



Dr. Luca Broggi

Researcher in Astrophysics

📍 Piazza della Scienza, Milano · 🐙 [LBroggi](#)

Key Research Expertises

Loss-cone theory
Galactic dynamics
Origin of TDEs & EMRIs

Key Soft Skills

Mediation
Autonomy
Group Cooperation

Technical Skills

Julia
██████████

MATLAB
██████████

Python
██████████

C
██████████

Linux
██████████

Languages

English
██████████

Italian
██████████

German
██████████

Profile

I am a young astrophysicist with a background in Computational and Theoretical Physics. I am becoming an expert in loss-cone theory and its application for determining rates and properties of tidal disruptions of stars and extreme mass ratio inspirals. More in general, I am interested in studying the dynamics of stellar systems, including galaxies and globular clusters. I work well in a team, where my moderation capabilities typically contribute to a calm and fruitful environment. When assigned independent activities, I am able to clearly state their progress and delineate the next steps of my work.

Work Experience

Postdoctoral researcher

[Università degli Studi di Milano-Bicocca](#)

In the group of **prof. Alberto Sesana**.

Nov 2023 -

Doctoral researcher

[Università degli Studi di Milano-Bicocca](#)

Supervisors: **prof. Alberto Sesana**, **prof. Massimo Dotti**. I developed a **code to solve the Fokker-Planck equation** describing galactic nuclei. I **co-supervised** a master student developing a 3-D Monte Carlo code to simulate the triggering of EMRIs. I **visited Dr. Nick Stone** at the Hebrew University of Jerusalem for three months.

Nov '20 - Oct '23

Teaching assistant


[BSc in Physics, Università degli Studi di Milano-Bicocca](#)

Introduction to IT for Physicists. I teach the C programming language to students at the first year and Python to students at second year.

2021, 2023, 2024

Research Interests

Loss-cone theory

I am the developer of `jFP` , the first public code to solve the orbit-averaged Fokker-Planck equation. I am working on the theory itself to better model the properties of captured TDEs and EMRIs. I am currently working with the group of A. Sesana to develop a Monte-Carlo simulation code, and to improve the dynamical models of EMRI progenitors.

Education

PhD in Physics and Astronomy

[Università degli Studi di Milano-Bicocca](#)

Thesis with **prof. Alberto Sesana** and **prof. Massimo Dotti**, *Dynamics of tidal disruptions and extreme mass ratio inspirals in galactic nuclei*. Cum laude.

Nov 2020 - Feb 2024

MSc in Computational and Theoretical Physics

[Università degli Studi di Milano-Bicocca](#)

Thesis with **prof. Claudio Destri**, *Maximum entropy and violent relaxation in self-gravitating spherical systems*. 110/110 cum laude.

Oct 2017 - Oct 2020

BSc in Computational and Theoretical Physics

[Università degli Studi di Milano-Bicocca](#)

Thesis with **prof. Claudio Destri**, *Hooke vs Kepler law in Classical and Quantum Mechanics*. 110/110 cum laude.

Oct 2014 - Oct 2017

Research visits

The Hebrew University of Jerusalem

Hosted by Dr. Nick Stone

Mar - Jun 2022

Publications

First Author

Breaking boundaries: extending the orbit averaged Fokker-Planck equation inside the loss cone [🔗](#)

[L.Broggi](#)

PRL, submitted

Nov 2024

Repeating partial disruptions and two-body relaxation [🔗](#)

[L.Broggi](#), [N.C. Stone](#), [T. Ryu](#), [E. Bortolas](#), [M. Dotti](#), [M. Bonetti](#), [A. Sesana](#), [M. Dotti](#)

OJAp

Apr 2024

Extreme mass ratio inspirals and tidal disruption events in nuclear clusters - I. Time-dependent rates [🔗](#)

[L.Broggi](#), [E. Bortolas](#), [M. Bonetti](#), [A. Sesana](#), [M. Dotti](#)

MNRAS

May 2022

My code `jFP` is available here

Relevant contributor

Hanging on the cliff: EMRI formation with local two-body relaxation and post-Newtonian dynamics [🔗](#)

[D.Mancieri](#), [L.Broggi](#), [M.Bonetti](#), [A.Sesana](#)

A&A, submitted


Sep 2024


Demographics of Tidal Disruption Events with L-Galaxies: I. Volumetric TDE rates and the abundance of Nuclear Star Clusters [🔗](#)

[M. Polkas](#), [S. Bonoli](#), [E. Bortolas](#), [D. Izquierdo-Villalba](#), [A. Sesana](#), [L. Broggi](#), [N. Hoyer](#), [D. Spinoso](#)

A&A

Dec 2023

Gravitational waves from an eccentric population of primordial black holes orbiting Sgr A*  PRD Mar 2023
S. Bondani, M. Bonetti, L. Broggi, F. Haardt, A. Sesana, M. Dotti

Partial stellar tidal disruption events and their rates  MNRAS Mar 2023
E. Bortolas, T. Ryu, L. Broggi, A. Sesana

Conference organization

Loss cones in Como Feb 2024
SOC and LOC. Università degli Studi dell'Insubria, Como, Italy.

LISA Phase-A workshop Jan 2024
LOC. Università degli Studi di Milano-Bicocca, Milano, Italy.

Seminars and Talks

Time dependent extreme mass ratio inspiral rate in (anisotropic) nuclear star clusters Garching, Germany Nov 2024
LISA Astro WG Meeting

Repeating partial disruptions and two-body relaxation Crete, Greece Sep 2024
TDEs and NTs: entering the data-rich era, contributed talk

Time dependent extreme mass ratio inspiral rate in (anisotropic) nuclear star clusters Dublin, Ireland Jul 2024
LISA Symposium, contributed talk

Partial disruptions and two-body relaxation Milan, Italy March 2024
Astrocoffee @ UNIMIB

Dynamics of tidal disruptions and extreme mass ratio inspirals in galactic nuclei Milan, Italy Feb 2024
PhD defense (Committee: Elena Maria S. Rossi, M. Cole Miller, Nicholas C. Stone)

Massive black hole growth through loss cone dynamics Milan, Italy Jan 2024
Lisa Phase-A workshop, contributed talk

Rates of TDEs and EMRIs in galactic nuclei Palermo, Italy Sep 2023
YAGN 2023

Dynamics of EMRI formation in nuclear star clusters Milan, Italy Sep 2023
LISA Astro-WG meeting

Tidal disruptions and extreme mass ratio inspirals in nuclear star clusters: do they feed Black Holes? <i>EAS Meeting 2023, contributed talk</i>	Krakow, Poland	July 2023
Extreme mass ratio inspirals and tidal disruption events in nuclear star clusters <i>EAS Meeting 2023, Flash Talk + ePoster</i>	Krakow, Poland	July 2023
Gravitational Waves and Light: the new era of Astronomy <i>with A. Spadaro, PhD Seminars - joint seminars of the School of Science, UNIMIB</i>	Milan, Italy	May 2023
Stellar objects feed massive black holes - What do they like? <i>Astrocoffee @ UNIMIB</i>	Milan, Italy	May 2023
Loss-cone dynamics in galactic nuclei <i>YAGN 2022</i>	Donostia, Spain	Sep 2022
Evolution of the anisotropy profile in Galactic nuclei and its effective treatment in 1D Fokker Planck models <i>Como meeting on TDEs and EMRIs dynamics</i>	Como, Italy	Sep 2022
Extreme mass ratio inspirals and tidal disruption events in nuclear clusters. <i>Tai Ji Consortium</i>	Remotely	Feb 2022
Using Fokker-Planck to simulate the evolution of nuclear clusters. <i>Group of Dr. Stone at HUJI</i>	Jerusalem, Israel	Mar 2022
Using Fokker-Planck to simulate the evolution of nuclear clusters. <i>Astrocoffee @ UNIMIB</i>	Milan, Italy	Jan 2022
EMRI formation rate from two-components Fokker-Planck equation <i>YAGN 2021</i>	Copenhagen, Denmark	Sep 2021

Conferences and Meetings

LISA Astro Working Group <i>Garching, Germany.</i>		Nov 2024
TDEs and NTs: entering the data rich era <i>Heraklion, Crete, Greece.</i>		Sep 2024
LISA Symposium <i>Dublin, Ireland.</i>		Jul 2024

EAS Conference
Padova, Italy.

Jul 2024

Loss cones in Como
Università degli Studi dell'Insubria, Como, Italy.

Feb 2024

LISA Phase-A workshop
Università degli Studi di Milano-Bicocca, Milano, Italy.

Jan 2024

YAGN 23
INAF Palermo, Palermo, Italy.

Sep 2023

EAS Meeting 2023
ICE conference center, Karakow, Poland

Jul 2023

1st Trieste Meeting in GW Astrophysics
SISSA International School, Trieste, Italy

Jun 2023

YAGN 22
Donostia International Physics Center, San Sebastián, Spain.

Oct 2022

Como Meeting on TDEs and EMRIs dynamics
Università degli Studi dell'Insubria, Como, Italy.

Sep 2022

YAGN 21
Niels Bohr Institutet, Copenhagen, Denmark.

Sep 2021

Awarded Grants

Exchange extra UE
Grant for mobility, Università degli Studi di Milano-Bicocca

Jan 2022

PhD grant
«Borsa libera», Università degli Studi di Milano-Bicocca

Oct 2020

Outreach activity

Modeling Planets with Julia
Università degli Studi di Milano-Bicocca (with high school students), Milano, Italy

Feb 2023

Cos'è un Buco Nero?
Istituto Cardinal Ferrari (primary school), Cantù, Italy

Feb 2023

La gravità ci tiene a Terra!
Istituto Santa Chiara (primary school), Como, Italy

Jan 2023

Cos'è un Buco Nero?

Istituto Cardinal Ferrari (primary school), Cantù, Italy

Oct 2021

Refereeing

Peer review referee

Monthly Notices of the Royal Astronomical Society, The Astrophysical Journal (6 papers).