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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

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[*]Inference and complex networks
[†]Of community structure detection on complex networks
[‡]Scientific communication prize

PUBLICATIONS

Peer-reviewed journals (20)

20. Bayesian inference of network structure from unreliable data
    J.-G. Young, G. T. Cantwell and M. E. J. Newman
    J. Complex. Netw. (in press)

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   2019
    rejection algorithm
    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-Onges, 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   2018
    configuration model networks
    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

[§]Editors' suggestion

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 (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
   ACL 2020, Proceedings of the Fourth Workshop on Online Abuse and Harms, pp. 102–112.

1. Connected graphs with a given degree sequence: 2020
   Efficient sampling, correlations, community detection and robustness
   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.

Preprints in submission (7)

- 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.*

- 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)
  ▷ 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"*[¶]   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 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