FabioAntonini

contact

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research fields

Stellar dynamics
Massive black holes
Galactic nuclei
Gravitational wave astrophysics
Exoplanet dynamics
Computational astrophysics

languages

Italian mother tongue
English fluency

programming

Fortran, C, C++, Python, CUDA

EDUCATION/EMPLOYMENT

From Jan. 2018 — **Lecturer/Assistant professor and Ernest Rutherford fellow** — Cardiff University
Main research activity: *gravitational wave astrophysics.*

2014–2017 — **CIERA postdoctoral fellow** — Northwestern University/CIERA
Main research activity: *dynamics of stars and compact-objects; stellar dynamics near massive black holes; formation and evolution of galactic nuclei*

2011–2014 — **CITA postdoctoral fellow** — University of Toronto/CITA
Main research activity: *dynamics of stars and compact-objects; stellar dynamics near massive black holes; formation of galactic nuclei*

Summer 2011 — **CFA Pre-doctoral fellow** — Harvard-Smithsonian Center for Astrophysics

2008–2011 — **Ph.D. in Astrophysics** — Rochester Institute of Technology
Thesis: *Dynamical Processes Near the Super Massive Black Hole at the Galactic Center*
Supervisor: David Merritt (RIT)

2005–2008 — **MSc. in Astrophysics (cum laude)** — University of Rome, La Sapienza
Thesis: *A dynamical Instability In Triaxial Stellar Systems*
Supervisors: Roberto Capuzo-Dolcetta (La Sapienza); David Merritt (RIT)

2002–2005 — **BSc. in Physics and Astrophysics** — University of Rome, La Sapienza
Thesis: *The dynamical evolution of stellar clusters with central black hole*
Supervisor: Roberto Capuzo-Dolcetta (La Sapienza)

Awards, Grants and Memberships

present — **Member of the LIGO Scientific Collaboration and GEO**

2018-2023 — **5 years Rutherford fellowship by the STFC research council**
Project: *Nuclear clusters as nurseries of gravitational wave sources*

2015 — **PI on NASA/Fermi program NNX15AU69G**
Understanding Gamma-Ray Emission from the Galactic Center: Constraining the Millisecond Pulsar Population
CO-Is: Tim Linden, Vicky Kalogera, Fred Rasio, Duncan Lorimer

2015 — **High-impact astronomical research paper**
Antonini 2013 (ApJ, 763, 62) selected as one of the 15 most high-impact astronomical research papers published in the years since the IAU General Assembly held in Beijing in 2012 to the IAU General Assembly held in Honolulu in 2015 (http://iopscience.iop.org/0004-637X/page/Focus_on_IAU)

2014 — **Visiting professorship at La Sapienza, Universitá di Roma (March to June)**

2014 **CIERA prize fellowship**

2011 **CITA prize fellowship**

2011 **CFA/Harvard predoctoral fellowship**

Teaching

2018-2019 **Lecturer** University of Surrey
Astrophysical dynamics

2014 **Visiting professor** University of Rome, La Sapienza
Course for graduate students (8 hours): *Astrophysical Black Holes*

2011 **Guest Lecturer** University of Toronto
Class taught: Stellar Dynamics

2008-2009 **Teaching Assistant** Rochester Institute of technology
Classes taught: Stellar Astronomy Lab; University Physics I; University Physics II; Extragalactic Astrophysics; Galactic Astrophysics and interstellar medium

Student supervision (as supervisor or adviser in research projects)

present **Jakob Stegmann. Graduate student at Cardiff University.**
Role: main supervisor

present **Sam Higginbotham. Graduate student at Cardiff University.**
Role: second supervisor

2014-2016 **Carl-Johan Haster. Graduate student at University of Birmingham (now post-doc at CITA)**
Project: (as principal adviser) *N-body dynamics of Intermediate mass-ratio inspirals in globular clusters*. Haster, C. J., Antonini, F., Kalogera, V., Ilya, M. et al. 2016, ApJ, 932, 192.

2014-2016 **Adrian Hamers. Graduate student at Leiden Observatory (now post-doc at IAS)**
Projects:
(as principal adviser) *Secular dynamics of multiplanet systems: implications for the formation of hot and warm Jupiters via high-eccentricity migration*. Hamers, A., Antonini, F., Lithwick Y., Perets, H., Portegies-Zwart, S. 2016, MNRAS, 464, 688.
(as co-adviser) *Secular Dynamics of Hierarchical Quadruple Systems: the Case of a Triple System Orbited by a Fourth Body*. Hamers, A., Perets, H., Antonini, F., Portegies-Zwart, S. 2015, MNRAS, 449, 4221.

Summer 2015 **Casey Chu. Undergraduate student at Harvey Mudd College**
Project: (as co-adviser) *Inferring the Gravitational Potential of the Milky Way.*

2012-2014 **Snezana Prodan. Graduate student at University of Toronto**
Project: (as principal adviser) *Secular Evolution Of Binaries Near Massive Black Holes*. Prodan, S., Antonini, F., Perets, H., 2015, ApJ, 799, 118.

Summer 2014 **Natalie Price-Jones. Undergraduate student at Univeristy of Toronto**
Project: (as co-adviser during the UofT Summer student program) *Rate Of Tidal Disruption Of Stars By Supermassive Black Holes.*

Summer 2013 **Fan Wu. Undergraduate student at University of Rochester**
Project: (as principal adviser during the UofT Summer student program) *Numerical Techniques For generating N-Body Initial Conditions.*

Scientific service

Journal referee for Nature, PRL, PRD, ApJ, ApJL, MNRAS (and Letters), Classical and Quantum Gravity

2017 **External reviewer for Astrophysics theory review panel (ATP).**

2016 **Member of NSF proposal evaluation panel for the Astronomy and Astrophysics Research Grants**

2018-present **Astrophysics seminar organizer, University of Surrey**

2015-2017 **Astrophysics seminar co-organizer, CIERA**

2015-present **Founder and organizer of the CIERA astro-ph discussion club**

2014 **SOC member of the Workshop in Cefalù (Sicily): The Unquiet Universe, June 3th-13th**

2014 **SOC member of the Alajar (Sevilla) meeting: *Growth And Evolution Of The Milky Way's Nuclear Star Cluster And Its Central Black Hole*, September 20th-28th**

2012-2013 **Founder and organizer of the CITA journal club**

2013 **Café Scientifique Brunch - Toronto Science Festival**

2010 **Outreach activity during the 2010 IMAGINE RIT festival (http://www.rit.edu/imagine/)**

Talks and Seminars

In the last 6 years I have given 24 talks at international conferences, and workshops, 11 on invitation. Out of the 11 invitations there was 1 invited review. I have been in the scientific organizing committee of 2 conferences and the invited speaker at 20 seminars and colloquia at internationally established universities and institutions.

Publications

Total: 38. First author: 20; *H*-index=27; citations=2049 (from ADS). In all publications listed below I was significantly involved at all stages. *Advised/co-advised students.

2020

38 Nasim, I., Gualandris, A., Read, J., Dehnen, W., Delorme, M. and **Antonini, F.** *Defeating stochasticity: coalescence timescales of massive black holes in galaxy mergers*, MNRAS

37 **Antonini, F.**, and Gieles, M. *Population synthesis of black hole binary mergers from star clusters*, 2020, MNRAS, 492, 2936

2019

36 **Antonini, F.**, Gieles, M., and Gualandris, A. *Black hole growth through hierarchical black hole mergers in dense star clusters: implications for gravitational wave detections*, 2019, MNRAS, 486, 5008

35 Fragione, G., and **Antonini, F.** *Massive binary star mergers in galactic nuclei: implications for blue stragglers, binary S-stars, and gravitational waves* , 2019, MNRAS, 488, 728

34 Fragione, G., **Antonini, F.** and Gnedin, O. Y., *Millisecond pulsars and the gamma-ray excess in Andromeda*, 2019, MNRAS, 488, 728

33 Erkal, D., Boubert, D., Gualandris, A., Evans, W., **Antonini, F.**, *A hypervelocity star with a Magellanic origin* 2019, MNRAS, 483, 2007

2018

32 Rodriguez, C. L., & Antonini, F., *A Triple Origin for the Heavy and Low-spin Binary Black Holes Detected by LIGO/VIRGO* 2018, ApJ, 863, 7

31 Hamers, A. Bar-Or, B., Petrovich, C., **Antonini, F.**, *The Impact of Vector Resonant Relaxation on the Evolution of Binaries near a Massive Black Hole: Implications for Gravitational-wave Sources*, 2018, ApJ, 865, 2

30 **Antonini, F.**, Rodriguez, C., Petrovich, C., Fischer, Caitlin L., *Precessional dynamics of black hole triples: binary mergers with near-zero effective spin*, 2018, MNRAS letters, 480, L58

29 *Fragione, G., **Antonini, F.**, and Gnedin, O. *Disrupted Globular Clusters and the Gamma-Ray Excess in the Galactic Centre*, 2018, MNRAS, 475, 5313

2017

28 Petrovich, C., **Antonini, F.**, *Greatly Enhanced Merger Rates of Compact-object Binaries in Non-spherical Nuclear Star Clusters*, 2017, ApJ, 846, 146

27 **Antonini, F.**, Toonen, S., and Hamers, A. *Binary Black Hole Mergers from Field Triples: Properties, Rates, and the Impact of Stellar Evolution*, 2017, ApJ, 841, 77

26 Dosopoulou, F., and **Antonini, F.** *Dynamical friction and the evolution of Supermassive Black hole Binaries: the final hundred-parsec problem*, 2017, ApJ, 840, 31

25 *Hamers, A., **Antonini, F.**, Lithwick, Y., Perets, H., Portegies Zwart, S. *Secular dynamics of multiplanet systems: implications for the formation of hot and warm Jupiters via high-eccentricity migration*, 2017, MNRAS, 464, 688

2016

24 Leigh, N., **Antonini, F.**, Stone, N., Shara, M., Merritt D., *On the origins of enigmatic stellar populations in Local Group galactic nuclei*, 2016, MNRAS, 463, 1605

23 *Haster, C. J., **Antonini, F.**, Kalogera, V., Mandel, I. $N-$*body dynamics of Intermediate mass-ratio inspirals in globular clusters*, 2016, ApJ, 832, 192

22 **Antonini, F.**, Rasio, F. *Merging black hole binaries in galactic nuclei: implications for advanced-LIGO detections*, 2016, ApJ, 831, 187

21 **Antonini, F.**, *Hamers, A., Lithwick, Y. *Dynamical constraints on the origin of hot and warm Jupiters with close friends*, 2016, AJ, 152, 174

20 **Antonini, F.**, Chatterjee, S., Rodriguez, C., Morscher, M., Pattabiraman, B., Kalogera, V., Rasio, F., *Black hole mergers and blue stragglers from hierarchical triples formed in globular clusters*, 2016, ApJ, 816, 65

2015

19 **Antonini, F.**, Barausse, E., Silk, J., *The Coevolution of Nuclear Star Clusters, Massive Black Holes, and Their Host Galaxies*, 2015, ApJ, 812, 72

18 Vasiliev, E., **Antonini, F.**, Merritt, D., *The final-parsec problem in the collisionless limit*, 2015, ApJ, 810, 49

17 **Antonini, F.**, Barausse, E., Silk, J., *The imprint of massive black-hole mergers on the correlation between nuclear clusters and their host galaxies*, 2015, ApJL, 806L, 8

16 Arca-Sedda, M., Capuzzo-Dolcetta, R., **Antonini, F.**, Seth, A., *Henize 2-10: The Ongoing Formation of a Nuclear Star Cluster around A Massive Black Hole*, 2015, ApJ, 806, 220

15 *Hamers, A., Perets, H., **Antonini, F.**, Portegiese-Zwart, S., *Secular Dynamics of Hierarchical Quadruple Systems: the Case of a Triple System Orbited by a Fourth Body*, 2015, MNRAS, 449, 4221

2014

14 *Prodan, S., **Antonini, F.** and Perets, H., Secular Evolution of Binaries Near Massive Black Holes, 2014, ApJ, 799, 118

13 **Antonini, F.**, *On The Distribution of Stellar Remnants Around Massive Black Holes: Slow Mass Segregation, Star Cluster Inspirals, And Correlated Orbits*, 2014, ApJ, 794, 106

12 Godet, O., Lombardi, J., **Antonini, F. et al.**, *Implications of the Delayed 2013 Outburst Of ESO 243-49 HLX-1*, 2014, ApJ, 793, 105

11 Vasiliev, E., **Antonini, F.**, and Merritt, D., *The Final Parsec Problem in non Spherical Galaxies Revisited*, 2014, ApJ, 785, 163

10 **Antonini, F.**, Murray, N., and Mikkola, S., *Black Hole Triple Dynamics: Implications for Gravitational Wave Detectors*, 2014, ApJ, 781, 45

2013

9 **Antonini, F.**, *Origin And Growth of Nuclear Star Clusters Around Massive Black Holes*, 2013, ApJ, 763, 62

8 **Antonini, F.,** and D., Merritt, *Relativity and the Evolution of the Galactic Center S-Star Orbits*, 2013, ApJL, 763, L10

2012

7 **Antonini, F.**, and Perets, H., *Secular Evolution of Compact Binaries near Massive Black Holes: Gravitational Wave Sources And Other Exotica*, 2012, ApJ, 757, 27

6 **Antonini, F.**, Capuzzo-Dolcetta, R., Mastrobuono-Battisti, A. and Merritt, D., *Dissipationless Formation and Evolution of the Milky Way Nuclear Star Cluster*, 2012, ApJ, 750,111

5 **Antonini, F.**, and Merritt, D., *Dynamical Friction around Super Massive Black Holes*, 2012, ApJ, 745, 83

2011

4 **Antonini, F.**, Lombardi, J., and Merritt, D., *Tidal Breakup of Binary Stars at the Galactic Center. II. Hydrodynamic Simulations*, 2011, ApJ, 731, 128

2010

3 **Antonini, F.**, Montez, R. J., Kastner, J., et al., *XMM-Newton Detection of a Transient X-Ray Source in the Vicinity Of V838 Monocerotis*, 2010, ApJ, 717, 795

2 **Antonini, F.**, Faber, J., Gualandris, A., and Merritt, D., *Tidal Breakup Of Binary Stars at the Galactic Center and its Consequences*, 2010, ApJ, 713, 90

2009

1 **Antonini, F.**, Capuzzo-Dolcetta, R., and Merritt, D., *A Counterpart to the Radial-Orbit Instability in Triaxial Stellar Systems*, 2009, MNRAS, 399, 671

conference proceedings

2 Capuzzo-Dolcetta, R., **Antonini, F.**, and Mastrobuono-Battisiti, A., *The formation of the Milky Way nuclear star cluster*, 2011, sca, conf, 291

1 **Antonini, F.**, Capuzzo-Dolcetta, R., and Merritt, D., *An Instability in Triaxial Stellar Systems*, 2008, Astronomische Nachrichten (Astronomical Notes), 329, 900

References

Professor **David Merritt**, Department of Physics, Rochester Institute of Technology, 85 Lomb Memorial Drive, Rochester, NY 14623, USA. Telephone: +1 (585) 475-7973; email: merritt@astro.rit.edu

Professor **Fred Rasio**, Center for Interdisciplinary Exploration and Research in Astrophysics Northwestern University 2145 Sheridan Road, Evanston, IL 60208-3112. Telephone: +1 847 491 7904; email: rasio@northwestern.edu

Professor **Joseph Silk**, Institut d'Astrophysique de Paris (IAP) Sorbonne Universites, UPMC Univ Paris 06, UMR 7095, France; email: silk@astro.ox.ac.uk

Professor **Hagai Perets**, Technion, Israel Institute of technology, Haifa, Israel. Telephone: 972-77-8871954; email: hperets@physics.technion.ac.il