor

- STAT-330: *Bayesian Statistics* F2021, F2022
- STAT-395: *Statistical Network Analysis* S2021

#### 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–
- Master's students:
  - ◊ Erik Weis, University of Vermont 2021–
  - ◊ Frederick Hall, University of Vermont 2021–
  - ◊ Simon Lizotte, Université Laval (co-direction with Antoine Allard) 2020–2022
- Undergraduate students:
  - ◊ Trevor Blanchard (Honors Thesis), University of Vermont AY 22/23

## INVITED TALKS AND SELECTED CONFERENCE CONTRIBUTIONS

- *"Uncertain Network Science"* 2021–2022
  - ▷ Channing Network Science Seminar, Boston MA, USA (invited seminar)
  - ▷ NERCCS 2022 conference, Buffalo, NY, USA (invited plenary)
  - ▷ University of Vermont — Seminar in Mechanical Engineering, Burlington VT, USA (invited seminar)
  - ▷ Central European University, Department of Network and Data Science (invited seminar)
- *"Which contributions count? Analysis of attribution in open source"* 2021
  - MSR2021, online (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>11</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

- *Satellite location organizer (UVM), NERCCS 2022* 2022
- *Organizer, SINM (Statistical Inference for Network Models)* 2021, 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–
- *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 (27): Science Advances, SIAM Review, Physical Review Letters, Physical Review X, Psychological Methods, PLOS Computational Biology, 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, 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
- *SIAM Workshop on Network Science (SIAM NS)* 2018, 2020

<sup>11</sup> Outstanding poster award



## 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 |