

Giacomo Fragione

Personal Information

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Current Position

Sep '20– **Research Assistant Professor**, Northwestern University, Evanston, USA.

Past Positions

Sep '19–Aug '20 **CIERA Fellow**, Northwestern University, Evanston, USA.
Sep' 18–Aug '19 **Fellow of the Israel Academy of Sciences and Humanities**, Hebrew University of Jerusalem, Jerusalem, Israel.
Sep '18–Aug '19 **Arskin Fellow**, Hebrew University of Jerusalem, Jerusalem, Israel.
Jan '17–Aug '18 **Postdoctoral Researcher**, Hebrew University of Jerusalem, Jerusalem, Israel.

Education

Sep '13–Dec '16 **Ph.D.**, Sapienza University of Rome - University of Rome Tor Vergata, Italy.
Thesis: "Hypervelocity Stars as Tools for Galactic Astrophysics" - Supervisor: Roberto Capuzzo-Dolcetta.
Sep '11–Aug '13 **Master Degree**, with mark 110/110 *summa cum laude*, Sapienza University of Rome, Italy.
Thesis: "Constraints on the Curvature of the Universe from Planck and Their Implications for Dark Energy" - Supervisor: Alessandro Melchiorri.
Sep '08–Aug '11 **Bachelor Degree**, with mark 110/110 *summa cum laude*, Sapienza University of Rome, Italy.
Thesis: "Primordial Nucleosynthesis" - Supervisor: Paolo de Bernardis.

Grants

2021-2024 **Preparing LISA for Intermediate-Mass Black Hole Science**, \$710K, funded by NASA, USA (PI: Giacomo Fragione).
2021-2024 **Gravitational Wave Sources from Dense Star Clusters**, \$498K, funded by NSF, USA (Co-PI: Giacomo Fragione; PI: Fred Rasio).
2022-2025 **Stellar Dynamics and Stellar Collisions in Star-by-Star Models of Nuclear Star Clusters**, \$746K, funded by NASA, USA (Co-I: Giacomo Fragione; PI: Carl Rodriguez).

Telescope Proposals

- 2022 **Capturing the Radio Emission from the Supermassive Black Hole at the Center of Leo I**, 0.75h, VLA (Co-I: Giacomo Fragione; PI: Fabio Pacucci).

Awards & Honors

- 2019-2024 **CIERA Prize Fellowship**, CIERA, Northwestern University, USA.
2019 **T.D. Lee Prize Fellowship**, Shanghai Jiao Tong University, China (declined).
2018-2020 **Fellowship for Foreign Researchers in Israel**, Israel Academy of Sciences and Humanities, Israel.
2018-2019 **Arskin Fellowship**, Hebrew University of Jerusalem, Jerusalem, Israel.
2014 **Prize for Excellent Graduates**, Sapienza, University of Rome, Rome, Italy.

Publications

Papers, 89 (total), 50 (1st author, incl. 4 single-author papers), 15 (2nd author), 24 (Nth author).

Metrics, *H-index* 32, citations 2701 (as of 10/01/2023).

— 2023 —

[89] N. Weatherford, F. Rasio, S. Chatterjee, **G. Fragione**, F. Kiroğlu, K. Kremer, "*Stellar Escape from Globular Clusters. II. Clusters May Eat Their Own Tails*", submitted, arXiv:2310.01485, 2023.

[88] N. Leigh, C. S. Ye, S. Grondin, **G. Fragione**, J. Webb, C. O. Heinke, "*The dominant mechanism(s) for populating the outskirts of star clusters with neutron star binaries*", submitted, arXiv:2309.13122, 2023.

[87] **G. Fragione**, F. Pacucci, "*Constraining the Properties of Black Hole Seeds from the Farthest Quasars*", submitted, arXiv:2308.14986, 2023.

[86] A. Tiwari, A. Vijaykumar, S. J. Kapadia, **G. Fragione**, S. Chatterjee, "*Accelerated binary black holes in globular clusters: forecasts and detectability in the era of space-based gravitational-wave detectors*", submitted, arXiv:, 2023.

[85] **G. Fragione**, A. Loeb, "*Neutron star kicks and implications for their rotation at birth*", submitted, arXiv:2305.08920, 2023.

[84] A. J. Levan, et al. (incl **G. Fragione**), "*A long-duration gamma-ray burst of dynamical origin from the nucleus of an ancient galaxy*", *Nature Astronomy*, 7, 976, 2023.

[83] S.C. Ye, **G. Fragione**, R. Perna, "*On the Tidal Capture of White Dwarfs by Intermediate-mass Black Holes in Dense Stellar Environments*", *Astrophysical Journal*, 953, 141, 2023.

[82] M. Fishbach, **G. Fragione**, "*Globular cluster formation histories, masses and radii inferred from gravitational waves*", *Monthly Notices of the Royal Astronomical Society*, 522, 5546, 2023.

[81] V. Stokov, **G. Fragione**, E. Berti, "*LISA Constraints on an Intermediate-Mass Black Hole in the Galactic Centre*", *Monthly Notices of the Royal Astronomical Society*, 524, 2033, 2023.

[80] **G. Fragione**, F. Rasio, "*Demographics of Hierarchical Black Hole Mergers in Dense Star Clusters*", *Astrophysical Journal*, 951, 129, 2023.

[79] R. Zhang, **G. Fragione**, C. Kimball, V. Kalogera, "*On the Likely Dynamical Origin of GW191109 and of Binary Black Hole Mergers with Negative Effective Spin*", *Astrophysical Journal*, 954, 23, 2023.

[78] **G. Fragione**, A. Loeb, "*Constraining the cosmic merger history of intermediate-mass black holes with gravitational wave detectors*", *Astrophysical Journal*, 944, 81, 2023.

[77] F. Kiroğlu, J. C. Lombardi Jr., K. Kremer, **G. Fragione**, S. Fogarty, F. Rasio, "*Partial Tidal Disruptions of Main-Sequence Stars by Intermediate-Mass Black Holes*", *Astrophysical Journal*, 948, 89, 2023.

[76] N. Weatherford, F. Kiroğlu, **G. Fragione**, S. Chatterjee, K. Kremer, F. Rasio, "*Stellar Escape from Globular Clusters I: Escape Mechanisms and Properties at Ejection*", *Astrophysical Journal*, 946, 104, 2023.

[75] D. Atallah, A. A. Trani, K. Kremer, N. Weatherford, **G. Fragione**, M. Spera, F. Rasio, "*Growing Black Holes through Successive Mergers in Galactic Nuclei: I. Methods and First Results*", *Monthly Notices of the Royal Astronomical Society*, 523, 4227, 2023.

— 2022 —

[74] E. Gonzalez, K. Kremer, **G. Fragione**, M. A. S. Martinez, N. Weatherford, M. Zevin, F. Rasio, "*Intermediate-mass black holes on the run from young star clusters*", *Astrophysical Journal*, 940, 131, 2022.

[73] S. C. Ye, **G. Fragione**, "*Millisecond Pulsars in Dense Star Clusters: Evolution, Scaling Relations, and the Galactic-Center Gamma-ray Excess*", *Astrophysical Journal*, 940, 162, 2022.

[72] **G. Fragione**, A. Loeb, "*Implication of spin constraints by the Event Horizon Telescope on stellar orbits in the Galactic Center*", *Astrophysical Journal Letters*, 932, L17, 2022.

[71] **G. Fragione**, A. Loeb, B. Kocsis, F. A. Rasio, "*Merger rates of intermediate-mass black hole binaries in nuclear star clusters*", *Astrophysical Journal*, 933, 170, 2022.

[70] **G. Fragione**, "*Mergers of supermassive and intermediate-mass black holes in galactic nuclei from disruptions of star clusters*", *Astrophysical Journal*, 939 97, 2022.

[69] P. Du, D. Egana-Ugrinovic, R. Essig, **G. Fragione**, R. Perna, "*Searching for Ultra-light Bosons and Constraining Black Hole Spin Distributions with Stellar Tidal Disruption Events*", *Nature Comm.*, 13, 4626, 2022.

[68] F. Kiroğlu, N. C. Weatherford, K. Kremer, C. S. Ye, **G. Fragione**, F. A. Rasio, "*Gravitational Microlensing Rates in Milky Way Globular Clusters*", *Astrophysical Journal*, 928, 181, 2022.

[67] S. C. Ye, K. Kremer, C. L. Rodriguez, N. Z. Rui, N. C. Weatherford, S. Chatterjee, **G. Fragione**, F. A. Rasio, "*Compact Object Modeling in the Globular Cluster 47 Tucanae*", *Astrophysical Journal*, 931, 84, 2022.

[66] V. Stokov, **G. Fragione**, K. Wong, T. Helfer, E. Berti, "*Hunting intermediate-mass black holes with LISA binary radial velocity measurements*", *Physical Review D*, 105, 124048, 2022.

[65] **G. Fragione**, B. Kocsis, F. A. Rasio, J. Silk, "*Repeated mergers, mass-gap black holes, and formation of intermediate-mass black holes in nuclear star clusters*", *Astrophysical Journal*, 927, 231, 2022.

[64] C. L. Rodriguez, N. C. Weatherford, S. C. Coughlin, P. Amaro-Seoane, K. Breivik, S. Chatterjee, **G. Fragione**, F. Kiroğlu, K. Kremer, N. Z. Rui, C. S. Ye, M. Zevin, F. A. Rasio, "*Modeling Dense Star Clusters in the Milky Way and Beyond with the Cluster Monte Carlo Code*", *Astrophysical Journal Suppl.*, 258, 22, 2022.

[63] Y. Yang, I. Bartos, **G. Fragione**, Z. Haiman, M. Kowalski, S. Marka, R. Perna, H. Tagawa, "*Micro Tidal Disruption Events in Active Galactic Nuclei*", *Astrophysical Journal Letters*, 933, L28, 2022.

[62] M. A. S. Martinez, C. L. Rodriguez, **G. Fragione**, "*On the Mass Ratio Distribution of Black Hole Mergers in Triple Systems*", *Astrophysical Journal Letters*, 937, 78, 2022.

— 2021 —

[61] **G. Fragione**, "*Black hole-neutron star mergers are unlikely multi-messenger sources*", *Astrophysical Journal Letters*, 923, L2, 2021.

- [60] **G. Fragione**, A. Loeb, F. A. Rasio, "*Impact of natal kicks on merger rates and spin-orbit misalignments of black hole – neutron star mergers*", *Astrophysical Journal Letters*, 918, L38, 2021.
- [59] K. Kremer, N. Z. Rui, N. Weatherford, S. Chatterjee, **G. Fragione**, F. Rasio, C. L. Rodriguez, C. S. Ye, "*White Dwarf Subsystems in Core-Collapsed Globular Clusters*", *Astrophysical Journal*, 917, 28, 2021.
- [58] **G. Fragione**, S. Banerjee, "*Binary black hole mergers from young massive and open clusters: comparison to GWTC-2 gravitational wave data*", *Astrophysical Journal Letters*, 913, L29, 2021.
- [57] A. S. Hamers, **G. Fragione**, P. Neunteufel, B. Kocsis, "*First and second-generation black hole and neutron star mergers in 2+2 quadruples: population statistics*", *Monthly Notices of the Royal Astronomical Society*, 506, 5345, 2021.
- [56] **G. Fragione**, A. Loeb, "*Constraining neutron star radii in black hole-neutron star mergers from their electromagnetic counterparts*", *Monthly Notices of the Royal Astronomical Society*, 503, 2861, 2021.
- [55] N. Weatherford, **G. Fragione**, K. Kremer, S. Chatterjee, C. S. Ye, C. L. Rodriguez, F. Rasio, "*Black Hole Mergers from Star Clusters with Top-Heavy Initial Mass Functions*", *Astrophysical Journal Letters*, 907, L25, 2021.
- [54] E. Gonzalez, K. Kremer, S. Chatterjee, **G. Fragione**, C. L. Rodriguez, N. Weatherford, C. S. Ye, F. Rasio, "*Intermediate-mass Black Holes from High Massive-star Binary Fractions in Young Star Clusters*", *Astrophysical Journal Letters*, 908, L29, 2021.
- [53] **G. Fragione**, A. Loeb, "*Implications of recoil kicks for black hole mergers from LIGO/Virgo catalogs*", *Monthly Notices of the Royal Astronomical Society*, 502, 3879, 2021.
- [52] **G. Fragione**, R. Perna, A. Loeb, "*Calibrating the binary black hole population in nuclear star clusters through tidal disruption events*", *Monthly Notices of the Royal Astronomical Society*, 500, 4307, 2021.
- 2020 —
- [51] **G. Fragione**, A. Loeb, F. A. Rasio, "*On the Origin of GW190521-like Events from Repeated Black Hole Mergers in Star Clusters*", *Astrophysical Journal Letters*, 902, L26, 2020.
- [50] **G. Fragione**, A. Loeb, "*An upper limit on the spin of SgrA* based on stellar orbits in its vicinity*", *Astrophysical Journal Letters*, 901, L32, 2020.
- [49] **G. Fragione**, M. A. S. Martinez, K. Kremer, S. Chatterjee, C. L. Rodriguez, C. S. Ye, N. Weatherford, S. Naoz, F. A. Rasio, "*Demographics of triple systems in dense star clusters*", *Astrophysical Journal*, 900, 16, 2020.
- [48] M. A. S. Martinez, **G. Fragione**, K. Kremer, S. Chatterjee, C. L. Rodriguez, J. Samsing, C. S. Ye, N. Weatherford, M. Zevin, S. Naoz, F. A. Rasio, "*Black Hole Mergers from Hierarchical Triples in Dense Star Clusters*", *Astrophysical Journal*, 903, 67, 2020.
- [47] K. Kremer, M. Spera, D. Becker, S. Chatterjee, U. N. Di Carlo, **G. Fragione**, C. L. Rodriguez, C. S. Ye, F. A. Rasio, "*Populating the upper black hole mass gap through stellar collisions in dense star clusters*", *Astrophysical Journal*, 903, 45, 2020.
- [46] **G. Fragione**, S. Banerjee, "*Demographics of neutron stars in young massive and open clusters*", *Astrophysical Journal Letters*, 901, L16, 2020.
- [45] **G. Fragione**, J. Silk, "*Repeated mergers and ejection of black holes within nuclear star clusters*", *Monthly Notices of the Royal Astronomical Society*, 498, 4591, 2020.
- [44] C. L. Rodriguez, K. Kremer, M. Grudic, Z. Hafen, S. Chatterjee, **G. Fragione**, A. Lamberts, M. Martinez, F. A. Rasio, N. Weatherford, C. S. Ye, "*GW190412 as a Third-Generation Black Hole Merger from a Super Star Cluster*", *Astrophysical Journal Letters*, 896, L10, 2020.
- [43] **G. Fragione**, A. Loeb, F. A. Rasio, "*Merging Black Holes in the Low-mass and High-mass Gaps from 2+2 Quadruple Systems*", *Astrophysical Journal Letters*, 895, L15, 2020.

- [42] **G. Fragione**, A. Loeb, K. Kremer, F. A. Rasio, "*Gravitational-wave captures by intermediate-mass black holes in galactic nuclei*", *Astrophysical Journal*, 897, 46, 2020.
- [41] M. Bonetti, A. Rasskazov, A. Sesana, M. Dotti, F. Haardt, N. Leigh, M. Arca Sedda, **G. Fragione**, E. Rossi, "*On the eccentricity evolution of massive black hole binaries in stellar backgrounds*", *Monthly Notices of the Royal Astronomical Society Letters*, 493, L114, 2020.
- [40] A. Rasskazov, **G. Fragione**, B. Kocsis, "*Binary intermediate-mass black hole mergers in globular clusters*", *Astrophysical Journal*, 899, 149, 2020.
- [39] K. Kremer, S. C. Ye, N. Z. Rui, N. C. Weatherford, S. Chatterjee, **G. Fragione**, C. L. Rodriguez, M. Spera, F. A. Rasio, "*Modeling dense star clusters in the Milky Way and beyond with the CMC cluster catalog*", *Astrophysical Journal Suppl.*, 247, 48, 2020.
- [38] S. C. Ye, W.-f. Fong, K. Kremer, C. L. Rodriguez, **G. Fragione**, F. A. Rasio, "*On the rate of neutron star binary mergers from globular clusters*", *Astrophysical Journal Letters*, 888, L10, 2020.
- [37] **G. Fragione**, B. Kocsis, "*Effective spin distribution of black hole mergers in triples*", *Monthly Notices of the Royal Astronomical Society*, 493, 3920, 2020.
- [36] **G. Fragione**, B. Metzger, R. Perna, N. Leigh, B. Kocsis, "*Electromagnetic transients and gravitational waves from white dwarf disruptions by stellar black holes in triple systems*", *Monthly Notices of the Royal Astronomical Society*, 495, 1061, 2020.
- [35] N. Leigh, **G. Fragione**, "*A new method to constrain the origins of dark-matter-free galaxies and their unusual globular clusters*", *Astrophysical Journal*, 892, 32, 2020.

— 2019 —

- [34] **G. Fragione**, A. Loeb, "*Black hole-neutron star mergers from triples II: the role of metallicity and spin-orbit misalignment*", *Monthly Notices of the Royal Astronomical Society*, 490, 4991, 2019.
- [33] **G. Fragione**, I. Ginsburg, A. Loeb, "*Supernovae in massive binaries and compact object mergers near supermassive black holes*", *Journal of Cosmology and Astroparticle Physics*, 10, 045, 2019.
- [32] R. Sari, **G. Fragione**, "*Tidal disruption events, main-sequence extreme-mass ratio inspirals and binary star disruptions in galactic nuclei*", *Astrophysical Journal*, 885, 24, 2019.
- [31] **G. Fragione**, N. Leigh, R. Perna, B. Kocsis, "*Tidal disruption events onto stellar black holes in triples*", *Monthly Notices of the Royal Astronomical Society*, 489, 727, 2019.
- [30] **G. Fragione**, A. Loeb, "*Black hole-neutron star mergers from triples*", *Monthly Notices of the Royal Astronomical Society*, 486, 4443, 2019.
- [29] **G. Fragione**, O. Bromberg, "*Eccentric binary black hole mergers in globular clusters hosting intermediate-mass black holes*", *Monthly Notices of the Royal Astronomical Society*, 488, 4370, 2019.
- [28] **G. Fragione**, N. Leigh, R. Perna, "*Black hole and neutron star mergers in Galactic Nuclei: the role of triples*", *Monthly Notices of the Royal Astronomical Society*, 488, 2825, 2019.
- [27] **G. Fragione**, F. Antonini, "*Massive binary star mergers in galactic nuclei: implications for blue stragglers, binary S-stars and gravitational waves*", *Monthly Notices of the Royal Astronomical Society*, 488, 728, 2019.
- [26] **G. Fragione**, B. Kocsis, "*Black hole mergers from quadruples*", *Monthly Notices of the Royal Astronomical Society*, 486, 4781, 2019.
- [25] L. Šubr, **G. Fragione**, J. Dabringhausen, "*Intermediate-Mass Black Holes in binary-rich star clusters*", *Monthly Notices of the Royal Astronomical Society*, 484, 2974, 2019.
- [24] **G. Fragione**, "*Dynamical origin of S-type planets in close binary stars*", *Monthly Notices of the Royal Astronomical Society*, 483, 3465, 2019.

[23] S. Rastello, P. Amaro-Seoane, M. Arca-Sedda, R. Capuzzo-Dolcetta, **G. Fragione**, I. Tosta e Melo, "*Stellar Black Hole Binary Mergers in Open Clusters*", Monthly Notices of the Royal Astronomical Society, 483, 1233, 2019.

[22] **G. Fragione**, E. Grishin, N. Leigh, H. B. Perets, R. Perna, "*Black Hole and Neutron Star Mergers in Galactic Nuclei*", Monthly Notices of the Royal Astronomical Society, 488, 47, 2019.

[21] A. Rasskazov, **G. Fragione**, N. Leigh, H. Tagawa, A. Sesana, A. Price-Whelan, E. M. Rossi, "*Hypervelocity Stars from a Supermassive Black Hole-Intermediate Mass Black Hole binary*", Astrophysical Journal, 878, 17, 2019.

[20] **G. Fragione**, A. Gualandris, "*Hypervelocity stars from star clusters hosting Intermediate-Mass Black Holes*", Monthly Notices of the Royal Astronomical Society, 489, 4543, 2019.

[19] **G. Fragione**, F. Antonini, O. Y. Gnedin, "*Millisecond pulsars and the gamma-ray excess in Andromeda*", Astrophysical Journal Letters, 871, L8, 2019.

[18] **G. Fragione**, A. Loeb, I. Ginsburg, "*A dynamical origin for planets in triple star systems*", Monthly Notices of the Royal Astronomical Society, 483, 648, 2019.

[17] M. Arca-Sedda, P. Berczik, R. Capuzzo-Dolcetta, **G. Fragione**, M. Sobolenko, R. Spurzem, "*Supermassive black holes coalescence mediated by massive perturbers: gravitational waves emission and the Milky Way - Andromeda fate*", Monthly Notices of the Royal Astronomical Society, 484, 520, 2019.

— 2018 —

[16] E. Grishin, H. B. Perets, **G. Fragione**, "*Quasi-secular evolution of mildly hierarchical triple systems: analytics and applications for GW-sources and hot Jupiters*", Monthly Notices of the Royal Astronomical Society, 481, 4907, 2018.

[15] **G. Fragione**, N. Leigh, "*Intermediate-Mass Ratio Inspirals in Galactic Nuclei*", Monthly Notices of the Royal Astronomical Society, 480, 5160, 2018.

[14] **G. Fragione**, N. Leigh, I. Ginsburg, B. Kocsis, "*Tidal Disruption Events and Gravitational Waves from Intermediate Mass Black Holes in Evolving Globular Clusters Across Space and Time*", Astrophysical Journal, 867, 119, 2018.

[13] **G. Fragione**, B. Kocsis, "*Black hole mergers from an evolving population of globular clusters*", Physical Review Letters, 121, 161103, 2018.

[12] **G. Fragione**, "*Tidal breakup of quadruple stars in the Galactic Centre*", Monthly Notices of the Royal Astronomical Society, 479, 2615, 2018.

[11] **G. Fragione**, V. Pavlík, S. Banerjee, "*Neutron stars and millisecond pulsars in star clusters: implications for the diffuse γ -radiation from the Galactic Centre*", Monthly Notices of the Royal Astronomical Society, 480, 4955, 2018.

[10] **G. Fragione**, N. Leigh, "*The secular tidal disruption of stars by low-mass Super Massive Black Holes secondaries in galactic nuclei*", Monthly Notices of the Royal Astronomical Society, 479, 3181, 2018.

[9] **G. Fragione**, I. Ginsburg, B. Kocsis, "*Gravitational waves and Intermediate Massive Black Hole retention in Globular Clusters*", Astrophysical Journal, 856, 92, 2018.

[8] **G. Fragione**, A. Gualandris, "*Tidal breakup of triple stars in the Galactic Centre*", Monthly Notices of the Royal Astronomical Society, 475, 4986, 2018.

[7] **G. Fragione**, F. Antonini, O. Y. Gnedin, "*Disrupted Globular Clusters and the Gamma-Ray Excess in the Galactic Centre*", Monthly Notices of the Royal Astronomical Society, 475, 5313, 2018.

[6] **G. Fragione**, R. Sari, "*Steeper stellar cusps in galactic centers from binary disruption*", Astrophysical Journal, 852, 51, 2018.

— 2017 —

[5] **G. Fragione**, A. Loeb, "*Constraining Milky Way mass with Hypervelocity Stars*", *New Astronomy*, 55, 32-38, 2017.

[4] **G. Fragione**, I. Ginsburg, "*Transits probabilities around hypervelocity and runaway stars*", *Monthly Notices of the Royal Astronomical Society*, 466, 1805-1813, 2017.

[3] **G. Fragione**, R. Capuzzo-Dolcetta, P. Kroupa, "*Hypervelocity stars from young stellar clusters in the Galactic Centre*", *Monthly Notices of the Royal Astronomical Society*, 467, 451-460, 2017.

— 2016 —

[2] **G. Fragione**, R. Capuzzo-Dolcetta, "*High velocity stars from the interaction of a globular cluster and a massive black hole binary*", *Monthly Notices of the Royal Astronomical Society*, 458, 2596-2603, 2016.

— 2015 —

[1] R. Capuzzo-Dolcetta, **G. Fragione**, "*High velocity stars from close interaction of a globular cluster and a super massive black hole*", *Monthly Notices of the Royal Astronomical Society*, 454, 2677-2690, 2015.

Preprints

[2] C. Y. Lam, et al. (incl **G. Fragione**), "*Roman CCS White Paper: Characterizing the Galactic population of isolated black holes*", arXiv:2306.12514, 2023.

[1] **G. Fragione**, "*Intermediate-mass black holes born via repeated mergers are unlikely thermodynamically stable*", arXiv:2204.00380, 2022.

Research Notes

[2] C. L. Rodriguez, K. Kremer, S. Chatterjee, **G. Fragione**, A. Loeb, F. Rasio, N. Weatherford, C. S. Ye, "*The Observed Rate of Binary Black Hole Mergers can be Entirely Explained by Globular Clusters*", *RNAAS*, 5, 19, 2021.

[1] N. Z. Rui, N. Weatherford, K. Kremer, S. Chatterjee, **G. Fragione**, F. Rasio, C. L. Rodriguez, C. S. Ye, "*No Black Holes in NGC 6397*", *RNAAS*, 5, 47, 2021.

Proceedings

[6] **G. Fragione**, A. Loeb, "*A triple channel for black hole-neutron star mergers*", *Bulletin of the American Astronomical Society*, 52, 334.05, 2020.

[5] L. Šubr, **G. Fragione**, J. Dabringhausen, "*Intermediate-Mass Black Holes in binary rich star clusters*", *Proc. IAU Symposium 351*, 2019.

[4] **G. Fragione**, "*Merging black holes of any size and hierarchy*", *Proc. IAU Symposium 351*, 2019.

[3] R. Capuzzo-Dolcetta, **G. Fragione**, "*Super massive black holes and the origin of high-velocity stars*", *Proceed. of the 14th Marcel Grossman Meeting on General Relativity*, pp. 1532-1537, 2018.

[2] **G. Fragione**, R. Capuzzo-Dolcetta, "*Star clusters and super massive black holes: high velocity stars production*", *Mem. Soc. Astron. Ital.*, 87, 687, 2016.

[1] **G. Fragione**, "*Gravity and thermodynamics: fundamental principles and gravothermal instability*", *J. of Phys.: Conf. Ser.*, 556, 012024, 2014.

Press & Media

A. J. Levan, et al. (incl **G. Fragione**), "*A long-duration gamma-ray burst of dynamical origin from the nucleus of an ancient galaxy*", [NOIRLab - Northwestern University](#) - [Reuters](#) - [Daily Mail](#) - [CNN](#), 2023.

G. Fragione, F. Rasio, "*Demographics of Hierarchical Black Hole Mergers in Dense Star Clusters*", [Astrobites](#) - [AAS Nova](#), 2023.

F. Kiroğlu, J. C. Lombardi Jr., K. Kremer, **G. Fragione**, S. Fogarty, F. Rasio, "*Tidal Disruption of Main-Sequence Stars by Intermediate-Mass Black Holes*", [CNN](#) - [Northwestern University](#) - [INAF](#), 2023.

N. Weatherford, F. Kiroğlu, **G. Fragione**, S. Chatterjee, K. Kremer, F. Rasio, "*Stellar Escape from Globular Clusters I: Escape Mechanisms and Properties at Ejection*", [Universe Today](#), 2022.

P. Du, D. Egana-Ugrinovic, R. Essig, **G. Fragione**, R. Perna, "*Searching for Ultra-light Bosons and Constraining Black Hole Spin Distributions with Stellar Tidal Disruption Events*", [Northwestern University](#) - [Perimeter Institute](#) - [Stony Brook University](#) - [Phys.org](#) - [INAF](#), 2022.

Y. Yang, I. Bartos, **G. Fragione**, Z. Haiman, M. Kowalski, S. Marka, R. Perna, H. Tagawa, "*Micro Tidal Disruption Events in Active Galactic Nuclei*", [AAS Nova](#), 2022.

G. Fragione, A. Gualandris, "*Hypervelocity stars from star clusters hosting Intermediate-Mass Black Holes*", [Astrobites](#), 2021.

G. Fragione, A. Loeb, "*An upper limit on the spin of SgrA* based on stellar orbits in its vicinity*", [Harvard University](#) - [Northwestern University](#) - [Phys.org](#) - [Harvard Crimson](#) - [INAF](#), 2020.

S. C. Ye, W.-f. Fong, K. Kremer, C. L. Rodriguez, **G. Fragione**, F. A. Rasio, "*On the rate of neutron star binary mergers from globular clusters*", [Northwestern University](#), 2020.

G. Fragione, A. Loeb, "*Constraining Milky Way mass with Hypervelocity Stars*", [Universe Today](#) - [Phys.org](#), 2017.

Seminars and Conferences

Presentations, 75 (total), 52 (invited), 23 (contributed).

Invited Presentations

— 2023 —

- 23 Oct '23 **[52] Canadian Institute for Theoretical Astrophysics**, Theory Seminar - Toronto (Canada).
- 4 Oct-6 Oct '23 **[51] Lunar GW Workshop**, Invited Review Talk - Nashville (USA).
- 24 May '23 **[50] Sapienza University of Rome**, Physics Colloquium - Rome (Italy).
- 5 May '23 **[49] Caltech**, TAPIR Seminar Talk - Pasadena (USA).
- 3 May '23 **[48] University of California Los Angeles**, Astro Colloquium - Los Angeles (USA).
- 28 Apr '23 **[47] University of California Santa Cruz**, FLASH Talk - Santa Cruz (USA).
- 26 Apr '23 **[46] University of California Berkeley**, Explosive Astro Talk - Berkeley (USA).
- 14 Apr '23 **[45] Vanderbilt University**, Vandygraf and Astronomy Seminar - Nashville (USA).
- 14 Feb '23 **[44] University of Notre Dame**, Astrophysics Seminar - Notre Dame (USA).
- 30 Jan '23 **[43] Harvard University**, Black Hole Initiative Colloquium - Cambridge (USA).
- 26 Jan '23 **[42] University of Mississippi**, Physics Colloquium - Oxford (USA).

— 2022 —

- 29 Sep '22 **[41] Georgia Institute of Technology**, Center for Relativistic Astrophysics Seminar - Atlanta (USA).
- 16 Jul-24 Jul '22 **[40] COSPAR Meeting 2022**, Invited Review Talk - Athens (Greece).
- 5 Jul '22 **[39] University College London**, Astronomy Seminar - London (UK).
- 6 Jun-8 Jun '22 **[38] Astrophysics in the Next Decade: From the First Stars to Intelligent Life**, Invited Talk - Martha's Vineyard (USA).

- 16 May '22 **[37] University of Cambridge**, Seminar at the Department of Applied Mathematics and Theoretical Physics - Oxford (UK).
- 16 Apr '22 **[36] Princeton University**, Galread Seminar - Princeton (USA).
- 29 Mar '22 **[35] Indiana University**, Astronomy Seminar - Bloomington (USA).
- 24 Mar '22 **[34] University of Texas Austin**, Relativity Seminar - Austin (USA).
- 13 Mar-17 Mar '22 **[33] HEAD19 Meeting of the AAS**, Invited Talk - Pittsburgh (USA).
- 1 Mar '22 **[32] Monash University**, Astrophysics Seminar - Melbourne (Australia).
- 8 Feb '22 **[31] Northwestern University**, Astrophysics Seminar - Evanston (USA).
- 17 Jan '22 **[30] University College Cork**, Astronomy Seminar - Cork (Ireland).
- 2021 —
- 13 Jul '21 **[29] Newcastle University**, Astronomy Seminar - Newcastle (UK).
- 18 May '21 **[28] Harvard University**, Black Hole Initiative Colloquium - Cambridge (USA).
- 16 April '21 **[27] University of Texas Rio Grande Valley**, Astronomy Seminar - Brownsville (USA).
- 2020 —
- 13 Nov '20 **[26] University of Arizona**, EHT Group Meeting Seminar - Tucson (USA).
- 21 Oct '20 **[25] Cornell University**, Astrophysics Seminar - Ithaca (USA).
- 6-7 Oct '20 **[24] AGN Disks: Where the Wild Things Are**, Invited Talk - New York (USA).
- 8 May '20 **[23] University of Wisconsin Milwaukee**, Astrophysics Seminar - Milwaukee (USA).
- 29 Apr '20 **[22] University of Concepcion**, Astronomy Seminar - Concepcion (Chile).
- 5 Mar '20 **[21] Center for Computational Astrophysics (CCA)**, CCA Seminar - New York (USA).
- 5 Mar '20 **[20] Columbia University**, Astrophysics Seminar - New York (USA).
- 3 Mar '20 **[19] American Museum of Natural History**, Astrophysics Seminar - New York (USA).
- 2 Mar '20 **[18] Stony Brook University**, Astrophysics Seminar - New York (USA).
- 2019 —
- 13 Dec '19 **[17] Harvard Center for Astrophysics**, Avi Loeb's Group Meeting - Cambridge (USA).
- 8 Nov '19 **[16] Johns Hopkins University**, High Energy Seminar - Baltimore (USA).
- 18 Oct '19 **[15] Northwestern University**, CIERA Theory Group Meeting - Evanston (USA).
- 22 May '19 **[14] Sapienza University of Rome**, Physics Seminar - Rome (Italy).
- 6 Mar '19 **[13] Ben Gurion University of the Negev**, Astrophysics Seminar - Beersheba (Israel).
- 26 Feb '19 **[12] Eötvös Lorand University**, Astrophysics Seminar - Budapest (Hungary).
- 2018 —
- 28 Nov '18 **[11] Technion**, Astrophysics Seminar - Haifa (Israel).
- 6 Nov '18 **[10] Hebrew University of Jerusalem**, Astrophysics Seminar - Jerusalem (Israel).
- 31 Oct '18 **[9] Tel Aviv University**, Astrophysics Seminar - Tel Aviv (Israel).
- 5 Mar '18 **[8] Nicolaus Copernicus Astronomical Center**, Astrophysics Seminar - Warsaw (Poland).
- 30 Jan '18 **[7] Hebrew University of Jerusalem**, Astrophysics Seminar - Jerusalem (Israel).
- 2017 —
- 5 Apr '17 **[6] Technion**, Astrophysics Seminar - Haifa (Israel).
- 2016 —
- 12-15 Dic '16 **[5] (M+1)-st Aarseth N-body Meeting**, Invited talk - Prague (Czech Republic).

- 23 May '16 **[4] University of Surrey**, Astrophysics Seminar - Guildford (UK).
4 May '16 **[3] Eötvös Lorand University**, Astrophysics Seminar - Budapest (Hungary).
27 Jan '16 **[2] Rochester Institute of Technology**, Astrophysics Seminar - Rochester (USA).

— 2015 —

- 18 Nov '15 **[1] University of Bonn**, Astrophysics Seminar - Bonn (Germany).

Contributed Presentations

— 2023 —

- 5 Mar-10 Mar '23 **[23] eXtreme Black Holes**, Aspen Center for Physics - Aspen (USA).

— 2022 —

- 22 Jun-24 Jun '22 **[22] LISA Astro GW Meeting**, University of Birmingham - Birmingham (UK).

- 9 Apr-12 Apr '22 **[21] APS April Meeting 2022**, New York (USA).

- 2 Jan-8 Jan '22 **[20] Dynamical Formation of Gravitational Wave Sources**, Aspen Center for Physics - Aspen (USA).

— 2021 —

- 17 Apr-20 Apr '21 **[19] APS April Meeting 2021**, American Physical Society - (USA).

- 30 Mar-1 Apr '21 **[18] Gravitational waves: a new messenger to explore the universe**, Sorbonne University - Paris (France).

- 22-24 Feb '21 **[17] Science at the Horizon: the Next-Generation EHT**, Harvard University - Cambridge (USA).

— 2020 —

- 7-11 Dec '20 **[16] Supermassive Black Holes**, University of Concepcion - Concepcion (Chile).

- 22-24 Oct '20 **[15] Midwest Relativity Meeting**, University of Notre Dame - Notre Dame (USA).

- 4-8 Jan '20 **[14] 235th AAS meeting**, Honolulu (USA).

— 2019 —

- 11-13 Nov '19 **[13] The New Faces of Black Holes**, Annapolis (USA).

— 2018 —

- 10-14 Sep '18 **[12] Triple Evolution and Dynamics Trendy-2**, Lorentz Center - Leiden (The Netherlands).

- 25-29 Jun '18 **[11] Modest 18: Dense Stellar Systems in the Era of Gaia, Ligo and Lisa**, Santorini (Greece).

- 1 Feb '18 **[10] National Israeli Astronomy Seminar Day**, Hebrew University of Jerusalem - Jerusalem (Israel).

— 2017 —

- 18-22 Sep '17 **[9] Modest 17: Modest under Prague's Starry Sky**, Charles University - Prague (Czech Republic).

— 2016 —

- 5-9 Dic '16 **[8] Stellar Aggregates over Mass and Spatial Scales**, Physikzentrum - Bad Honnef (Germany).

— 2015 —

- 21-25 Sept '15 **[7] 101th National Congress of the Italian Society of Physics (SIF)**, Sapienza University of Rome - Rome (Italy).
- 12-18 Jul '15 **[6] 14th Marcel Grossmann Meeting**, Sapienza University of Rome - Rome (Italy).
- 31 May-5 Jun '15 **[5] Triple Evolution and Dynamics**, Technion - Haifa (Israel).

— 2014 —

- 22-26 Sept '14 **[4] 100th National Congress of the Italian Society of Physics (SIF)**, University of Pisa - Pisa (Italy).
- 14-15 Jul '14 **[3] 5th Young Researcher Meeting 2014**, SISSA - Trieste (Italy).
- 1-14 Jun '14 **[2] The Unquiet Universe**, Cefalú (Italy).
- 14 May '14 **[1] Investigating Strangeness: from Accelerators to Compact Stellar Objects**, LNF - Frascati (Italy).

Meeting Organization

- 2-5 Dec '23 **Intermediate-Mass Black Holes: The Dawn of a Revolutionary Era**, *Chair*, San Pedro (Belize).
- 28 Aug-1 Sep '23 **MODEST-23: Star Clusters in the Post-Pandemic Era**, *Chair*, Northwestern University - Evanston (USA).
- 26 Mar-30 Mar '23 **HEAD20 Meeting of the AAS**, *Chair of Parallel Session*, Waikoloa (USA).
- 30 Apr-3 May '22 **Intermediate-Mass Black Holes: New Science from Stellar Evolution to Cosmology**, *Chair*, Northwestern University - COFI - San Juan, Puerto Rico (USA).
- 22-24 Mar '21 **Triple Evolution and Dynamics Trendy-3**, *Chair*, Northwestern University - Evanston (USA).

Professional Service

- 2022-2023 **Chair of Astrophysics seminar and colloquium committee at Northwestern University (USA).**
- 2021-2022; 2023-2024 **Organizer of the journal club at Northwestern University (USA).**
- 2020-2022 **Astrophysics seminar and colloquium committee at Northwestern University (USA).**
- 2020-2021 **Topic Editor**, *Universe*.
- 2020 **Review panelist for the Dutch Research Council (The Netherlands).**
- 2020 **Review panelist for the Chilean Research Council for Science and Technology (Chile).**
- 2019 **Review panelist for scientific proposals for the ERC Consolidator Grant 2019 (European Union).**
- 2018 **Review panelist for the Telescope Access Program at the Kavli Institute for Astronomy and Astrophysics at Peking University (China).**
- 2018-2019 **Organizer of the astrophysics seminars at the Hebrew University of Jerusalem (Israel).**
- 2018-2019 **Organizer of the journal club at the Hebrew University of Jerusalem (Israel).**
- 2017- **Referee Activity**, *Monthly Notices of the Royal Astronomical Society*, *Astrophysical Journal*, *Astrophysical Journal Letters*, *Physical Review D*, *Physical Review Letters*, *Nature*, *Astronomy & Astrophysics*, *Astrophysics and Space Science*, *Nature Astronomy*.

Teaching Experience

Lecturer

- Sep - Dec '23 **PHYS 130-1 (College Physics) - Mechanics**, Northwestern University - Evanston (USA).
Jun - Aug '23 **PHYS 135-3 (General Physics) - Introduction to Modern Physics and Wave Phenomena**, Northwestern University - Evanston (USA).
Jul '23 **PHYS 130-2 (College Physics) - Electricity and Magnetism**, Northwestern University - Evanston (USA).
Sep - Dec '22 **PHYS 135-2 (General Physics) - Electricity and Magnetism**, Northwestern University - Evanston (USA).
Jun - Jul '22 **PHYS 130-1 (College Physics) - Mechanics**, Northwestern University - Evanston (USA).

Teaching Assistant

- Feb - Sep '16 **Mechanics**, Sapienza University of Rome - Rome (Italy).
Oct '15-Jul '16 **Thermodynamics**, Sapienza University of Rome - Rome (Italy).
Feb - Sep '15 **Mechanics**, Sapienza University of Rome - Rome (Italy).
Oct '14-Jul '15 **Thermodynamics**, Sapienza University of Rome - Rome (Italy).

Student Supervision

Graduate

- 2019- **Rachel Zhang, Miguel A. S. Martinez, Dany Atallah, Newlin Weatherford, Fulya Kiroglu, Elena Gonzalez**, Northwestern University - Primary advisor: Fred Rasio.
2020- **Vladimir Stokov**, Johns Hopkins University - Primary advisor: Emanuele Berti.
2023- **Joseph Fichera**, University of Florida - Primary advisor: Laura Blecha.
2019-2022 **Claire Shi Ye**, Northwestern University - Primary advisor: Fred Rasio.

Undergraduate

- 2020-2021 **Avery Keare**, Northwestern University.
REU
2023 **Rujuta Purohit**, Dartmouth College.
2023 **Charles Gibson**, Allegheny College.
2022 **Dana Kullgren**, University of Delaware.

Outreach

- 2022 **RET Program**, *Research Experiences for Teachers*, Northwestern University (USA).
2020-2022 **REACH Program**, *The REACH program provides high school students experience with astronomy research in an atmosphere of team-style learning, hands-on training, and mentorship from professional scientists*, Northwestern University (USA).
2018 **Public stargazing in the streets of Jerusalem**, *Event organized by students and researchers at the Hebrew University of Jerusalem*, Jerusalem (Israel).

Memberships

- 2021- Laser Interferometer Space Antenna (LISA).
2021- LSST Transients and Variable Stars Science Collaboration (LSST TVSSC).
2021- American Physical Society (APS).
2021- Einstein Telescope (ET).

- 2020- International Astronomical Union (IAU).
- 2020- Cosmic Explorer (CE).
- 2019- American Astronomical Society (AAS).

Computer Skills

Programming Fortran, C, Bash, Python, Machine Learning.
O.S. Linux, MacOS, Microsoft Windows.

Languages

Italian Native Speaker.
English Fluent.
Hebrew Fluent.
French Intermediate.
Spanish Intermediate.

Academic References

Fred Rasio, Northwestern University (USA).
rasio@northwestern.edu

Avi Loeb, Harvard University (USA).
aloeb@cfa.harvard.edu

Bence Kocsis, University of Oxford (UK).
bkocsis@gmail.com

Vicky Kalogera, Northwestern University (USA).
vicky@northwestern.edu

Re'em Sari, Hebrew University of Jerusalem (Israel).
sari@phys.huji.ac.il

Roberto Capuzzo-Dolcetta, Sapienza University of Rome (Italy).
roberto.capuzzodolcetta@uniroma1.it