

Luca Sciarini

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PhD student in Astrophysics



Profile

Third year PhD student in stellar astrophysics at the Department of Astronomy of the University of Geneva. Physics bachelor degree at EPFL, astrophysics master degree at UNIGE. I am interested in massive stars and multiple systems, particularly in understanding how interactions such as tides and mass transfer drive their evolution, and the role of the internal physics of the stellar components in shaping these interactions.

Education

- Dec 2022 – Present **PhD in massive multiple systems modeling**, *Department of Astronomy, University of Geneva, Geneva, Switzerland*
Specializing in massive binary and triple systems modeling under the supervision of Prof. Sylvia Ekström and Dr. Patrick Eggenberger, main developer of a binary version of the GENeVA Evolutionary Code (GENEC).
Doctoral school: *Physics Applications of AI*, Unige, 5 ECTS, *Machine learning applied to gravitational waves detection*, Liège summer school, 2 ECTS, *From stars to planets in the space-based photometry era*, Saas-Fee Advanced Course 2024, 4 ECTS.
Project I: *Dynamical Tides in Binaries - Inconsistencies in the implementation of Zahn's prescription*. Published letter in A&A.
Project II: *Detailed Simulations of Massive Hierarchical Triple Star Systems - Exploring the impact of the stellar physics on the evolutionary pathways of massive hierarchical triple systems*, in collab. with Prof. Silvia Toonen's group (University of Amsterdam). Published paper in A&A. Awarded the "Prix Plantamour-Prévost 2025".
Project III: *Chemical evolution of close massive binaries - tidally-enhanced or tidally-suppressed mixing?* Submitted paper in A&A, minor revisions.
- Sept 2020 – July 2022 **Astrophysics Master**, *Department of Astronomy, University of Geneva, Geneva, Switzerland*
120 ECTS program, awarded the "Prix de l'Observatoire 2022" (best Astrophysics master grade, 5.8/6.0).
Specialization: *From stars to the Universe*: advanced courses including *Stellar Structure and Evolution*, *Cosmology*, *High Energy Astrophysics*, *Spectroscopic diagnostics in Astrophysics*.
Astrophysics Lab I: *Numerical simulation of a free fall collapse*, supervised by Prof. Georges Meynet and Dr. Devesh Nandal.
Astrophysics Lab II: *The distance scale in the Universe: The zero point of the luminosity period relationship of the Cepheids with Gaia*, supervised by Dr. Laurent Eyer.
Master Thesis: *Explosive nucleosynthesis of first generation stars*, supervised by Prof. Georges Meynet and Prof. Sylvia Ekström.
- Aug 2019 – July 2020 **SEMP Exchange Program**, *Faculty of Science and Technology, University of Uppsala, Uppsala, Sweden*
Third year exchange program, completed nine courses across Physics and Astrophysics, including four advanced courses: *Advanced Quantum Mechanics*, *Classical Electrodynamics*, *Plasma physics*, *Gravitation & Cosmology*, final grade 4.83/5.0.
- Sept 2017 – July 2020 **Physics Bachelor**, *Faculté des sciences de base, Ecole polytechnique fédérale de Lausanne (EPFL), Lausanne, Switzerland*
180 ECTS program, graduated with a final grade of 5.19/6.0.

Work Experience

- Jan 2024 – Present **Bachelor and Master students supervision**, *Department of Astronomy, University of Geneva, Geneva, Switzerland*
- Dec 2022 – Present **Science outreach**, *Department of Astronomy, University of Geneva, Geneva, Switzerland*
Public or group observations, virtual (3D) observations, visits of the Observatory of Geneva.

- Feb 2022 – Jan 2023 **Physics, Mathematics and Computer Science teacher**, *Institut Privé Voltaire (INPV)*, Chavannes-près-Renens, Switzerland
- Dec 2021 – Present **Teaching assistant**, *Department of Astronomy, University of Geneva*, Geneva, Switzerland

Presentations and Posters at International Conferences

- Sept 2025 **Apsidal motion in O-star binaries: GENE models put to the k_2 -test (presentation)**, *IAUS 402: Massive stars across redshifts in the era of JWST and large surveys*, Universidad Nacional Autónoma de México (UNAM), Ensenada, Mexico
- Sept 2025 **Chemical evolution of close massive binaries - tidally-enhanced or tidally-suppressed mixing? (poster)**, *IAUS 402: Massive stars across redshifts in the era of JWST and large surveys*, Universidad Nacional Autónoma de México (UNAM), Ensenada, Mexico
Link https://drive.google.com/file/d/1rPPX-awJ1epNPVJ76wBuzEa_jWP79d1H/view?usp=sharing
- July 2025 **Chemical evolution of close massive binaries - tidally-enhanced or tidally-suppressed mixing? (presentation)**, *Binary Stars in the Space Era*, Keele University, Keele, UK
- July 2025 **Detailed simulations of massive hierarchical triple-star systems - Exploring the impact of the stellar physics on the evolutionary pathways of massive hierarchical triple systems (poster)**, *Binary Stars in the Space Era*, Keele University, Keele, UK
Link <https://drive.google.com/file/d/144mRI69VJ6fmjJhqQPH50mBKdtlixL0R/view?usp=sharing>
- Oct 2024 **Observational Phenomenology - What the models need to reproduce (online presentation)**, *IAU G2 commission - Massive stars online seminar series 1*
Link <https://www.youtube.com/watch?v=dlax3jfURCw>
- July 2024 **Detailed simulations of massive hierarchical triple-star systems - On the impact of the single star physics on the evolution of massive hierarchical triple systems (presentation)**, *41st Liège International Astrophysical Colloquium: The Eventful Life of Massive Star Multiples*, University of Liège, Liège, Belgium
- July 2024 **Dynamical tides in binaries - Inconsistencies in the implementation of Zahn's prescription (poster)**, *41st Liège International Astrophysical Colloquium: The Eventful Life of Massive Star Multiples*, ULiège, Liège, Belgium
Link <https://drive.google.com/file/d/1Lm19WBndoXewtnZRfRCPL1Gz4VkuHT6L/view?usp=sharing>
- July 2023 **On the impact of the physical assumptions for the transport of angular momentum during a mass transfer episode (poster)**, *3,2,1: Massive Triples, Binaries and Mergers 2023*, KU Leuven, Leuven, Belgium
Link <https://fys.kuleuven.be/ster/events/conferences/2023/massivebinaries2023/posters/luca-sciarini-poster.pdf>

Workshops and Summer Schools

- Sept 2025 **XShooter workshop**, *Universidad Nacional Autónoma de México (UNAM)*, Ensenada, Mexico
- July 2024 **Machine learning applied to gravitational waves detection**, *Liège summer school*, ULiège, Liège, Belgium
- Feb 2024 **From stars to planets in the space-based photometry era**, *Saas-Fee Advanced Course 2024*, *Swiss Society for Astrophysics and Astronomy (SSAA)*, Saas-Fee, Switzerland
- June 2022 **AMUSE (Astrophysical MULTipurpose Software Environment) summer school**, *Department of Astronomy, University of Geneva*, Geneva, Switzerland
- Oct 2021 **STAREX (STARs at the EXtreme) workshop**, *Château Mercier*, Sierre, Switzerland

Publications

- Oct 2025 **Apsidal motion in O-star binaries: GENE rotating binary models put to the k_2 -test**, *Rosu, S., Sciarini, L., Ekström, S., Hirschi, R.*, 2025arXiv251026306R.
- Oct 2025 **One century data of τ CMa: a (2+1)+1 system with a short-period overcontact binary and an eccentric intermediate orbit with probably no apsidal motion**, *Rosu, S., Maíz Apellániz, J., Sciarini, L., Gamen, R. C., Molina-Calzada, J. A., Holgado, G., Barbá, R. H.*, 2025arXiv251016202R.

- July 2025 **Reverse mass transfer and rejuvenation in the massive contact system**, Qi, S., Song, H.-F., Meynet, G., Maeder, A., Ekström, S., **Sciarini, L.**, Zhang, R., Qin, Y., Zhan, Q., 2025A&A...699A.178Q.
- June 2025 **Detailed Simulations of Massive Hierarchical Triple Star Systems - Exploring the impact of the stellar physics on the evolutionary pathways of massive hierarchical triple systems**, **Sciarini, L.**, Ekström, S., Kummer, F., Rieder, S., Bruenech, C., Toonen, S., and Farrell, E., 2025A&A...698A.240S.
- Jan 2025 **Evolving massive stars to core collapse with GENEC: Extension of equation of state, opacities and effective nuclear network**, Griffiths, A., Aloy, M.-Á., Hirschi, R., Reichert, M., Obergaulinger, M., Whitehead, E. E., Martinet, S., **Sciarini, L.**, Ekström, S., Meynet, G., 2025A&A...693A..93G.
- Oct 2024 **Grids of stellar models with rotation: VIII. Models from 1.7 to 500 M_⊙ at metallicity $Z = 10^{-5}$** , Sibony, Y., Shepherd, K. G., Yusof, N., Hirschi, R., Chambers, C., Tsiatsiou, S., Nandal, D., **Sciarini, L.**, Moyano, F. D., Bétrisey, J., Buldgen, G., Georgy, C., Ekström, S., Eggenberger, P., and Meynet, G., 2024A&A...690A..91S.
- July 2024 **Rapidly rotating Population III stellar models as a source of primary nitrogen**, Tsiatsiou, S., Sibony, Y., Nandal, D., **Sciarini, L.**, Hirai, Y., Ekström, S., Farrell, E., Murphy, L., Choplin, A., Hirschi, R., Chiappini, C., Liu, B., Bromm, V., Groh, J., and Meynet, G., 2024A&A...687A.307T.
- Jan 2024 **Letter to the editor - Dynamical tides in binaries: Inconsistencies in the implementation of Zahn's prescription**, **Sciarini, L.**, Ekström, S., Eggenberger, P., Meynet, G., Fragos, T., and Song, H.-F., 2024A&A...681L...1S.

Awards, Honours and Grants

- June 2025 **Prix Plantamour-Prévost 2025** — awarded by the Department of Astronomy of the University of Geneva in recognition of the excellence of the article *Detailed Simulations of Massive Hierarchical Triple Star Systems - Exploring the impact of the stellar physics on the evolutionary pathways of massive hierarchical triple systems*.
- May 2025 **IAUS 402 meeting grant** — awarded by the International Astronomical Union
- July 2024 **NOVA financial support for a visit** — awarded by the Netherlands Research School for Astronomy.
- May 2024 **SSAA travel grant (young scientist support)** — awarded by the Swiss Society for Astrophysics and Astronomy.
- June 2023 **LKBF support for a visit** — awarded by the Leids Kerkhoven-Bosscha Fonds.
- Nov 2022 **Prix de l'Observatoire 2022** — awarded by the Department of Astronomy of the University of Geneva for the best Astrophysics master grade.
- June 2016 **Prize for the best mathematics grade (6.0/6.0)** — awarded by the CEC André-Chavanne.

Volunteering

- Sept 2018 - July 2019 **Coaching EPFL** — Student-run mentoring initiative providing academic support and guidance to first-year students across scientific and engineering programs.
- Feb 2017 **Humanitarian project in Nepal** — Humanitarian project in the Khumbu Valley helping in the reconstruction after the 2015 earthquake. Fundraising of CHF 25,000.-.

Technologies

Programming Python, C++, Matlab, Fortran.