Laura Symul, PhD

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Academic Experience

4.2018 - curr.	**Postdoctoral Fellow** at **Stanford University**. Principal mentor: Pr. Holmes (Stanford U., Statistics) Additional mentors: Pr. Relman (Stanford U., Microbiology), Pr. Hillard (Stanford U., OB-GYN) My current research focuses on (designing methods for) understanding the impact of the menstrual cycle as a biological rhythm on various aspect of health. This includes multi-omics longitudinal analyses of the temporal dynamics of the vaginal microbiome and a digital health component in which self-tracked data from menstrual cycle apps are used. I developed statistical methods based on hidden (semi-)Markov models for labeling these self-reported time series which have high rates of non-random missingness, and analysed these data for digital epidemiology studies and personalized health applications. Selected publications: *Assessment of Menstrual Health Status and Evolution through Mobile Apps for Fertility Awareness.* npg Digital Medicine, July 16 2019. *Labeling self-tracked menstrual health records with hidden semi-Markov models* IEEE Journal of Biomedical and Health Informatics, 2021. *Sub-communities of the vaginal ecosystem in pregnant and non-pregnant women.* pre-print, 2021. *Unmasking Seasonal Cycles in Human Fertility: How holiday sex and fertility cycles shape birth seasonality* pre-print, 2020.
6.2017-3.2018	**Research Scientist** at **EPFL** in the lab **Digital Epidemiology**. Mentor: Pr. Salathé Initialization of my current research project: obtained ethics approval, established research partnership with 3 org. providing menstrual tracking apps to obtain datasets, established a Data Management Plan and preprocessed the acquired data.
2014 - 2017	See end of CV for my professional experience during my academic career break.

Education

3.2010 - 11.2013	**Ph.D. in Computational Biology**, **EPFL** (École Polytechnique Fédérale de Lausanne), Switzerland. Public PhD defense held in Lausanne, EPFL on November 1st, 2013. Supervision: Pr. Naef (naef-lab.epfl.ch) Title: *Kinetic analysis of transcriptional and post-transcriptional processes during circadian cycles.* My doctoral work focused on the regulation of gene expression by the circadian clock. It relied on statistical analyses of periodic signals identified in multi-omics datasets and required the establishment of models describing variations in transcript abundance. While transcript degradation rates are not directly measurable, our models enabled us to infer the degradation rates from transcript production and accumulation rates, which are measurable.
Spring 2012	**Visiting student at the Weizmann Institute of Science** (Israel) Dpt of Physics of Complex Systems Mentoring by Dr. A. Zeisel and Pr. E. Domany
2-6.2012	Audited a selection of classes from the **Scientific Illustration** program at **ZHdK, CH**.
9.2007-6.2009	**Master in Engineering, Life Sciences & Applied Math (ULiege, Belgium)** *Summa cum laude.*
1-6.2009	**Master Project: "Circadian Rhythms : robustness and entrainment".** Supervision : Pr. Hasler, Dr. Koeppl (EPFL) & Pr. Sepulchre (ULg). *Grade: 5.5/6 (EPFL) - 17/20 (ULg).*
9.2004-6.2007	**Bachelor in Engineering (University of Liege, Belgium)** *Cum laude.*

Grants and Fellowships

9.2019-9.2020	**Stanford Clinical Data Science Fellowship** (12 months' salary).
4.2018-9.2019	**SNSF Postdoc Early Mobility fellowship**, Stanford University (18 months' salary).
9.2009	**IST-EPFL Joint Doctoral Initiative fellowship in bio-robotics** (3 years' salary) - *declined*
4.2009	**Erasmus grant** for masters' research project at EPFL

Institutional Responsibilities

Member of the IAPMD Community Coalition (PMDD patient-centered focus group) (2021)

Member of the Stanford SURPAS **Diversity and Inclusion** committee (1.2019 - 1.2020)

Organizer of the 2.2018 public symposium "Menstrual Health & New Technologies" at UNIL, Anthropos Café as part of the "Interface Science-Société" program lead by A. Kauffmann.

President (2007-2008) and administrator of student association "Centrale des Cours" (non-profit, Liège University)

Supervision of junior researchers

2021	Supervision of **Charlyne Burky**'s Master project (Stanford/EPFL)
2019-2020	Supervision of **Fiorella Wever**'s Master thesis project (Stanford/Universiteit van Amsterdam)
4-10.2018	Supervision of **Peggy Hsieh**'s Master project (Stanford/Columbia University)
2010-2013	Supervision of **Cedric Gobet**'s Bachelor, Master1 and Final Master projects (EPFL)
1012	Supervision of **Mathieu Quinodoz**'s Bachelor project of (EPFL)

Teaching Activities

02.2021	**Invited lecturer** for "Applications of Machine Learning in Global Health", graduate course of Prof. Nsoesie, Boston University.
2020	**Teaching assistant** of Prof. Goodman for "Diversity and Inclusion in STEMM", Stanford.
07.2019	**Co-lecturer** for graduate course Modern Statistics for Modern Biology of Prof. Holmes, Stanford.
2014 - 2017	**Workshop instructor** for my "Data Visualisation and Scientific Illustration" workshops (30+) in universities and R&D departments throughout Switzerland.
2010-2013	**Teaching assistant** for Prof. Naef's course "Math. & Computational Models in Biology" (EPFL).
2009	**Principal teaching assistant** for Prof. Sepulchre's course "Linear systems and control" (ULiege).
2006-2008	**Teaching assistant** for course "Algorithms" (ULg).

Membership (Reviewing)

2019-curr.	Invited reviewer for npj Digital Medicine, Journal of Women's Health, Scientific Data.
10.2013	Assisted Prof. Naef in reviewing for Cell Reports

Organization of conference

2.2018	**Organizer** of the symposium "Menstrual Health & New Technologies" at UNIL, Anthropos Café as part of the "Interface Science-Société" program lead by A. Kauffmann.

Prizes and Awards

2.2021	**Atmo research fellowship**
4.2019	**Clue Research Innovation Program** award.
6.2013	**1st prize** of poster competition at the SystemsX days.
2009	**Award** for the best master project.

Publications

2021	**L. Symul**, S. Holmes *Labeling self-tracked menstrual health records with hidden semi-Markov models* IEEE Journal of Biomedical and Health Informatics, Sept 2021
2021	F. Wever, T.A. Keller, V. Garcia, **L. Symul** *As easy as APC: Leveraging self-supervised learning in the context of time series classification with varying levels of sparsity and severe class imbalance* NeurIPS 2021 Self-Supervised Learning workshop, also accepted at the WiML NeurIPS workshop
2019	**L. Symul**, K. Wac, P. Hillard, M. Salathé *Assessment of Menstrual Health Status and Evolution through Mobile Apps for Fertility Awareness.* npg Digital Medicine, July 16 2019
2018	B. Liu*, Y. Wu*, S. Shi*, D. Thomas, **L. Symul**, E. Pierson and J. Leskovec *Predicting pregnancy using large-scale data from a women's health tracking mobile application.* Accepted as a Web conference short paper and as a NeurIPS ML4H poster paper.
2018	G. Lazzari, Y. Jaquet, D. Kebaili, **L. Symul**, M. Salathé, *FoodRepo: an open database of barcoded food products.* Frontiers in Nutrition, July 4 2018
2018	J.Wang*, **L. Symul***, C. Gobet, J. Sobel, S. Lück, P. O. Westermark, N. Molina, F. Naef *Circadian clock –dependent and –independent post-transcriptional regulation underlies temporal mRNA accumulation in mouse liver.* PNAS, Feb 2018
2014	J. Hoffmann, **L. Symul**, A. Shostak, T. Fischer, F. Naef and M. Brunner *Non-Circadian Expression Masking Clock-Driven Weak Transcription Rhythms in U2OS Cells* Plos One, July 2014
2013	C. Jouffe, G. Cretenet, **L. Symul**, E. Martin and F. Atger et al. *The Circadian Clock Coordinates Ribosome Biogenesis* Plos Biology, vol. 11, num. 1, 2013.
2012	G. Le Martelot*, D. Canella*, **L. Symul***, E. Migliavacca* and F. Gilardi et al. *Genome-Wide RNA Polymerase II Profiles and RNA Accumulation Reveal Kinetics of Transcription and Associated Epigenetic Changes During Diurnal Cycles* Plos Biology, vol. 10, num. 11, 2012.
2010	M. Hafner, P. Sacré, **L. Symul**, R. Sepulchre and H. Koeppl. *Multiple feedback loops in circadian cycles: robustness and entrainment as selection criteria* Proceedings of the Seventh International Workshop on Computational Systems Biology, WCSB 2010.

* shared co-first authorship.

Pre-prints and submitted manuscripts

2021	**L. Symul**, P. Jeganathan, E. K. Costello, M. France, S. Bloom, J. Ravel, D. Kwon, D. Relman, S. Holmes *Sub-communities of the vaginal ecosystem in pregnant and non-pregnant women.*
Submitted 2021	J. Fukuyama*, K. Sankaran*, **L. Symul*** *Multiscale Analysis of Count Data through Topic Alignment* (in revision) submitted at Biostatistics
Submitted 2020	**L. Symul**, P. Hsieh, A. Shea, C.R.C. Moreno, D. Skene, S. Holmes, M.E. Martinez *Unmasking Seasonal Cycles in Human Fertility: How holiday sex and fertility cycles shape birth seasonality* (in revision) submitted at Nature Communications

* shared co-first authorship.

Manuscript in progress

2021	**L. Symul**, T.A. Eisenlohr-Moul, T. Hardy, P. Hillard, S. Holmes *Longitudinal characterization of menstrual breast pain symptoms from large-scale self-tracked data.*
2021	H. Héritier, C. Allémann, E. Boliger, **L. Symul**, E. Ugurlu-Baud, G. Rousseau-Leupin, V. Boulanger, D. Kebaili, T. Salzmann, N. Froidevaux, G. Hugon, P. de Verteuil, S. Bettinelli-Ricardi Y. Jaquet, M. Salathé *Dietary Patterns of a Swiss Cohort using the MyFoodRepo App, a Novel Dietary Assessment Tool*

Software

2021	alto is an R package for aligning topics across a collection of LDA models.
2021	cpass is an R package for the application of the C-PASS (Carolina Premenstrual Assessment Scoring System) procedure for the diagnosis of PMDD (Pre-Menstrual Dysphoric Disorder) and MRMD (Menstrually Related Mood Disorder).
2020	HiddenSemiMarkov is an R package for specifying hidden semi-Markov models, simulating sequences, fitting models to specific observation sequences and predicting the sequence of hidden states from observation sequences. It is especially designed to model multivariate sequences with frequent missing data. The probabilities of missing data may be state- or variable-dependent and specified manually or learned from observation sequences.

Selected Talks

2021	*Automating Dimensional Assessment of Premenstrual Disorders - Introducing the CPASS R Package* IAPMD Cycle Science Webinar
2020	*Labeling self-tracked menstrual health records with hidden semi-Markov models* Invited speaker at the AMLD 2020 conference, health track.
2018	*Exploring human birth seasonality via menstrual cycle tracking apps* Invited participant and speaker at the Wild Clocks meeting, MPI Seewiesen, October 2018.
2018	*Digital Tools for Menstrual Health*, co-presenting with Prof. Hillard Stanford Center for Digital Health, April 2018.

Outreach activities

2021	Invited speaker at "Tech4Eva" meeting, Lausanne, Switzerland
2021	Invited speaker at "**Figure1a**" career event, Lausanne, Switzerland
2021	Moderator at the "**Femtech Summit**", ETH Zürich
2019-2020	Speaker at "**Women in data sciences**" events at local community colleges (De Anza College, San Jose State University, ...)
2018-2019	Invited speaker at **outreach events** in the **San Francisco Bay Area** (Red Vic Talks, Meet-up,...)
2018	Organized a mini-symposium at Unil, Anthropos Café as part of the "Interface Science-Societé" program lead by A. Kauffmann on the theme of "**Menstrual Health & New Technologies**".
2016, 2017	Mentor and speaker at the **Exposure Science Film Hackathon**.
2017	Speaker at the **ScienceComm'17 India**

Media coverage

2021	Le Temps. La pandémie influence (aussi) les cycles menstruels [in french]
2020	The Guardian. Sex at Christmas tends to be off menu until fireworks at new year – study
2020	Le Temps, forum des 100. Portrait of 100 personalities in French Switzerland in 2020 [in french]
2018	RTS TV interview "Le Rendez-Vous Santé. Les règles et leurs conséquences. [in french]
2018	RTS Couleur 3 Radio interview (between 1h28 et 1h37). [in french]
2018	Newspaper article in La Liberté: "Suivre ses cycles avec application". [in french]

Academic Career Break and Professional Experience

3.2016-4.2017	**Design & Scientific communication** specialist at the **World Economic Forum**, Programme team. — Preparation & delivery of "science sessions" at AMNC16 (China) and the Annual Meeting 2017 (Davos) — Experience in multi-stakeholder **project management**. Training in **positive influence skills**.
6.2014 - 12.2015	**Data Analysis & Visualisation Expert** at **Quantum** - Data science consultant. — Design and implementation of **data analysis strategies** for a Swiss electricity grid provider. — Deployment of **graph databases** to store & analyse data from a major airline company.
1-4.2014	**Scientific Illustration & academic publishing** intern at **EMBO Press**.
2013 - 2018	**Freelance Scientific Illustrator & Instructor** - www.illustratedscience.net — Visualization services and workshops (25+) about data visualisation and scientific illustration. — Selected speaker at ScienceComm 2014 and ScienceComm India 2017 — Customers: publishing groups such as Wiley-Blackwell, Swiss museums, academic labs, etc.

References

Prof. Susan Holmes, Stanford University, Statistics, `susan@stat.stanford.edu`. Principal postdoctoral mentor

Prof. Marcel Salathé, EPFL, Digital Epidemiology, `marcel.salathe@epfl.ch`. Postdoctoral mentor

Prof. Felix Naef, EPFL, Computational Biology, `felix.naef@epfl.ch`. Doctoral advisor

Prof. David Relman, Stanford University, Medicine - Infectious Diseases, `relman@stanford.edu` . Collaborator

Prof. Tory Eisenlohr-Moul, University of Illinois at Chicago, Clinical psychology, `temo@uic.edu` . Collaborator

Prof. Paula Hillard, Stanford University, Obstetrics and Gynecology, `phillard@stanford.edu` . Collaborator

Prof. Micaela Martinez, Emory University, Biology, `micaela.elvira.martinez@emory.edu` . Collaborator

Prof. Katarzyna Wac, University of Geneva, Quality of Life Technologies, `katarzyna.wac@unige.ch`. Informal mentor