

I am a computational astrophysicist, interested in how we can explain observed features of Type I X-ray Bursts, the most common transient in the high-energy sky, using theoretical models and numerical simulations of neutron star surfaces. I employ widely used astrophysical software (MESA, MAESTROeX, Athena++), and utilize high-performance computing clusters for massively parallel calculations. I enjoy creating insightful data visualizations and presenting my results, both to physics peers and for outreach.

## EDUCATION

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### Ph.D. — Physics

2020 - 2024, McGill University, Advisor: Prof. Andrew Cumming

Thesis: Convection and Outflows from Accreting Neutron Stars during Thermonuclear Flashes

### M.Sc. — Physics

2018 - 2020, McGill University, Advisor: Prof. Andrew Cumming

Thesis: [Regimes of photospheric radius expansion driven by high luminosities in Type I X-ray bursts](#)

### B.Eng. — Engineering Physics

2014 - 2020, École Polytechnique de Montréal

Internships in neuroscience & biomedical physics research. 3.85/4 GPA.

## SCHOLARSHIPS & AWARDS

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2024	<a href="#">McGill Physics graduate teaching award</a>
2023	<a href="#">CRAQ International Internship Scholarship (at Stony Brook University, 10k CA\$)</a>
2021-2024	<a href="#">NSERC Doctoral Fellowship (63k CA\$)</a>
2018-2020	<a href="#">FRQNT Master's Fellowship (35k CA\$)</a>
2018	<a href="#">IVADO Data Science Research Scholarship (7k CA\$)</a>
2016	<a href="#">NSERC Undergraduate Research Internship Scholarship (3k CA\$)</a>

## PRESENTATIONS

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### Invited talks

Sep 2024	Seminar, Institut de Recherche en Astrophysique et Planétologie, Toulouse	France
Nov 2023	Astronomy seminar, Michigan State University	USA
May 2023	Geophysical/Astrophysical fluid dynamics seminar, CU Boulder	USA
Nov 2023	Stars & Compact Objects group meeting, Flatiron CCA, NYC	USA

### Contributed talks

May 2024	CRAQ Annual Meeting, St-Alexis-des-Monts. <i>Best student talk prize.</i>	Canada
May 2023	Frontiers Meeting for Nuclear Astrophysics, East Lansing, MI	USA

May 2022	CRAQ Annual Meeting, Magog	Canada
Mar 2022	AAS High Energy Astrophysics Meeting, Pittsburgh, PA	USA
June 2019	Lorentz Center workshop on X-ray bursts, Leiden	Netherlands
May 2019	CRAQ Annual Meeting, St-Alexis-des-Monts	Canada

## OUTREACH

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- June 2024 Speaker at [annual public astronomy conference](#) at Observatoire du Mont-Mégantic
- March 2021 Speaker at Vanderbilt Dyer Observatory [Virtual Star Party](#)
- 2021 Lead Coordinator of AstroMcGill outreach group
- 2018-2020 Public lecture coordinator for AstroMcGill

## SERVICE

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- 2021-2023 CRAQ (Centre de Recherche en Astrophysique du Québec) Student representative
- 2023 Referee, Astronomy & Astrophysics
- 2019-2022 Mentor for undergraduate and new graduate students, McGill Physics

## TEACHING

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At McGill University: Graduent Student Instructor

- PHYS642: Radiative Processes in Astrophysics (W2022,W2024). 2 guest lectures.
- PHYS512: Computational Physics with Applications (F2023).
- PHYS521: Astrophysics (F2022). 1 guest lecture.
- PHYS251: Honours Classical Mechanics (F2019,F2020)
- PHYS142: Electromagnetism and Optics (W2019,W2020)
- PHYS131: Mechanics and Waves (F2018)

## SKILLS

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Programming (\* = proficient)

<b>Languages</b>	*python, Matlab, Fortran 90, C++, *Excel, bash
<b>Tools</b>	NumPy, SciPy, scikit-learn
<b>Visualization</b>	*Matplotlib, yt
<b>Version control</b>	git, <a href="#">github</a>
<b>Markup</b>	* $\text{\LaTeX}$ , Markdown, HTML
<b>Development</b>	*vim, vscode, jupyter
<b>Operating systems</b>	Unix, Linux

Interpersonal: Technical writing & presenting, Teaching, Leadership

Spoken languages: English, French (native)

Other: First aid, certified canoeing instructor

## PUBLICATIONS

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### Peer-reviewed Journal Articles

- **S. Guichandut**, M. Zingale, A. Cumming (2024). *Hydrodynamical Simulations of Proton Ingestion Flashes in Type I X-Ray Bursts*, *ApJ*, 975, 250
- **S. Guichandut**, A. Cumming (2023). *The Imprint of Convection on Type I X-Ray Bursts: Pauses in Photospheric Radius Expansion Lightcurves*, *ApJ*, 954, 11
- **S. Guichandut**, A. Cumming, M. Falanga, Z. Li, M. Zamfir (2021). *Expanded Atmospheres and Winds in Type I X-Ray Bursts from Accreting Neutron Stars*, *ApJ*, 914, 49

### Submitted

- M. Zingale, K. Bhargava, R. Brady, Z. Chen, **S. Guichandut**, E.T. Johnson, M. Katz, A. Smith Clark (2024). *The Challenges of Modeling Astrophysical Reacting Flows*, [arxiv:2411.12491](https://arxiv.org/abs/2411.12491)
- F. Barra, D. Barret, C. Pinto, T. Di Salvo, N. Weinberg, **S. Guichandut**. *Line detections in photospheric radius expansion bursts from 4U 1820-303*. [arxiv:2501.01488](https://arxiv.org/abs/2501.01488)

### In preparation

(\* = I mentored this student)

- **S. Guichandut**, M. Zingale, A. Cumming. *Hydrodynamic Simulations of Proton-Ingestion Flashes in Type I X-ray Bursts. II. 3D compressible simulations*.
- **S. Guichandut**, \*B. Herfray, A. Cumming. *Metal Ejection in Helium-Triggered Type I X-ray bursts*.
- \*S. Casten, **S. Guichandut**, A. Cumming, E. Brown. *Weak X-ray Bursts on Slowly Accreting Neutron Stars*.
- \*N. Baz-Pérez, A. Cumming, D. Page, M. Nava-Callejas, **S. Guichandut**. *Post-Supernova Accretion of Light Elements onto a New-Born Neutron Star and NS 1987A*.

## REFERENCES

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### Prof. Andrew Cumming

McGill University, Montréal, Canada  
Department of Physics and Trottier Space Institute  
[andrew.cumming@mcgill.ca](mailto:andrew.cumming@mcgill.ca)

### Prof. Michael Zingale

Stony Brook University, NY, USA  
Department of Physics and Astronomy  
[michael.zingale@stonybrook.edu](mailto:michael.zingale@stonybrook.edu)

### Prof. Edward Brown

Michigan State University, USA  
Department of Physics and Astronomy  
[browned@msu.edu](mailto:browned@msu.edu)