Alexandre Champagne-Ruel

Ph.D candidate – astrophysics

Université de Montréal

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Research interests

Major evolutionary transitions, origin of life, complex systems, information theory.

Education

Ongoing	**Ph.D. Astrophysics** Average: 4.1/4.3 Advisor: Paul Charbonneau	Université de Montréal
2020	**M.Sc. Astrophysics** Average: 4.0/4.3 Thesis: *From game theory to exobiology – the emergence of cooperation as a critical phenomenon* (link) Advisor: Paul Charbonneau	Université de Montréal
2018	**B.Sc. Physics** Average: 3.7/4.3 (excellence award)	Université de Montréal
2012	**B.Sc. Philosophy** Average: 3.6/4.3	Université de Montréal

Scholarships and awards

2021	Best poster award (250$)	Université de Montréal
2021	Student initiative project (2 000$)	Université de Montréal
2020	Scholarship for transition to PhD (2 500$)	Université de Montréal
2020	Excellence award (1 000$)	Université de Montréal
2018	Excellence award (10 000$)	Université de Montréal
2017	John Low Brebner scholarship (2 500$)	Regroupement Québécois sur les Matériaux de Pointe
2014	Excellence scholarship (4 000$)	Université du Québec à Montréal
2011	Student initiative project (1 000$)	Université de Montréal

Skills

Programming: Python, C++, Fortran, LaTeX, MatLab, Assembly
Operational: Machine learning, Git, Linux

Publications

Preprints:

Alexandre Champagne-Ruel and Paul Charbonneau. "A Mutation Threshold for Cooperative Takeover". Preprint. 2021.

Papers:

Simon Gelin, **Alexandre Champagne-Ruel**, and Normand Mousseau. "Enthalpy-Entropy Compensation of Atomic Diffusion Originates from Softening of Low Frequency Phonons". In: *Nature Communications* 11.1 (1 Aug. 7, 2020), p. 3977.

Conferences:

Alexandre Champagne-Ruel. "Mutation Favors the Emergence of Cooperation". Talk. Life and Space Poland. 2021.

Alexandre Champagne-Ruel. "La Criticalité Dans Un Système Évolutif Artificiel". Talk. Centre de Recherche En Astrophysique Du Québec (CRAQ) - Rencontre Annuelle. 2019.

Posters:

Alexandre Champagne-Ruel. "Mutations Promote Cooperation in an Evolutionary Setting". Poster. Gordon Research Conference. 2022.

Alexandre Champagne-Ruel. "Mutations Promote Cooperation in an Evolutionary Setting". Poster. Gordon Research Seminar. 2022.

Alexandre Champagne-Ruel. "Les Mutations Favorisent La Coopération En Contexte Évolutif". Poster. Centenaire, Département de Physique, Université de Montréal. 2021.

Alexandre Champagne-Ruel. "Mutation Favors the Emergence of Cooperation". Poster. Molecular Origins of Life Munich. 2021.

Alexandre Champagne-Ruel. "Mutations Promote Cooperation in an Evolutionary Setting". Poster. XIXth ISSOL Conference. 2021.

Alexandre Champagne-Ruel. "Self-Organized Criticality : A Prelude to Avalanche Models of Solar Flares". Poster. Space Climate 7 Symposium. 2019.

Professional experiences

2021 Teaching assistant – *Introduction to astrobiology* Université de Montréal

Memberships

Center for Research in Astrophysics of Québec (http://craq-astro.ca/)
Canadian Association of Physicists (https://www.cap.ca/)
Canadian Astronomical Society (https://casca.ca/)
Origin of Life Early-career Network (https://oolen.org/)
International Society for the Study of the Origin of Life (https://issol.org)