

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

PUBLICATIONS

Under review:

Published:

A. Champagne-Ruel and P. Charbonneau, “A Mutation Threshold for Cooperative Takeover”, [Life](#) **12**, 254 (2022).

S. Gelin, **A. Champagne-Ruel**, and N. Mousseau, “Enthalpy-entropy compensation of atomic diffusion originates from softening of low frequency phonons”, [Nature Communications](#) **11**, 3977 (2020).

Conferences:

A. Champagne-Ruel, “Mutation Favors the Emergence of Cooperation”, Talk, Life and Space Poland, 2021.

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

Posters:

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

A. Champagne-Ruel, “Mutation Favors the Emergence of Cooperative Behavior”, Poster, Molecular Origins of Life Munich, 2021.

A. Champagne-Ruel, “Mutations Promote Cooperation in an Evolutionary Setting”, Poster, XIXth ISSOL Conference, 2021.

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

EDUCATION

| | | |
|---------|--|------------------------|
| ongoing | Ph.D. Astrophysics ADVISOR: Paul Charbonneau | UNIVERSITÉ DE MONTRÉAL |
| 2020 | M.Sc. Astrophysics THESIS: <i>From game theory to exobiology – the emergence of cooperation as a critical phenomenon</i> (link) ADVISOR: Paul Charbonneau | UNIVERSITÉ DE MONTRÉAL |
| 2018 | B.Sc. Physics | UNIVERSITÉ DE MONTRÉAL |
| 2012 | B.Sc. Philosophy | UNIVERSITÉ DE MONTRÉAL |

SCHOLARSHIPS AND AWARDS

| | | |
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| 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\$) | RQMP |
| 2014 | Excellence scholarship (4 000\$) | UNIVERSITÉ DU QUÉBEC À MONTRÉAL |
| 2011 | Student initiative project (1 000\$) | UNIVERSITÉ DE MONTRÉAL |

SKILLS

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| Languages: | PYTHON/NUMPY/SCIPY/MATPLOTLIB, C/C++, FORTRAN, \LaTeX , MATLAB, ASSEMBLY, BASH SCRIPTING |
| Tools: | MACHINE/STATISTICAL LEARNING, WEB DEVELOPMENT, NETWORK SECURITY |
| Operational: | GIT, LINUX, PARALLEL/HIGH PERFORMANCE COMPUTING |

CONFERENCES & WORKSHOPS

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| 2021 | XIXth ISSOL conference | INTER. SOC. FOR THE STUDY OF THE ORIGIN OF LIFE |
| 2021 | Life and Space Conference | POLISH ASTROBIOLOGICAL SOCIETY |
| 2021 | Molecular Origins of Life Munich | CRC 235 EMERGENCE OF LIFE |
| 2019 | Space Climate 7 | UNIVERSITÉ DE MONTRÉAL |
| 2019 | Annual Meeting | CENTER FOR RESEARCH IN ASTROPHYSICS OF QUÉBEC |

PROFESSIONAL EXPERIENCES

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| 2022– | Member of the Executive Board | ORIGIN OF LIFE EARLY-CAREER NETWORK |
| 2021–2022 | Conference organizer – <i>OoLEN Annual Meeting</i> | ORIGIN OF LIFE EARLY-CAREER NETWORK |
| 2021–2022 | Teaching assistant – <i>Introduction to astrobiology</i> | UNIVERSITÉ DE MONTRÉAL |
| 2018–2019 | Local organizing committee – Space Climate 7 | UNIVERSITÉ DE MONTRÉAL |
| 2018–2022 | Tutoring – undergraduate level | 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/>)
Complex Systems Society (<https://cssociety.org/>)