CURRICULUM VITAE

- Maria Giovanna Dainotti -

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Research expertise: High energy astrophysics, gamma ray bursts (GRBs), Quasars (QSOs), selection bias, statistical methods for astronomical data, active galactic nuclei (AGN) and machine learning (ML) applied to GRBs and AGN. Discoverer of the Dainotti relations in GRB afterglows between the luminosity at the end of the plateau phase, La, and its rest frame duration, Ta, and in GRB prompt-afterglow between La and the peak luminosity of the prompt emission, Lpeak. The first relation indicates that the more luminous the plateau phase is, the shorter its duration, i.e., the more powerful the phenomenon is, the quicker it consumes its energy. The second relation shows that the prompt luminosity is proportional to the luminosity at the end of the plateau phase. An extension of these two relations led to the discovery of a fundamental plane for GRB afterglows. The application of these relations in combination with supernovae Type Ia (SNe Ia) and cosmic microwave background radiation (CMB) led to obtain compatible results with these previous probes showing the validity of these relations as cosmological tools. Recently, additional studies by me and collaborators showed the reliability of QSOs as standard candles as well and that the statistical assumptions commonly used for Supernovae Ia (SNe Ia), QSOs and Baryon Acoustic Oscillations are challenged. The use of more accurate statistical assumptions has reduced the uncertainties on cosmological parameters of 43%. The application of ML to the GRBs has led to a reliable method to infer GRB redshifts with a correlation between the observed and predicted redshifts of > 90%.

Summary of key achievements

1. 18 years of experience in research on high energy astrophysical phenomena, such as GRBs, SNe Ia and Quasar cosmology and ML applied to GRBs and AGN.

2. discovered several important relations (dubbed the Dainotti relations) existing among relevant parameters in GRB prompt and afterglow emission. This discovery has contributed to further our understanding of the GRB emission mechanism.

3. investigate the use of GRBs and QSOs as valuable cosmological tools in combination with SNe Ia and CMB to infer cosmological parameters.

4. study the Hubble constant tension with SNe Ia, GRBs and QSOs and how possible evolutionary effects in SNe Ia can affect the determination of cosmological parameters.

5. Evaluate selection effects and/or cosmological evolutions via robust statistical techniques applied for GRB and QSOs. These techniques are versatile so that they can be used for any extragalactic objects that undergo a redshift evolution and a selection bias due to instrumental truncation, such as SNe Ia, galaxy clusters, AGN, etc.

6. Lead a team that developed and utilized advanced ML and statistical learning methods,

such as the Superlearner used for the first time in astronomical application in AGN.

7. Received numerous awards including the Knighthood of the Italian Republic. https://www.quirinale.it/onorificenze/insigniti/323628

8. Have mentored >140 students, among high school, undergrad and grad students from all over the world. 60% of them are women and belong to underrepresented minority groups.

Education

Dec 2008 PhD in International Relativistic Astrophysics University of Rome La Sapienza, Rome, Italy. Dissertation: "GRBs associated with SNe Ib/c and their theoretical interpretation within the Fireshell model". Advisor: Professor Remo Ruffini. International Relativistic Astrophysics Ph.D. Program (IRAP) Fellowship: First in the IRAP PhD cycle to obtain the doctorate in the short period of 3 years. IRAP is a consortium of seven participating institutions: Rome La Sapienza, ETH Zurich, Freie Universitat at Berlin, Observatoire de la Côte d'Azur, Universite' de Nice-Sophia Antipolis, Universite' de Savoie and the University of Ferrara.

July 2005: Master Degree in Physics, University of Salerno, Italy. Earned with full marks, magna cum laude. Thesis: "Standard Candles in Astronomy". Supervisor Professor S. Capozziello.

Professional Positions

1. Assistant Professor at the National Observatory of Japan, January 2021–present.
2. Assistant Professor at Sokendai, Japan, February 2021–present.
3. Affiliated Scientist at Space Science Institute, Colorado, May 2020–present.
4. Visiting Assistant Professor, University of Nevada, Las Vegas, April 2021-present.
5. Senior Research Scientist, iTHEMS, RIKEN, Japan, 2020/12-2020/10.
6. Assistant Professor at Jagiellonian University Poland, 2012/04– 2020/12.
7. Visiting Scholar at Stanford University within the miniatura grant from the polish ministry of Science and Education, June 2019–September 2019.
8. Riken Pioneer Research Grant, January-February 2019.
9. American Astronomical Society Chretienne Fellow, August 2018–January 2019 at Stanford.
10. Visiting Scholar at Stanford University, February 2018.
11. Marie Curie Ingoing Fellowship, INAF, Bologna, Italy June 2017–January 2018.
12. Marie Curie Outgoing Fellowship, Stanford, CA, US, Feb 2015–June 2017.
13. Japan Society for Promotion of Science Fellowship, Riken, Japan, Nov 2013–Jan 2015.
14. Blanceflor-Ludovisi Scholar at Stanford University, Stanford, CA, USA, May 2013–Nov 2013.
15. Blanceflor-Ludovisi Scholar at Stanford University, Stanford, CA, USA, Oct 2012–May 2013.
16. Fulbright Scholar at Stanford University, Stanford, CA, USA, Oct 2012–Sept 2013.
17. Visiting Scientist at UNAM University, Mexico City, Mexico, May 2013.
18. Fulbright Visiting Scholar Enrichment Program in Puerto Rico, USA, March 2013.
19. L'Oreal Italia Scholar at "La Scuola Normale", Pisa, Italy, June 2012–March 2013.
20. Visiting Scientist at Stanford University, Stanford, CA, USA, Oct 2011–March 2012 with the Mobilnosc Plus Fellowship from the Polish Ministry of Science and Education.
21. Visiting Scientist at Leicester University, Leicester, UK, June 2011–July 2011.
22. Research Assistant at Jagiellonian University, Krakow, Poland, Feb 2009–March 2012.
23. Visiting Scientist at Harvard University, Cambridge, MA, USA, Sept 2009.
24. Visiting Scientist at Jagiellonian University, Krakow, Poland, Jan 2009.

Publications

Total Number =238 including GCN, 95 refereed papers and a book, 46 are referred papers as first author, 50 as a co-author with two as ashared first coauthor. Proceedings: 44; GCN:99. As a note, paper numbers 19, 25, 51 are in the top 1% most cited in the Web of Science, and number 50 is in the top 0.1% in the web of Science. H-index=38 and total citations=4884 according to Google Scholar.

Referred Publication list as a lead author

1. Dainotti et al. 2024, "The largest GRB optical catalog with known redshift", MNRAS, tmp.1527D.
2. Dainotti et al. 2024, "GRBs as Distance Indicators by a Statistical Learning Approach", ApJL, 967, 2, id.L30.
3. Dainotti et al. 2024, "A new binning method to choose a standard set of Quasars", Physics of the Dark Universe, Vol. 44, article id. 101428. DOI: doi.org/10.1016/j.dark.2024.101428,https://arxiv.org/abs/2401.12847.
4. Dainotti et al. 2024, "The scavenger hunt for Quasar samples to be used as cosmological tools: similarities with Gamma-Ray Burst analysis of standard candles", Galaxies, Vol. 12, issue 1, p. 4. DOI:https://doi.org/10.3390/galaxies12010004
5. Dainotti et al. 2024, "On the statistical assumption on the distance moduli of Supernovae Ia and its impact on the determination of cosmological parameters", Journal of High Energy Astrophysics, Vol. 41, p. 30-41, ISSN 2214-4048, https://doi.org/10.1016/j.jheap.2024.01.001.
6. Dainotti et al. 2024, "Inferring the redshift of more than 150 GRBs with a machine learning ensamble", accepted in ApJS, DOI: 10.48550/arXiv.2401.03589
7. Dainotti et al. 2024, "Reduced uncertainties up to 43\% on the Hubble constant and the matter density with the SNe Ia with a new statistical analysis, JHEAP, Vol. 41, pp. 30-41, ISSN 2214-4048, https://doi.org/10.1016/j.jheap.2024.01.001.
8. Dainotti et al. 2023, "A Stochastic Approach to Reconstruct Gamma-Ray-burst Light Curves", ApJS, 2023, Vol. 267, Issue 2, p 42. https://iopscience.iop.org/article/10.3847/1538-4365/acdd07, DOI: 10.3847/1538-4365/acdd07.
9. Dainotti et al. 2023, "Reducing the Uncertainty on the Hubble Constant up to 35% with an Improved Statistical Analysis: Different Best-fit Likelihoods for Type Ia Supernovae, Baryon Acoustic Oscillations, Quasars, and Gamma-Ray Bursts", ApJ, 951, Vol. 1, Issue 1, id. 63, 24. DOI:10.3847/1538-4357/acd63f
10. Dainotti et al. 2023, Quasars: Standard Candles up to z = 7.5 with the Precision of Supernovae Ia, ApJ, Volume 950, Issue 1, id. 45, 8, 10.3847/1538-4357/accea0
11. Dainotti et al. 2023, "The Closure Relations in High-Energy Gamma-Ray Bursts detected by Fermi-LAT", Galaxies 2023, Vol. 11, 1, pp. 25. https://doi.org/10.3390/galaxies11010025.
12. Dainotti et al. 2023, "The gamma-ray bursts fundamental plane correlation as a cosmological tool", MNRAS, Vol. 518, 2, pp 2201-2240, https://ui.adsabs.harvard.edu/abs/2023MNRAS.518.2201D/abstract

13. Dainotti et al. 2022, "The Closure Relations in Optical Afterglow of Gamma-Ray Bursts", ApJ, Vol. 940, Issue 2, Id. 169, pp. 14. https://ui.adsabs.harvard.edu/abs/2022ApJ...940..169D/abstract

14. Dainotti et al. 2022, "Gamma-ray bursts, Supernovae Ia, and baryon acoustic oscillations: A binned cosmological analysis", PASJ, Vol. 74, Issue 5, pp. 1095-1113. https://ui.adsabs.harvard.edu/abs/2022PASJ. 74.1095D/abstract

15. Dainotti et al. 2022, "The Quest for New Correlations in the Realm of the Gamma-Ray Burst-Supernova, Connection", ApJ, Vol. 938, Issue 1, id. 41D, pp. 27. https://ui.adsabs.harvard.edu/abs/2022ApJ...938. 41D/abstract

16. Dainotti et al., 2022, "Optical and X-ray GRB Fundamental Planes as cosmological distance indicators",MNRAS, Vol. 514, Issue 2, pp. 1828-1856. https://ui.adsabs.harvard.edu/abs/2022MNRAS.514.1828D/abstract

17. Dainotti et al. 2022, "The Optical Two- and Three-dimensional Fundamental Plane Correlations for Nearly 180 Gamma-Ray Burst Afterglows with Swift/UVOT, RATIR, and the Subaru Telescope", ApJS, Vol. 261, Issue 2, id 25, pp. 20. https://ui.adsabs.harvard.edu/abs/2022ApJS..261. 25D/abstract

18. Dainotti et al. 2022, "Quasar Standardization: Overcoming Selection Biases and Redshift Evolution", ApJ, Vol. 931, Issue 2, id. 106. https://ui.adsabs.harvard.edu/abs/2022ApJ...931..106D/abstract

19. Dainotti et al. 2022, "On the evolution of the Hubble constant with the SNe Ia Pantheon Sample and Baryon Acoustic Oscillations: A feasibility study for GRB-cosmology in 2030", Galaxies, Vol. 10, issue 1, pp. 24. https://www.mdpi.com/2075-4434/10/1/24;

20. Dainotti et al. 2021, "Accounting for Selection Bias and Redshift Evolution in GRB Radio Afterglow Data", Galaxies; Vol. 9, issue 4, pp. 95. https://ui.adsabs.harvard.edu/abs/2021Galax...9. 95D/abstract

21. Dainotti et al. 2021, "Predicting the Redshift of γ-Ray-loud AGNs Using Supervised Machine Learning", ApJ, Vol. 920, Issue 2, id.118, pp. 20. https://ui.adsabs.harvard.edu/abs/2021ApJ...920..118D/abstract

22. Dainotti et al. 2021, "Closure relations during the plateau emission of Swift GRBs and the fundamental plane", PASJ, Vol. 73, Issue 4, pp. 970-1000. https://ui.adsabs.harvard.edu/abs/2021PASJ...73..970D/abstract

23. Dainotti et al. 2021, "On the Existence of the Plateau Emission in High-energy Gamma-Ray Burst Light Curves Observed by Fermi-LAT", ApJS, Vol. 255, Issue 1, id. 13, pp. 14. DOI 10.3847/1538-4365/abfe17

24. Dainotti et al. 2021, "Cosmological Evolution of the Formation Rate of Short Gamma-Ray Bursts with and without Extended Emission", ApJL, Vol. 914, Issue 2, id.L40, pp. DOI: 10.3847/2041-8213/abf5e4.

25. Dainotti et al. 2021, "On the Hubble Constant Tension in the SNe Ia Pantheon Sample", ApJ, Vol. 912, Issue 2, id.150, pp. 15. DOI 10.3847/1538-4357/abeb73

26. Dainotti et al. 2020, "The Optical Luminosity-Time Correlation for More than 100 Gamma-

Ray Burst Afterglows". ApJL, Vol. 905, Issue 2, id. L26, pp. 8. DOI: 10.3847/2041-8213/abcda9.

27. Dainotti et al. 2020, The X-Ray "Fundamental Plane of the Platinum Sample, the Kilonovae, and the SNe Ib/c Associated with GRBs", ApJ, Vol. 904, Issue 2, id.97, pp. 13. DOI: 10.3847/1538-4357/abbe8a

28. Dainotti et al. 2018, "Gamma-ray Burst Prompt Correlations: Selection and Instrumental Effects. Publications of the Astronomical Society of the Pacific", Vol. 130, Issue 987, pp. 051001. DOI: 10.1088/1538-3873/aaa8d7

29. Dainotti et al. 2018, "Gamma-Ray Burst Prompt Correlations". Advances in Astronomy, Vol. 2018,id.4969503.DOI: 10.1155/2018/4969503

30. Dainotti et al. 2017, "A Study of the Gamma-Ray Burst Fundamental Plane", ApJ, Vol. 848, Issue 2, id. 88, pp. 12. DOI: 10.3847/1538-4357/aa8a6b

31. Dainotti et al. 2017, "Gamma Ray Burst afterglow and prompt-afterglow relations: An overview", NewAR, Vol. 77, pp. 23-61. DOI: 10.1016/j.newar.2017.04.001

32. Dainotti et al. 2017, "A study of gamma ray bursts with afterglow plateau phases associated with supernovae", A&A, Vol. 600, id A98, pp. 11. DOI: 10.1051/0004-6361/201628384

33. Dainotti et al. 2016, "A Fundamental Plane for Long Gamma-Ray Bursts with X-Ray Plateaus", ApJL, Vol. 825, Issue 2, id. L20, pp. 6. DOI: 10.3847/2041-8205/825/2/L20

34. Dainotti et al. 2015, "Luminosity-time and luminosity-luminosity correlations for GRB prompt and afterglow plateau emissions", MNRAS, Vol. 451, Issue 4, pp.3898-3908. DOI: 10.1093/mnras/stv1229

35. Dainotti et al. 2015, "Selection Effects in Gamma-Ray Burst Correlations: Consequences on the Ratio between Gamma-Ray Burst and Star Formation Rates", ApJ, Vol. 800, Issue 1, id. 31, 12 pp. DOI: 10.1088/0004-637X/800/1/31

36. Dainotti et al. 2013, "Slope evolution of GRB correlations and cosmology", MNRAS, Vol. 436, Issue 1, pp.82-88. DOI: 10.1093/mnras/stt1516

37. Dainotti et al. 2013, "Determination of the Intrinsic Luminosity Time Correlation in the X-Ray Afterglows of Gamma-Ray Bursts", ApJ, Vol. 774, Issue 2, article id. 157, pp. 9. DOI: 10.1088/0004-637X/774/2/157

38. Dainotti et al. 2012, "A cosmic ray cocoon along the X-ray jet of M87?", MNRAS, Vol. 426, Issue 1, pp. 218-225. DOI: 10.1111/j.1365-2966.2012.21086.x

39. Dainotti et al. 2012, "On the intrinsic nature of the updated luminosity time correlation in the X-ray afterglows of GRBs. Death of Massive Stars: Supernovae and Gamma-Ray Bursts, Proceedings of the International Astronomical Union", IAU Symposium, Vol. 279, pp. 248-252. DOI: 10.1017/S1743921312013002

40. Dainotti et al. 2011, "Towards a standard gamma-ray burst: tight correlations between the prompt and the afterglow plateau phase emission", MNRAS, Vol. 418, Issue 4, pp. 2202-2206. DOI: 10.1111/j.1365-2966.2011.19433.x

41. Dainotti et al. 2011, "Study of Possible Systematics in the L*X-T*a Correlation of Gamma-

ray Bursts", ApJ, Vol. 730, Issue 2, id. 135, pp. 10. DOI: 10.1088/0004-637X/730/2/135

42. Dainotti et al. 2010, "Discovery of a Tight Correlation for Gamma-ray Burst Afterglows with Canonical Light Curves", ApJL, Vol. 722, Issue 2, pp. L215-L219. DOI: 10.1088/2041-8205/722/2/L215.

43. Dainotti et al. 2010, "The astrophysical trypthic: GRB, SN and URCA can be extended to GRB060218?", JKPS, Vol. 56, issue 51, pp. 1588. DOI: 10.3938/jkps.56.158837)

44. Dainotti et al. 2008, "A time-luminosity correlation for γ-ray bursts in the X-rays", MNRAS: Letters, Vol. 391, Issue 1, pp. L79-L83 DOI: 10.1111/j.1745-3933.2008.00560.x

45. Dainotti et al. 2007, "GRB 060218 and GRBs associated with supernovae Ib/c", A&A, Vol. 471, Issue 2, pp. L29. DOI: 10.1051/0004-6361:20078068

46. Dainotti, M.; 2019, "Gamma-ray Burst Correlations; Current status and open questions. Gamma-ray Burst Correlations; Current status and open questions, by Dainotti, Maria". ISBN: 978-0-7503-1573-9. IOP ebooks. Bristol, UK: IOP Publishing, 2019. DOI: 10.1088/2053-2563/aae15c

Refereed Publications list as a co-author

47. Colgáin, E. Ó.; et al. 2022, "Putting Flat ΛCDM In The (Redshift) Bin", eprint arXiv:2206.11447. DOI 10.48550/arXiv.2206.11447, Physics of the Dark Universe, 44, id.101464.

48. Montani, Carlevaro, Dainotti, "Slow-rolling scalar dynamics and as solution for the Hubble tension", Physics of the Dark Universe, 44, id.101486.

49. Petrosian & Dainotti, "Progenitors of Low-redshift Gamma-Ray Bursts", ApJL, Vol. 963, 12

50. Rinaldi, Fraija, Dainotti, "Parameter inference of a state-of-the-art physical afterglow model for GRB 190114C.", Galaxies, 12, 1, 5.

51. Angulo et al. 2023, including Dainotti, "Machine-Learning Enhanced Photometric Analysis of the Extremely Bright GRB 210822A", MNRAS, 527, Issue 3, pp.8140-8150.

52. Fraija, N, Dainotti et al. 2023, "Microphysical parameter variation in gamma-ray burst stratified afterglows and closure relations: from sub-GeV to TeV observations", MNRAS, Vol. 527, Issue 2, pp.1884-1909. DOI: 10.1093/mnras/stad3272

53. Fraija, N. et al. 2023, including Dainotti: "An explanation of GRB Fermi-LAT flares and high-energy photons in stratified afterglows", MNRAS, Vol 527, Issue 2, pp.1674-1704. DOI: 10.1093/mnras/stad3243

54. Bhardwaj, Dainotti et al. 2023, "GRB optical and X-ray plateau properties classifier using unsupervised machine learning", MNRAS, Volume 525, Issue 4, pp.5204-5223. DOI: 10.1093/mnras/stad2593

55. Fraija, et al. 2023, including Dainotti, "The unprecedented flaring activities around Mrk 421 in 2012 and 2013: The test for neutrino and UHECR event connection", JHEA, Vol. 40, p 55. DOI:10.1016/j.jheap.2023.10.003.

56. Bargiacchi, Dainotti, & Capozziello 2023, "Tensions with the flat ΛCDM model from high-redshift cosmography", MNRAS, Vol. 525, Issue 2, pp.3104-3116. DOI:10.1093/mnras/stad2326

57. Cooper, N., Dainotti, M. et al. 2023, "Fermi LAT AGN classification using supervised machine

learning", MNRAS, 525, 1731C, DOI: 10.1093/mnras/stad2193.

58. Bargiacchi, Dainotti et al. 2023, "Gamma-Ray Bursts, Quasars, Baryonic Acoustic Oscillations, and Supernovae Ia: new statistical insights and cosmological constraints", MNRAS, Vol. 521, Issue 3, pp.3909-3924. DOI:0.1093/mnras/stad7631.

59. Fraija, N., Dainotti et al. 2023, "Off-axis Afterglow Closure Relations and Fermi-LAT Detected Gamma-Ray Bursts", ApJ, Vol. 958, Issue 2, id126.

60. Charakraborty, A.; Dainotti, M.; et al, 2023, "Radio-bright vs. Radio-dark Gamma-ray Bursts - More Evidence for Distinct Progenitors", MNRAS, tmp, 453C, arXiv:2210.12972.

61. Levine, D.; Dainotti M.; Fraija, N. et al., "Interpretation of radio afterglows in the framework of the standard fireball and energy injection models", MNRAS, Vol. 519, Issue 3, pp. 4670. https://ui.adsabs.harvard.edu/abs/2023MNRAS.519.4670L/abstract

62. Do, E. Pedreira et al. 2023, "Afterglow Polarization from Off-axis Gamma-Ray Burst Jets", ApJ, Vol. 942, Issue 2, id.81, pp. 12. DOI: 10.3847/1538-4357/aca019

63. Fraija et al. 2022, "Modeling Gamma-Ray Burst Afterglow Observations with an Off-axis Jet Emission", ApJ, Vol. 940, Issue 2, id. 189, pp. 26. DOI: 10.3847/1538-4357/ac68e1

64. Łukasz L, Bargiacchi, G; Dainotti, M; et al. 2022; "A bias-free cosmological analysis with quasars alleviating H0 tension", ApJS, Vol. 264, Issue 2, id. 46, pp. 20. eprint arXiv:2211.10785. DOI 10.48550/arXiv.2211.10785

65. Cao, S.; Dainotti, M.; Ratra, B.; 2022, "Gamma-ray burst data strongly favour the three-parameter fundamental plane (Dainotti) correlation over the two-parameter one", MNRAS, Vol. 516, Issue 1, pp.1386-1405. https://ui.adsabs.harvard.edu/abs/2022MNRAS.516.1386C/abstract;

66. Dereli-Begue, H.; et al. 2022, "A wind environment and Lorentz factors of tens explain gamma-ray bursts X-ray plateau", Nature Communications, Vol. 13, id. 5611. https://ui.adsabs.harvard.edu/abs/2022NatCo..13.5611D.

67. Ó Colgáin, E.; et al. 2022, "Revealing intrinsic flat Λ CDM biases with standardizable candles", Phys.Rev. D, Vol. 106, Issue 4, id L041301. https://ui.adsabs.harvard.edu/abs/2022PhRvD.106d1301O

68. Fraija, N.; Dainotti, M.; et al., 2022, "Synchrotron Self-Compton Afterglow Closure Relations and Fermi-LAT-detected Gamma-Ray Bursts", ApJ, Vol. 934, Issue. 2, Id. 188, pp. 11. https://ui.adsabs.harvard.edu/abs/2022ApJ...934..188F

69. Fraija, N.; et al. 2022, "GRB Afterglow of the Sub-relativistic Materials with Energy Injection", ApJ, Vol. 933, Issue 2, id 243, pp. 25. DOI: 10.3847/1538-4357/ac714d

70. Narendra, A.; Gibson, S. J.; Dainotti, M. G. 2022; "Predicted redshifts of gamma-ray loud AGNs using supervised machine learning II"; ApJS, Vol. 259, Issue 2, id. 55, pp. 16. DOI: 10.3847/1538-4365/ac545a

71. Abdalla, E.; et al. 2022, "Cosmology intertwined: A review of the particle physics, astrophysics, and cosmology associated with the cosmological tensions and anomalies", JHEAp, Vol. 34, pp. 49-211. DOI: 10.1016/j.jheap.2022.04.002

72. Cao, S.; Dainotti, M.; Ratra, B.; 2022, "Standardizing Platinum Dainotti-correlated gamma-ray bursts, and using them with standardized Amati-correlated gamma-ray bursts to constrain cosmological model parameters", MNRAS, Vol. 512, Issue 1, pp. 439-454. DOI: 10.1093/mnras/stac517

73. Gibson, S.J.; Narendra, A.; Dainotti, M.; et al. 2022, "Using Multivariate Imputation by ChainedEquations to Predict Redshifts of Active Galactic Nuclei. Frontiers in Astronomy and Space Sciences", Vol. 9, id. 836215. DOI: 10.3389/fspas.2022.836215

74. Levine, D; Dainotti, M.; Zvonarek, K. J.; et al.; 2022, "Examining Two-dimensional Luminosity-Time Correlations for Gamma-Ray Burst Radio Afterglows with VLA and ALMA", ApJ,Vol. 925, Issue 1, id.15, pp. 10. DOI: 10.3847/1538-4357/ac4221

75. Warren, Donald C.; Dainotti, M.; et al. 2022, "A Semianalytic Afterglow with Thermal Electrons and Synchrotron Self-Compton Emission", ApJ, Vol. 924, Issue 1, id.40, pp. 16. DOI:10.3847/1538-4357/ac2f43

76. Valore, P.; Dainotti, M.; Kopczyński, O.; 2021, "Ontological Categorizations and Selection Biases in Cosmology: the case of ExtraGalactic Objects", Foundations of Science, Vol. 26, pp. 515–529. DOI: 10.48550/arXiv.2008.04746

77. Fraija, N.; Kamenetskaia, B.B; Dainotti, M.; et al. 2022, "Afterglow Light Curves of Non-relativistic Ejecta Mass in a Stratified Circumstellar Medium", ApJ, Vol. 907, Issue 2, id.78, pp. 24. DOI: 10.3847/1538-4357/abcaf6

78. Fraija, N.; et al.; 2020, "GRB Fermi-LAT Afterglows: Explaining Flares, Breaks, and Energetic Photons", ApJ, Vol. 905, Issue 2, id.112, pp. 14. DOI: 10.3847/1538-4357/abc41**a**

79. Srinivasaragavan, G. P.; Dainotti, M.; et al., 2020, "On the Investigation of the Closure Relations for Gamma-Ray Bursts Observed by Swift in the Post-plateau Phase and the GRB Fundamental Plane", ApJ, Vol. 903, Issue 1, id.18, pp. 15. DOI: 10.3847/1538-4357/abb702

80. Ajello, M.; et al.; 2019, "A Decade of Gamma-Ray Bursts Observed by Fermi-LAT: The Second GRB Catalog", ApJ, Vol. 878, Issue 1, id. 52, pp. 61. DOI: 10.3847/1538-4357/ab1d4e.

81. Lloyd-Ronning, N. M.; Gompertz, B.; Pe'er, A.; Dainotti, M.; et al., 2019, "A Comparison between Radio Loud and Quiet Gamma-Ray Bursts, and Evidence for a Potential Correlation between Intrinsic Duration and Redshift in the Radio Loud Population", ApJ, Vol. 871, Issue 1, articleid. 118, pp. 8. eprint arXiv:1809.04190. DOI: 10.48550/arXiv.1809.04190

82. Stratta, G.; Dainotti, M., et al, 2018, "On the Magnetar Origin of the GRBs Presenting X-Ray Afterglow Plateaus", ApJ, Vol. 869, Issue 2, id. 155, pp. 10. DOI: 10.3847/1538-4357/aadd8f. This isa first shared author publication.

83. Stratta, G.; et al. 2018, "THESEUS: A key space mission concept for Multi-Messenger Astrophysics", Advances in Space Research, Vol. 62, Issue 3, pp. 662-682. DOI: 10.1016/j.asr.2018.04.013

84. Amati, L.; et al., 2018, "The THESEUS space mission concept: science case, design and expectedperformances", Advances in Space Research, Vol. 62, Issue 1, pp. 191-244. DOI: 10.1016/j.asr.2018.03.010

85. Del Vecchio, R.; Dainotti, M.; Ostrowski, M., 2016, "Study of GRB Light-curve Decay Indices in the Afterglow Phase", ApJ, Vol. 828, Issue 1, id. 36, pp. 6. DOI: 10.3847/0004-

637X/828/1/36

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Teaching

NAOJ and Sokendai (January 2020-present)

a. October 2022- February 2023 Leader of the high energy astrophysics course both theoryand exercises, seminar basic C first and second semester (45 h).
b. January-April 2024, Guest Lecturer of the Big Data Corral at the University of South Methodisth, Dallas, US. The lectures are held online.

Jagiellonian University, Krakow, Poland (2009-2020)

c. February 2020 - June 2020 Leader at the colloquia for the PhDs (30 h).
d. August 2020, Astronomical exercises held in one week (40 hours, undergrad).
e. February 2020-June 2020 high energy astrophysics, theory and exercises (60 h, master).
f. March 2020 - June 2020 Teaching assistant in Observational Astronomy (40 h, undergrad).
g. February 2019 - June 2019 Leader at the colloquia for the PhDs (30 h).
h. February 2019 - June 2019 high energy astrophysics, theory and exercises (60 h, master).
i. March 2019 - June 2019 Teaching assistant in Observational Astronomy (40 h, undergrad).
j. February 2018 - June 2018 Leader of the teaching at the colloquia for the PhDs (30 h).
k. March 2018 - June 2018 high energy astrophysics, theory and exercises (60 h, master).
l. March 2018 - June 2018 Teaching assistant in Observational Astronomy (undergrad, 40 h).
m. Feb 2012 – June 2012 Teaching assistant in High Energy Astrophysics (30 h, master).
n. Feb 2012 – June 2012 Teaching assistant in Observational Astrophysics (30 h, undergrad).
o. Feb 2012 – June 2012 Teaching assistant in Observational Astronomy (30 h, undergrad).
p. Feb 2011 – June 2011 Teaching assistant in High Energy Astrophysics (30 h, master).
q. Feb 2011 – June 2011 Teaching assistant in Observational Astronomy (30 h, undergrad).
r. Feb 2011 – June 2011 Teaching assistant in Observational Astrophysics (30 h,

undergrad).

s. Feb 2011 – June 2011 Teaching assistant in the High Energy Astrophysics (30 h, master).
t. Feb 2011 – June 2011 Teaching assistant in Observational Astronomy (30 h, undergrad).
u. Feb 2011 – June 2011 Teaching assistant in Observational astrophysics (30 h, undergrad).
v. Feb 2010 – June 2010 Teaching assistant in High Energy Astrophysics (30 h, master).
w. Feb 2010 – June 2010 Teaching assistant in Observational Astronomy (30 h, undergrad).
x. Feb 2010 – June 2010 Teaching assistant in Observational Astrophysics (30 h, undergrad).
y. Feb 2009 – June 2009 Teaching assistant in High Energy Astrophysics (30 h, master).
z. Feb 2009 – June 2009 Teaching assistant in Observational Astronomy course (30 h).
aa. Feb 2009 – June 2009 Teaching assistant in Observational Astrophysics course (30 h).

University of Rome La Sapienza, Rome, Italy:

bb. Nov 2005–June 2006 Teaching assistant in the "General Relativity".

Supervising students

Total students supervised since 2007=141. The breakdown is Postdoctoral Fellows: 2; PhDs:13; master students:13; undergraduates: 112; high school:14. Out of these students supervised I have published so far papers with 22 undergraduates (22%), 6 with high school (46%), 4 master students (18%), and 12 PhD (92%).

Out of these 60% are women, transgender, people with disabilities and belong to underrepresented and underprivileged minorities (e.g., first generation College students).

Many students found my supervision very profitable, and they continued working in my group after the summer and they kept working with me when I moved from Jagiellonian to NAOJ. These students are counted in each section, but they are not counted twice in the total computation.

At NAOJ/Sokendai: 01/2021 – 01/2024 and in collaboration with University of Salerno, Naples, Jagiellonian University, University of Tor Vergata, University National Autonoma of Mexico (UNAM), Puerto Rico and several Universities from India. Total number of students supervised among PhD, master, and undergraduates: 8**7.**

Postdoctoral Fellows: 2 Purba Mukherjee, Sarath Nelleri.

PhD students: 13. Supervised, supervising and collaborated: S. Bhardwaj; co-supervised: T. Schiavone, G. Sarracino, A. Narendra, B. De Simone, G. Bargiacchi, Antonio Galvan, Arianna Favale, C. Pedreira, B. Betancourt, E. Aguilar; collaborated with Camila A. Valdez and C. Shulei. Narendra, Bargiacchi and De Simone have visited NAOJ for 3.5 months, 6 and 12 months, respectively. The joint co-supervision of De Simone and Narendra is for the full duration of the PhD (three and four years, respectively). The duration of the co-supervision of Bargiacchi is for 2 years and 6 months: from 1st of November 2021 until 31st of May 2024. The co-supervision of A. Favale started in July 2023, and it will last until end of May 2024 with the possibility of extension. The co-supervision of Sarracino lasted almost three years, it started at the beginning of his PhD, December 2018, and ended on the 30/09/2021. The co-supervision of T. Schiavone lasted for one year and a half, from July 2020 until January 2022. **Papers published and accepted with De**

Simone 4, with Narendra 4, with Bargiacchi 7, with Schiavone 2, with Sarracino 4.

Master students: **13.** Master student at the Center of Astrophysics of Maiselle, 1 from Italy (R. F. Mohideen Malik, started as undergraduate), 3 from Holland (Angana Chakraborty, Sushreta Paul, K. Kalinowski started as an undergraduate), two from Poland (K. Wozniak, A. Lenart), one from Teheran (M. Ghodsi), one from Lebanon (Wajihl Jamal), one from India (Raman Kumar), one from Algery (K. M. Islam). **Papers published:**1 with Chakraborty, 1 with Kalinowski, 1 with Islam, 1 with Wozniak, 10 with Lenart. Lenart started in high school.

Undergraduate students: **49, short term internship** (from 1 to 10 weeks) 3 from summer and Winter students of Sokendai (Y. Kawabata, Kawagucki, K., N. Lachshimi), 2 from Poland (J. Osenka, G. Krężel), 13 from India (Harikant, H. Raj, H. Chawla, T. Singh, R. Sankar, A. Salgundi, Swati S., T. Singh, S. Sahu), one from Puerto Rico (N. Rosado); **Long term students** (more than10 weeks): two undergraduate students from Poland (A. Rabeda, G. Rucki), 1 from summer student of Sokendai (D. Kido), 18 undergraduate students from India (N. Saha, S. Ugale, D. Jyoti, B. Gangula, S. Sourav, G. Govindara, V. Singh Sindhu, S. Gharat, R. Sharma, U. Das, T.S.S. Venkatesh, A. Kalsi, Vikas P. A., A. Chraya, D. Mishra, D. Mitra, I. Jindal, S. Chakraborty), 2 from US (S. Livermore, D. Levine). **Papers published:** 1 with Kawagucki and Islam;1 with D. Jyoti, 2 with S. Ugale; 2 with Sourav, 1 with Chraya, 1 with Livermore, 8 with Levine, 1 with Sharma, 1 with Kalsi, 1 with Venkatesh.

High school students: **12.** 5 from Puerto Rico (M. Fuentes, L; Zambrano, L; Zambrano-Tapia, A.; Sanchez-Vazquez, E, G. Enid), 5 from US (Tran B., C. Wala, E. Johnson, D.Sooknauth, L. Chan), 1 from India (S. Gupta) and one from Poland (S. Kania). One paper published with M. Fuentes, L; Zambrano, L; Zambrano-Tapia, A.; Sanchez-Vazquez, and Tran, B.

At Stanford University, Stanford, USA (2016-2023) or hired via Swift grant.

Total number: 33 students among undergraduate and high school students.

20 June–20 Aug 2016 onsite a summer undergraduate student, Christian Gilbertson, Virginia Tech University, Virginia, USA, now PhD at Penn State.

Mar 2017- June 2019 onsite/online A high school student, Z. Nguyen from Los Altos High School, obtained a bachelor at UCLA, now CEO of a start-up in Silicon Valley, California.

Mar 2017–June 2017 onsite S. Striegel, undergraduate from San Jose State University, now PhD at University of San Jose'. **Paperspublished** with Striegel 1.

June 2018-Sept 2018 onsite summer students, T. Nelson senior undergraduate (*University of Massachusetts* at Amherst), D. Sellers junior undergraduate (University of Oregon), M. Aguilar master student (San Diego State University), V. Campbell, undergraduate freshman student from San Jose Community College. One Paper published with Nelson.

June 2019-September 2019 onsite summer L. Bowden, senior undergraduate (*Cornell University*), G. Srinivasaragavan, junior undergraduate (University of Caltech), R. Wynne undergraduate student (MIT), R. Wagner, undergraduate student (**College of New Jersey**), Z. Nguyen (UC Los Angeles). **Papers published** with Nguyen 2, with Bowden 1**.**

June 2020-September 2020 online A. M. Abraham (Stanford University), J. Fernandez (University of Santa Barbara), S. Livermore (Tuft University), S. Gibson (Carnegie Mellon University), R. Wagner (College of New Jersey), G. Srinivasaragavan (Caltech). **Papers published** with Srinivasaragavan 3, with Livermore 1, with Wagner 1.

Year 2021: 13 students: Zvonarek, K. (Michigan University), D. Levine (Maryland University), D. Zhou (University of Arizona), V. Nielson (Michigan University), T. Dankworth (Rensselaer Polytechnic Institute), S. Gibson (Carnegie Mellon University), Young S (Pennsylvania University), N. Osborne (Purdue University), N. Oshe' (University of California Davis), D. Tso

(**Foothill College**), P. Richardson (Mercer University), L. Nearhood (Rochester Institute of Technology), S. Sharma (**Foothill College**). **Papers published with Zvonarek 1, with Gibson 3, with Nielsen 1, with Young 1.**

Year 2022: SULI student D. Levine (Maryland University, now PhD in Caltech), H.Yasin Hashai, undergraduate at Stanford University.

Year 2023: SULI student: Elias L, Elias T, E. Wang.

Hired through the Swift grant: O. Elsherif, Elias L and M. Urcovo.

At Jagiellonian University, Poland 2011-2020:

Total number of students: **22.** 3 students continued with me when I transferred to NAOJ.
Year 2020: summer internships. Master students: A. Buonaiuto, S. Savastano,
Bachelor: C. Bartlomiej, D. Rząsa, K. Sieniatecka, K. Szawkało, Z. Wawro, C. Charnik, M. Sawko, P. Liniewicz, L. Dash, M. Skwierawski, high school: A. Socha.
Supervised PhD student: R. Del Vecchio, "GRB correlations" (November 2013- September 2019). Papers published with Del Vecchio=4.
Co-supervised PhD student: G. Sarracino on GRB cosmology (December 2018-September 2021).
Master students: B. De Simone, "cosmology with SNe Ia" (June 2020-December 2020)
Bachelor student: A. Lenart ("GRBs and Quasar cosmology"), April 2020-on-going. Started when he was still a high school student.
Year 2019: winter/spring internship Dominika Krol (master student)
Jul–Aug 2014: Supervisor of winter and summer internship of undergraduate students, A. Boria, A. Flores of the University of Puerto Rico.
January-September 2011: master thesis of U. Nedzinska, "GRB correlations".
June-September 2011 Summer exercises of K. Podalicki.

At INAF-IASF, Bologna, Italy (2017): 1 student

November 2017-January 2018 (200 hours) Supervisor of an undergraduate student of the Statistical Department, of the University Alma Mater of Bologna, Italy for the winter internship, S. Scemini.

At La Sapienza, Rome, Italy: Dec 2007–May 2008: 1 student

Supervisor of a Master thesis: W. Ferrara on "GRBs as cosmological tools"

Granted Projects, Fellowships and Scholarships

Total grant as PI and student supervisor: European grant - equivalent to USD 523,880+ US grant 70,000 + Japanese grant equivalent to 274,376+ student grant USD 94,168= **TOTAL: USD 952,654=880,252 Euros.** Total funding won by students: equivalent to the current exchange rate $94,168. Won by S. Bhardwaj (8,208,000 Yen), A. Narendra (41,953 zl), A. Lenart (27150 zl), D. Zhou (5000 USD).

1) Swift IXX Cycle, $38000, the GRB rate estimator and the optical catalog.
2) **Exploratory Research Grant 2022**, Inferring the redshift of GRBs from a multiwavelength investigation of Gamma-Ray Burst features from archival data part II: 680,000 JPY funded by the NAOJ and spent at NAOJ.
3) **Exploratory Research Grant 2021**, Inferring the redshift of GRBs from a multiwavelength investigation of Gamma-Ray Burst features from archival data pat I: 400,000 JPY funded by the NAOJ and spent at NAOJ.

4) **Overseas joint appointment between RIKEN and UJ**, declined since it was too complex for NAOJ to make the agreement with RIKEN, for 2020-2023: 22,410,000 JPY.
5) **Miniatura research grant**, short GRB density rate evolution corrected by selection biases by the National Science Center Poland, spent at Stanford University, June 2019 to September 2019: prize: 49, 282 polish zlotys, PLN.
6) **RIKEN Research Pioneer**, from January 2019-February 2019 at Riken Astrophysical Big Bang Laboratory, funded by RIKEN equivalent to 6000 USD.
7) **American Astronomical Society Chretienne International grant**, from August 2018-January 2019, spent at Stanford University, "On machine learning analysis to derive the redshift estimates of GRBs", prize: 20,000 USD.
8) **Fellowship for publication of the book** in 2019: 6,000 Polish zlotys, PLN.
9) **Marie Curie Global Fellowship** sponsored by the European Commission, "New Cosmological Standard Candles from Gamma Ray Burst Correlations", spent at Stanford Universityand INAF, Bologna, Italy. February 2015-January 2018: 272285,40 Euros. Success rate is <10%.
10) **Japan Society for the promotion of Science Fellowship (JSPS)**, Japanese Ministry of Education, Jan 2013-Feb 2015. Selection was performed through nominating authorities, namely the Ministry of Italian University Research, MIUR. The period of the award was spent in Riken, Japan. Among the most prestigious awards in Asia, the success rate is 10%.The title of the grant was "A theoretical investigation of the Dainotti relation within the photospheric emission models." funding:11,088,000 JPY.
11) **Polish Mobility grant Plus**, Principal Investigator, funded by the Ministry of Science and Higher Education, "Selection bias in Gamma Ray Burst relations", October 2012- March 2013, spent at Stanford University: 86,000 polish zlotys, PLN.
12) **Polish Ministry of Science and Higher Education Grant N N203 579840**, title: "The study of GRB correlation between prompt and afterglow correlations", Principal Investigator, FY2011-2014: 205,000 polish zlotys, PLN. This grant is considered among the most competitive polish grants for PhD holders (until 10 years from the completion of PhD).
13) **Blanceflor-Ludovisi Scholarship**, sponsored by Blanceflor-Ludovisi Boncompagni Foundation, May 2012- April 2013, spent at Stanford University, Stanford, California. "How is it possible to correct for selection bias in GRB relations in the X-ray afterglows?"
14) **Blanceflor-Ludovisi Scholarship renewal**, sponsored by the Blanceflor-Ludovisi Boncompagni Foundation, May 2013-November 2013 and February 2014, spent at Stanford University, Stanford, California. Title of the award: "Application of GRB relationas a cosmological tool together with SNe Ia". It is among the most prestigious awards in Sweden for Italian and Swedish young scientists (<35 years old). Both grants amount to 300,000 Swedish Krona, SEK.
15) **Italian l'Oreal-UNESCO Fellowship** "For Women in Science", sponsored by the L'Oréal Foundation and UNESCO (the United Nations Educational, Scientific and Cultural Organization), title: "Investigation of the properties of GRBs associated with SNe Ib/c and the phenomenology of the Dainotti relation", May 2012-March 2013 spent at La Normale Pisa, Italy: 18,450 Euros. I was selected from more than 300 candidates whose expertise ranged among all the scientific disciplines, such as biology, engineering, physics, astrophysics and mathematics. The success rate for this award is 1%.
16) **Fulbright Scholarship**, sponsored by the US Department of State and the Italian Ministry of Foreign Affairs. Title: "GRB relations, selection effects and their implication on theoretical models", Stanford University, California, October 2012-September 2013: 12,000 USD. The success rate for this award is 8%.
17) **Angelo Della Riccia Scholarship 2010** – sponsored by Angelo Della Riccia Foundation, post-doctoral award, Jagiellonian University, Krakow, Poland. Title: "Using the Dainotti relation in

Gamma Ray Burst afterglow as a viable cosmological tool."

18) **Angelo Della Riccia Scholarship 2009** – sponsored Angelo Della Riccia Foundation – postdoctoral award, spent at Jagiellonian University, Krakow, Poland. Title: "Studying the Dainotti relation in Gamma Ray Burst afterglows". Both Della Riccia grants sum up to 10, 000 Euros.

Research Experience after PhD

Here I list only a few research tasks performed with the grant and professional positions held above among the 96 papers presented in the above section of the CV.

January 2021-present National Astronomical Observatory of Japan and the Graduate University for Advanced Studies, SOKENDAI in Japan, an affiliated scientist at the Space Science Institute in the U.S.A and Visiting Assistant Professor at University of Nevada, Las Vegas.

- Discovered an evolutionary trend of the Hubble constant in Supernovae Ia Pantheon sample (Dainotti et al. 2021, Dainotti et al. 2022a, press release). If confirmed with future and higher-quality data from the Subaru Telescope and other observatories, these results could indicate still unknown physics working on the cosmic scale. This paper is in the top 1% among most cited papers in Web of Science.
- A full analysis of the data to map the evolutionary history of the Universe from today until and beyond the epoch of re-ionization. Dainotti et al. (2023a) demonstrated that GRBs are reliable cosmological probes with the X-ray and optical fundamental plane relation (Dainotti et al. 2022c, press release), but a much larger sample (7.8 times larger) is needed (Dainotti et al. 2022b) to achieve the same precision of the SNe Ia Pantheon sample.
- A binned analysis in redshift in combination with SNe Ia still shows that GRBs can extend the Hubble diagram of z=5, although with larger scatter compared to an unbinned sample Dainotti et al. (2022d).
- Quasars can also be reliable standardizable candles up to z=7.5 (Dainotti et al. 2022e, Lenart et al. 2023 including Dainotti) (two papers are summarized in this Rewriting the Past and Future of the Universe | NAOJ: National Astronomical Observatory of Japan - English) by including a method which solves the problem of selection biases and redshift evolution together with the circularity problem.
- Investigated the cosmological evolution of short GRBs (Dainotti et al. 2021a, ApJL).
- Supervised 87 students among PhD, master, undergraduates and high-school students.

June 2018-September 2019 American Astronomical Society Chretienne Fellowship and MINIATURA2 grant at Stanford University

- Conduct a full-time research project on the existence of the LAT lightcurves at high energy (Dainotti et al. 2021b).
- Mentored 9 undergraduate students at Stanford University (4 in the summer 2018 and 5 in summer 2019)
- A comparison between radio loud and quiet GRBs, and evidence for a potential correlation between intrinsic duration and redshift in the radio loud population (Lloyd et al. 2019 including Dainotti).
- A decade of GRBs observed by Fermi-LAT: the second GRB Catalog (Ajello et al. 2019 including Dainotti)

June 2017-January 2018, Marie Curie' Fellowship, INAF Bologna, Italy

- Conduct a full-time research project from the title “Cosmological standard candles”. Mentored 1 undergraduate student from the department of Statistics of Bologna University.
- A review on selection biases that affect GRB prompt relations and their application as cosmological tools (Dainotti et al. 2018a)
- Stratta, Dainotti et al. (2018) investigated how the statistical difference between the planes implies a difference from a theoretical point of view. They investigated that within the magnetar theoretical scenario long GRBs and short with extended emission lie in different regions of the magnetic fields and spin periods (P-B diagram).
- Study of the THESEUS space mission from the concept, the science case, and the expected performance, Amati et al. (2018) including Dainotti.
- Study of THESEUS as a key space mission concept for multi-messenger Astrophysics (Stratta et al. 2018b) including Dainotti.

Feb 2015- June 2017, Marie Curie Fellowship, 2014-2017 Stanford University, USA

- Conduct a full-time research project from the title “Cosmological standard candles”. Mentored 3 summer and spring students at the undergraduate and high school levels. Participation as a local organizer for the Conference on "Relativistic Jets: Creation, Dynamics, and Internal Physics" held in Krakow in April 2015.
- The discovery that the Dainotti relations between prompt and afterglow phases are intrinsic to the GRB physics and not due to selection bias (Dainotti et al. 2015b). This result has been achieved using statistical methods that consider one side truncation; with this method we were able to compute the peak luminosity evolution. Dainotti et al. (2015b) showed that the L_a-T_a has a power law slope different, within more than 2 σ, from the slope of the prompt L_{peak}-T_γ correlation (Willingale et al. 2010) between the isotropic pulse peak luminosity, L_{peak}, and the pulse duration, T_γ. Such a difference is also visible between the prompt and plateau phases in the energy-duration distributions. All these features open a new debate on whether the offsets are due to a selection effect or to a different emission mechanism between the prompt and the plateau phase.
- The discovery of a fundamental plane (a 3D correlation among prompt and afterglow properties) obtained adding a third parameter, the observed GRB peak luminosity, to the L_X-T_X correlation. This is a much tighter relation that increases the utility of GRBs as standard candles. This plane has a reduction in the scatter of 54% compared to the previous bi-dimensional luminosity-time relation. These results were verified by using Monte Carlo simulations proving the reduced scatter in the 3D relation was not due to the sample size (Dainotti et al. 2016). Results of this analysis were noted in press releases by NASA and the American Astronomical Society.
- To crucially reduce the correlation scatter for its effective use as a cosmological tool, Dainotti et al. (2017c) investigated how the scatter may be reduced depending on the GRB class and on the quality of each GRB LC. They investigated the planes corresponding to each GRB class and showed that the distance of a given GRB from the gold plane (a sub-sample with well-defined plateau emission) discriminates between classes. The fundamental plane relation is statistically different for long and short duration GRBs.
- A review on the GRB afterglow and prompt-afterglow relations and their application as possible cosmological tools (Dainotti & del Vecchio 2017).
- A review on the GRB prompt relations and their application as possible cosmological tools (Dainotti et al. 2018a).
- The discovery that the magnetars model, which explains the plateau phase, in its present

form needs to account for super-magnetars with high magnetic fields (Rea et al. 2015).

Nov 2013-Jan 2015, Japan Society for Promotion of Science Fellowship, Riken, Japan

- Conduct a full-time research project from the title "GRB relations and their theoretical interpretation". Mentored 1 student in summer and 1 in winter. Participation as a local organizer for the Conferences held and participated in the Open House at Riken.

Devised a general method to build mock datasets, which considers selection effects on both the time and the luminosity (Dainotti et al. 2015a). This method shows how not knowing the efficiency function of the instrument detecting GRBs could influence the evaluation of the intrinsic slope of any correlation and the GRB density rate. Dainotti et al. (2015a) showed that the intrinsic slope of the L_a-T_a correlation is -1.0. This method is general, therefore relevant to investigate if any other GRB relation is generated by the biases themselves. Moreover, Dainotti et al. (2015a) evaluated the redshift-dependent ratio $Psi(z)=(1+z)^{\alpha}$ of the GRB rate to the star formation rate. They found a modest evolution $-0.2< \alpha < 0.5$ consistent with Swift GRB afterglow plateau in the redshift range $0.99<z<9.4$.

The interpretation of the L_a-T_a intrinsic correlation, corrected by selection bias, can be explained within the context of a central engine origin. Rownlinson et al. 2014 (including Dainotti) suggested that the magnetar model predicts an observable plateau phase, with plateau durations and luminosities being determined by the magnetic fields and spin periods of the newly formed magnetar. This paper analytically shows that the magnetars can explain, within the 1 σ uncertainties, the L_a-T_a intrinsic correlation.

- The use of the L_a-T_a relation as a possible cosmological tool is presented in Postnikov, Dainotti et al. (2014), where they constrained the cosmological equation of state as a function of redshift, w(z), up to z=9.4 in a completely non-parametric way, without imposing any a priori functional form for w(z). To avoid the circularity problem, Postnikov et al. (2014) calibrated the GRBs at high redshift using the slope and normalization of the L_a-T_a correlation at low redshift in the same range of the SNe Ia. Within the assumption of a flat Friedmann- Lemaître-Robertson-Walker universe and combining SNe Ia data with baryonic acoustic oscillation constraints, the resulting maximum likelihood solutions are close to a constant w.

Oct 2012-Nov 2013, Fulbright Scholar at Stanford University, CA, US & Blanceflor Boncompagni-Ludovisi Scholar, CA, USA.

- Conduct a full-time research project from the title "GRB relations and their theoretical interpretation". Mentored 2 summer students. Participation as a local organizer for the Open House at Stanford.
- Determination whether the luminosities and time distributions are redshift independent (Dainotti et al. 2013a). Such an independence implies absence of this evolution, which, if exists, can be removed via a statistical method by creating new observables divided by their evolutionary functions. After the selection biases and redshift evolution were removed, they demonstrated that the relationis intrinsic at 12 σ level and described how this can be used to constrain physical models of the plateau emission.
- Evaluation of how changes of the observed slope, b_{obs}, of the L_a-T_a correlation may affect the determination of the cosmological parameters (Dainotti et al. 2013b). To this

end, Dainotti et al. (2013b) simulated a sample of 101 GRBs with a central value of b_{obs} that differs from the intrinsic one by a 5σ factor. By comparing all their results with the values obtained by SNe Ia, they outlined an overestimation in the value of the matter density parameter, Ω_M of the 13%, while the Hubble constant, H_0, is still compatible in 1 σ. Instead, for a subsample of high luminous GRBs, Ω_M is underestimated by 13%, while H_0 of 5%. They concluded that any approach involving cosmology should consider only intrinsic correlations, namely corrected for cosmological evolutions and selection bias.

May 2012-Mar 2013, L'Oreal Italia Scholar at University "Scuola Normale", Pisa, Italy

- Conduct a full-time research project from the title "GRB-SNe associated and the L_X-T_X relation" and promote this research project via public media.
- The discovery that the luminosity-time relation (Dainotti relation in the afterglow phase) for GRBs associated to SNe Ib/c has a slope=-1.9 implies that a possible energy reservoir in this class of objects is not constant (Dainotti et al. 2017a). This conclusion was drawn from the analysis of 176 GRB afterglow plateaus with known redshifts observed by Swift. This study revealed that the subsample of GRBs with spectroscopically associated SNe (GRB- SNe) show a much higher L_a-T_a relation than any other analyzed sample and with a much steeper slope (-1.9) than the long-duration GRBs for which the association with the SNe (GRB- NO-SNe) has not been seen, see the case of GRB 060614. Due to the possibility that the GRB-SNe sample may be a real physical motivated one, it is advisable to consider it separately from the long duration with no SNe Ic associated as a future standardizablecandle to constrain cosmological parameters.

Feb 2009-May 2012, Research Assistant at Jagiellonian University, Krakow, Poland and Assistant Professor at Jagiellonian University. This period coincides also with the two awards of Angelo della Riccia Foundation 2009-2010

- Conducted a research project from the titles "Studying the Dainotti relation in Gamma Ray Burst afterglows" and "Using the Dainotti relation in Gamma Ray Burst afterglows as viable cosmological tools". Taught 3 courses per year at Jagiellonian University (120 hours of frontal lectures per year) and supervise summer and master students. Details of the courses and mentoring are presented in the Teaching and Supervising section.
- The update of L_a-T_a relation with 77 GRBs (Dainotti et al. 2010) has led to the discovery of a new subclass of long duration GRBs with plateau emission with smoothly observed X-ray light curves. These GRBs obey not only the mentioned tight physical scaling, but also, for a given T_a, the more regular progenitor explosions lead to preferentially brighter afterglows. In addition, Dainotti et al. (2010) have also found a similar relation for the intermediate class of GRBs. The remaining open questions are if this subclass could be used to explore theoretical models and to be employed to derive cosmological parameters.
- The study of selection bias related to L_a-T_a relation (Dainotti et al. 2011a). Dainotti et al. (2011a) also attempted to use the well-sampled lightcurves as a redshift estimator, which gives encouraging results only if the L_a-T_a intrinsic scatter is reduced to σ_{int}=0.20. Thus, a larger number of GRBs with well-defined properties is needed together with an effective strategy to reduce the intrinsic scatter of the correlation.
- The analysis performed by studying physical parameters for both the prompt and afterglow phases, have led to the determination of new significant relations between the afterglow luminosity, L_X, and the mean luminosities of the prompt emission, $L_\gamma(T)=E_{iso}/T$, (E_{iso} is the isotropic radiated energy in the prompt emission) computed at different time scales, T

(Dainotti et al. 2011b). Dainotti et al. (2011b) found that the highest correlated sub-sample in the afterglow leads also to the highest prompt–afterglow relations.

- The study of a sample of 69 GRBs with measured distance moduli in combination with a sample that obeys the L_a-T_a relation and the use of a Bayesian-inspired fitting method to calibrate the different GRB correlations (Cardone, Capozziello, Dainotti 2009).Averaging over six correlations, Cardone at al. (2009) built a new GRB Hubble Diagram (HD) with 83 objects. To avoid assuming an a priori cosmological model,the so called "circularity problem", they presented a new calibration procedure based ona model-independent local regression estimate of mu(z) using the Union Type Ia SNe sample to calibrate the GRB correlations.
- The construction of a new HD using the L_a- T_a correlation alone or in combination with other data (Cardone, Dainotti et al. 2010). This analysis showed that the use of the L_a-T_a relation leads to constraints in the cosmological parameters in agreement with previous results. Finally, the study concluded that the best evaluation of the cosmological parameters comes from the HD made up only with the well-sampled GRBs.
- The study of the possible existence of a cocoon dominated by cosmic rays with a decreased thermal gas emissivity along M87 jet boundaries (Dainotti et al. 2012). The detailed analysis of Chandra X-ray data, obtained by merging 42 separate observations, shows signatures of lower emissivity surrounding the jet.

PROFESSIONAL TRAINING

1. Fermi-Swift GRB Data Analysis Workshop, Goddard Space Flight Center, Greenbelt, MD, USA, November 8-12, 2010.

2. Scuola Nazionale di Astrofisica IX ciclo', Venezia, Italy, September 16-22, 2007.

3. `XII Brazilian School of Gravitation and Cosmology', Mangaratiba, Brazil, September 10-23, 2006.

4. `Astrofisica Gamma e Multifrequenza: Analisi Dati e Problematiche Astroparticellari', Perugia, Italy, July 3-7, 2006.

5. `1st Bego Scientific Rencontre', Nice, France, February 6-17, 2006.

6. `Mathematical Problems in General Relativity', ETH in Zurich, Switzerland, January 2006.

7. `Theoretical physics: general relativity, cosmology, gravitational collapse', `Gravitational physics and relativistic linear theory of electrodynamic', held by Prof. Ruffini, at University 'La Sapienza' in Rome, 2005-2008.

8. `Geometrodynamics and matter fields', `From classical to quantum gravity', `Early cosmology', held by Dr. Montani at University 'La Sapienza' in Rome, 2005-2008

Weekly seminars on high energy astrophysics, cosmology and general relativity at Rome La Sapienza, Jagiellonian University, Krakow, Riken, Tokyo, NAOJ, Stanford University, USA, and INAF Bologna, Italy.

Skills and Qualifications

Skills in winning grants and fellowships: I have been awarded numerous proposals and other prizes, attesting my ability to develop successful and appealing research projects.

Skills in supervising: To date, I have supervised > 140 students ranging from the level of PhD candidates all the way to students of high school. These students come from diverse educational and cultural backgrounds. I have helped especially underrepresented minorities and women in science. I also helped over the years students to obtain prestigious scholarships themselves.

Communication skills: Excellent communication skills, both written and oral. I can work effectively (both independently and collaboratively) with people from diverse backgrounds and in multidisciplinary teams.

Characteristics:

- Detail-oriented, results-driven, independent thinking, leadership, team building.
- I am very open-minded and value diversity. Because of that, I can adjust myself to a new environment very easily (I have lived on three different continents and in four countries).
- I have sought out and nurtured unique and exciting collaborations with a diversity of recognized researchers across the globe, and I have maintained these collaborations over the years.
- I am also skilled at promoting research results via public outreach and media relations, and my work has been featured in numerous articles, newspapers, magazines on the radio and TV news.

Research methodology:

- Cosmological analysis by using Bayesian methods and Monte Carlo simulations, fitting methods such as the D'Agostini. Selection bias for data truncation.
- Theoretical interpretation of GRB relations within several models, with particular attention to the magnetar model.
- Use of several machine learning techniques like the gradient boosting and random forests andensemble methods such as Superlearner.
- I am an in-depth expert in the use of parametric, semi-parametric (the generalized additive models) for fitting variables and correlations.

Computing skills

Operating systems: Windows, Linux, UNIX; Typesetting: LATEX, Microsoft Office
Data analysis and computational tasks: XSPEC, Qdp, FTOOLS, Gnuplot, Excel, Swift (XRT, UVOT and BAT analysis), Chandra X-ray analysis with CIAO and DS9, Fermi LAT analysis, the standard analysis tool.
Programming abilities in Mathematica, python, R, IDL, Fortran and Matlab.

Languages

Italian: Native language, English: advanced level (CAE certificate), Polish: pre-intermediate.

Prizes and Awards

1. Knighthood of the Italian Republic, order of merit of the Italian Republic, honor awarded directly by the President of the Italian Republic, Giorgio Napolitano for the excellence of results achieved in the field of Astrophysics, 8 March, 2013. This prize is among the highest recognition in Italy. Notably, I was awarded this prize at the age of 34, when it is typically awarded to individuals over the age of 35. The ceremony took place in the historic Quirinale Palace in Rome on the 8th March 2013. https://www.quirinale.it/onorificenze/insigniti/323628
2. International Princess Sichelgaita Prize, received on the 4th of June 2018, sponsored by the Presidency of the Italian Republic. This international award enjoys the patronage of the Chamber of Deputies, the Senate and the Presidency of the Italian Republic. Received the gold medal, the highest

honor. The Prize promotes women from South of Italy who have distinguished themselves and become role models in their category of expertise at an international level.

3. RIKEN Fellow of the week, Japan, 2014.

4. Marie Curie Fellow of the week 26th of April 2019 from Marie Curie Programme Scheme. The award has been notified on 29th of October 2018.

5. Distinguished Fellow of the City of Cava dei Tirreni, hometown of the fellow. This award is given by the Rotary Club to people who have distinguished themselves in any discipline for their contribution.Award was given on the 15th of December by the mayor of the city and by the President of the Rotari Club of the same city. So far, I have been the only woman to have received this award.

6. Project chosen as "**Success stories**" by Marie Curie' Media in February 2019. Only a very small fraction of projects is chosen to be presented to the broader audience.

SERVICE AND LEADERSHIP

1. Selected reviewer

1) NSF Panel for Multimessenger Astrophysics Call, June 2024
2) Leverhulme, trust, UK Grant, June 2024.
3) ERC Advanced Grant, January 2024.
4) Swift XIX cycle (panelist), online, 5-8 December 2023.
5) Swift XIX cycle (co-chair), online, 5-8 December 2022.
6) US NSF Astrophysics and Astronomy Grant Program, April 2022.
7) Swift XV cycle (chair), Washington, 3-5 December 2018.
8) NPP Reviewer (panelist) for the cycle of December 2017, 2018, 2022.
9) Swift XIV cycle (co-chair), Washington, 28 November-1 December 2017.
10) NASA Postdoctoral Fellowship 2015-2016, 2017, 2022, 2023.
11) Icelandic Centre for Research, December 2015.
12) Swift XII cycle (panelist), Washington, December 2015.
13) NASA Astrophysical Data Analysis Panel (ADAP), 17-19 August 2015, Baltimore.
14) Swift XI cycle (panelist), November 2014, Washington.
15) Poster panel chair of the AAS 220th Meeting, Alaska, Anchorage, June 2012.
16) Selected member of the Academic Promotions Committee at the University of Bahrain to evaluate a researcher's work on GRBs to become Associate professor.
17) For Nature, Nature Astronomy, Physical Review Letters, Universe, Astrophysical Journal (ApJ), ApJL, Monthly Notices of the Royal Astronomical Society (MNRAS), Advances in Astronomy, Galaxies, New Frontiers in Astronomy.

18) Local Organizing Committee (LOC) and Scientific Organizing Committee (SOC)

2.1 Mini-workshop on GRBs at NAOJ, 29 July 2021-30 July 2021 (LOC and SOC)
2.2 SOC of three sessions in the Marcell GrossMann Meeting, MG XVI, 6th, 8th, 9th July 2021.
2.3 Applications of Machine Learning in the Space Sciences, ASMMLS, http://spacescience.org/workshops/mlconference2021.ph, 17-21 May 2021, SOC.
2.4 Workshop on Astrophysical Big Bangs at Riken, 6-10 November 2017
2.5 Workshop on "GRB-SNe", Riken in Tokyo, August 31-2 September 2015
2.6 Conference `Relativistic Jets: Creation, Dynamics and Internal Physics', Cracow, April 2015
2.7 Conference, Kyoto, GRB-SNe Japan, 11-15, November 2013
2.8 Conference `Understanding Relativistic Jets', Cracow, 23rd-26th May, 2011.

3 Editorial experience

3.1 Editor of New Frontiers in Astronomy, January 2017- 2019

3.2 Co-Editor of a Special Issue for the journal Galaxies on "Observations and Theory of short GRBs at the Dawn of the Gravitational Wave Era", January 2018- 2019

3.3 Guest Editor of special issue on GRB multiwavelength observations, Galaxies, December 2022

4 Chair of sessions

4.1 Three sessions at the Marcell GrossMann Meeting XVI, https://indico.icranet.org/event/1/program), 6th, 8th-9th July 2021.

4.2 NAOJ mini workshop on GRBs and machine learning in astronomy, 29-30 July 2021.the GRB Poster session**,** AAS 237th, online

4.3 the GRB session, AAS 235th, onsite and on the CMB and SNe Ia cosmology

4.4 Black Hole II in the 229th AAS Meeting, Grapevine, 5th of Jan 2017

4.5 GRB topics, VIII Fermi Symposium, Baltimore, 17 October 2018

4.6 Architect of cross-institutional and cross-national research agreement as part of the Erasmus Project, which fosters collaborations across country lines in the EU. Orchestrated Partnership Agreement between the Universities of Federico II of Naples, Italy, and the Astronomical Observatory of the Jagiellonian University Krakow, Poland, which performed an exchange of students and professional staff. I actively participated as teaching staff within this project by teaching PhD lectures on GRBs (Dec 2010 -Jan 2011). My PhD student, Roberta del Vecchio, participated as well in this exchange as a PhD Scholar for 6 months in 2013. The agreement has been renewed and it is still in place.

4.7 Orchestrated Partnership Agreement between the Sokendai University, Tokyo, and the University of Salerno, Italy. The agreement is now signed.

4.8 Orchestrated Partnership Agreement between NAOJ, Tokyo and the Institute of National Astrophysics Italy, INAF. The agreement is signed.

Outreach and Media Relations Activities

Press Releases and research highlights

By NAOJ and Sokendai

1. Crisis in Cosmology: Statistics on the rescue.｜国立天文台 科学研究部 (nao.ac.jp) on Quasar cosmology

2. Measuring the Universe with Star-Shattering Explosions | NAOJ: National Astronomical Observatory of Japan - English, Subaru and Swift Gamma-Ray Bursts: a new optical 3D leap toward Standard Candles, OAUJ: Astronomy Object of the Month

3. Charting the Expansion History of the Universe with Supernovae | NAOJ: National Astronomical Observatory of Japan - English

By Astronomical Observatory of the Jagiellonian University, On AGNs and the machine learning algorithm, Astronomy Object of the Month: 2022, October, http://www.oa.uj.edu.pl/AOM/aom22oct.en.html

By Stanford University

5. Optical Luminosity-Time Correlation for More Than 100 GRBs (Astronomy) – Uncover reality (the uncover reality.in), OAUJ: Astronomy Object of the Month, Optical joins X-Ray: Optical

Luminosity-Time correlations for more than 100 GRBs | Kavli Institute for Particle Astrophysics and Cosmology (KIPAC) (stanford.edu)

6. Delving Back Deeper: Towards GRBs as Standard Candles : https://kipac.stanford.edu/highlights/delving-back-deeper-towards-grbs-standard-candles,

The theory meets the observations, OAUJ: Astronomy Object of the Month,

Study In Astrophysical Journal Presents Gamma Ray Burst Theory Meets Observations: Birth Of New Standard Candles (ladailypost.com), https://ladailypost.com/study-in-astrophysical-journal-presents-gamma-ray-burst-theory-meets-observations-the-birth-of-new-standard-candles/,

Teoria kontra obserwacje rozbłysków gamma: narodziny nowych świec standardowych | Urania - Postępy Astronomii

Distributed by American Astronomical Society,

7. Ambushing the standard candle in its own nest, OAUJ: Astronomy Object of the Month, (phys.org), https://phys.org/news/2020-11-kilonovae-ambushing-standard-candle.html, Neil Gehrels Swift Observatory Gamma-Ray Burst Associated with Kilonovae: Ambushing the Standard Candle in its own Nest (Astronomy) – Uncover reality (the uncover reality.in), Ambushing a Standard Candle in Its Own Nest | CosmoQuest, Dainotti_SSI_press_release_2020-11-24_final_v2 (spacescience.org)

8. Standard candles news and latest updates (phys.org), https://phys.org/tags/standard+candles/

By INAF on the study of a fundamental plane for X-ray afterglows, published on ApJ the 13th of October 2017, http://www.inaf.it/en/inaf-news/gold-grb

Additional press releases on the same article are the following:

By Stanford

9. http://kipac-web.stanford.edu/three-dimensional-step-towards-sorting-out-grb-zoo

10. https://www.facebook.com/pg/FulbrightCommissionItaly/posts/ on the 13th of October

11. https://www.facebook.com/pg/Marie.Curie.Actions/posts/?ref=page_internal on 18/10/2017

12. https://twitter.com/lorealitalia on the 16th of October 2017

By AAS 228 Meeting: INVITED PRESS BRIEFING BY AAS and PRESS RELEASE Swift

13. GRBs: A 3D Step Toward Standard candles, 12-16 June 2016, San Diego. The press briefing can be found at https://aas.org/media-press/archived-aas-press-conference-webcasts. Press release of Swift is present at http://swift.gsfc.nasa.gov/news/2016/grbs_std_candles.html

14. The press briefing given at the 228th AAS has been featured in many journals, publications, websites, and blogs, including:

NASA press release: https://swift.gsfc.nasa.gov/news/2016/grbs_std_candles.html, http://www.spaceref.com/news/viewpr.html?pid=48942,
https://phys.org/news/2016-06-swift-gamma-ray-burstsa-3d-standard.html,
http://www.spacetoday.net/olderlinks.php?sid=294088,
http://asterisk.apod.com/viewtopic.php?t=36073,

by STANFORD blog: https://kipac-web.stanford.edu/swift-grbs-3d-step-toward-standard-candles, https://twitter.com/cosmoquestx on the 21th, June 2016

This research topic has also been mentioned in Scientific American, see https://www.scientificamerican.com/article/blinded-by-the-dark-energy/

The news has been taken by the Fulbright Commission, the European Commission and the l'Oreal Commission. The Stanford blog about this news received many views and has been featured among

the most popular KIPAC blog. Many other websites, publications, and newspapers in Italy such as the ones taken from Media INAF (National Italian Institute of Astrophysics) reported the news http://www.media.inaf.it/2016/06/21/lampi-gamma-dainotti/, http://www.astronews.it/

Other newspapers quoted the news:

18 "il Giornale di Lecco", a newspaper of the city and province of Lecco, Italy
19 "Positanonews", a newspaper of the city of Positano, Italy
20 "Pomezia notizie", a newspaper of the city of Pomezia, Italy
21 "Fermento", a newspaper of the city of Cava dei Tirreni, Italy
22 "Dentro Salerno", a newspaper of the city of Salerno, Italy.
23 "The magazine "Corrente Rosa**"** on the discovery of the fundamental plane of GRB afterglows, June 2016,

TV and radio interviews with

24 TV Battipaglia, interview to speak about the research on SNe Ia cosmology.
25 Fulbright, as Fulbright Alumni on the impression of the Fulbright Program and on the day in which I received the knighthood of the Italian Republic by the Italian President of Italy, July 2015:https://video.search.yahoo.com/yhs/search;_ylt=AwrTcdQyd8dYrrcA9EMnnIlQ?p=mariagiovanna+dainotti&fr=yhs-mozilla-001&fr2=piv-web&hspart=mozilla&hsimp=yhs-001#id=2&vid=c59c23a3886a535b9a0351d2156bd2f9&action=view
26 RAI (Italian Radio television) Storia, National Italian TV channel regarding the Knighthood, http://gallery.media.inaf.it/main.php/v/video/inafintv/Rai2/20180308-tg2-dainotti.mp4.html
27 "il Mattino" newspaper about the l'Oreal Unesco-Italy award, May 2012.
28 "Famiglia Cristiana", a weekly newspaper about the l'Oreal award in 2009 and the study of GRBs and the Dainotti relation.
29 The magazine "Corrente Rosa"**,** an Italian magazine promoting activities conducted by women regarding the knighthood of the Italian Republic, May 2013.
30 The magazine "Corrente Rosa" on the use of the fundamental plane as cosmological tools, October 2017 and on the importance of being women as a role model in STEMs.
31 TG2 RAI News. This is among the most prestigious Italian TV news channels. The video is in Italian with English subtitles. This news has been shared by the Marie' Curie' Actions via facebook and via Twitter at the following links. The same news has been shared by the l'Oreal Italia on the 20th March at 9:20am:https://twitter.com/lorealitalia/status/976136889953673216 and by Fulbright Italia on the 22th of March at https://twitter.com/FulbrightIT
32 Experience **as Fulbright Alumni, 30th of September 2019, Rome, Italy**
The News of the L'Oreal award was featured by national newspapers such as ANSA and ADNKRONOS, La Repubblica, il Mattino, il Sole 24 ore, il Corriere della Sera, l'Avvenire and regional newspapers such as, Cinque Giorni di Milano, Lab il Socialista, and a weekly magazine tutto scienza e tecnologia.
33 JSPS Science in Dialogue, Lecture on "An introduction to Gamma Ray Bursts, hands on session on spectral analysis computation" at Shizuoka, High School, Japan, 28 May 2014.

Open House

34 at NAOJ, October 2023, March 2022, March 2021
35. at Riken, Japan, 19 April 2014
36 for the celebration of the 10 Anniversary of KIPAC, Stanford University, CA, 27 March 2013.

37 Cassini Mission outreach, 15th September, 2017, Bologna, INAF, Italy.
38 Researcher Night "Speed dating about Gamma-Ray Bursts", 29th of September 2017, Bologna, Sala Borsa, Italy.

Talks at Conferences and Colloquia

Talks and seminars are listed in reverse chronological order: **total 107.**

1. "The fundamental plane relation as cosmological tool", COSPAR, Busan, 13-21 July, 2024, **INVITED TALK**
2. "GRB cosmology", XVII Marcell GrossMann Meeting, Pescara, Italy, 7-12 July 2024, **INVITED TALK**
3. "The Hubble constant Tension", Thessaloniki, 2-7 June 2024, **INVITED TALK**
4. "An overview on GRBs as theoretical model discriminator and as cosmological tools", **INVITED Seminar,** Wroclaw, 29 May 2024
5. "The new statistical assumptions to enhance determination of cosmological parameters", The Nanjiing GRB conference, 20-25 May, Nanjing, China, **INVITED TALK**,
6. "The GRB Catalog", SuperVirtual Conference, 8th of November, a flash 1 minute talk.
7. "What are GRBs?", talk for the Open House, at NAOJ, 28th of October 2023.
8. "GRB cosmology", **INVITED Seminar** at the University of Palermo, 20th of October, 2023, Virtual.
9. "The GRB-SNe connection", **INVITED TALK**, at the Anisotropies for Core Collapse Supernovae, 23th of October 2023.
10. "The Tension on the Hubble constant with GRBs and SNes", **INVITED Seminar**, at University of Sheffield, 17 th of October 2023.
11. "The GRB cosmology and the statistical assumptions", contributed talk, 18th of October 2023, Space Jam at Space Science Institute, online.
12. "The GRB closure relationships in multi-wavelengths", the Fermi-LAT collaboration meeting, 23rd of September 2023.
13. "The GRB and its application as cosmological tools", the Italian Institute of Culture, Tokyo, 30th of June, 2023.
14. "The GRB cosmology", contributed talk, Tension in Cosmology, Lisbon, 1st of June 2023.
15. "The GRB, Quasars and SNe cosmology with different statistical assumptions", 20th June 2023, Tensions in cosmology Workshop at La SISSA, Trieste.
16. "The GRB correlations and their applications as cosmological tools", May 29th 2023, INVITED TALK, at University of Salerno.
17. "The tension on the Hubble constant", 6th of June 2023, INVITED TALK, University of Naples.
18. "The largest optical catalog to date", 242th AAS Meeting, June 2023, contributed talk.
19. "The tension on the Hubble constant", 13th of June 2023, INVITED TALK, the Frascati Workshop, Palermo.
20. "The GRB correlations with the plateau emission", 14th of June, the Frascati Workshop, "Highlights of the Frascati Workshop", 15th of June, the Frascati Workshop, Palermo.
21. "The GRB correlations with ALMA data and the closure relationships", 8th March 2023 Joint DoS and Alma seminar, INVITED Seminar.
22. "The Closure relationships in high energy with the Fermi-LAT', 7th March 2023, Fermi Collaboration meeting online, Contributed TALK.
23. "GRB correlations and their application as cosmological tools", 3th March, at the Division of Science for the 5th year review of the DoS, INVITED TALK.

24. Gamma-Ray Burst and the challenge in astrophysics for women and minorities, Women Breakfast online, 14th of February, INVITED TALK.
25. "The three-dimensional optical correlation in GRB afterglows", the Subaru meeting, NAOJ, 2th February 2023, Contributed TALK.
26. The Optical 2D and 3D fundamental plane correlations, AAS 241: 11th of January 2023, Contributed TALK.
27. "The largest optical GRB Catalog", 5th of January 2023, UCL, Mullard Space Center, INVITED seminar.
28. "GRB correlations and their application as cosmological tools", 14th December 2022, Kanazawa University, onsite, Japan, INVITED Seminar.
29. "Review on GRB correlations and their use as cosmological tools", DoS, NAOJ Workshop, 5th of December 2022, INVITED TALK.
30. "The GRB-SNe connection", Super Virtual 2022 Conference, 11 November 2022, Contributed TALK.
31. The GRB correlation and mentoring students, Latino foundation Summit, 11th of October 2022, INVITED TALK.
32. "The Hubble constant Tension", Dainotti, M., Tensions in Cosmology, Corfu', Greece, 10 September 2022, INVITED TALK.
33. "The closure relationships on Fermi-LAT GRBs: testing with MCMC simulations", Fermi-Collaboration meeting 7th September 2022, Contributed TALK.
34. "A review on Gamma-Ray Bursts correlations and their application as cosmological tools", Dainotti, M., Bego Recontre' Summer School, Online, 11 July 2022, INVITED TALK.
35. GRB correlations with Subaru and Alma, DoS Meeting, 5th December 2021, Contributed TALK.
36. Guest lecturer of the Conference for Leaf, The Latino Educational Advancement Foundation, virtual educational summit, 11th October 2021, online, INVITED TALK.
37. The Fermi-LAT three-dimensional correlations, at Space Jam, September 2021, Space Science Institute, online, INVITED TALK.
38. "Fermi-LAT closure relationships: work in progress", Fermi-LAT collaboration Meeting, September 2021, Contributed TALK.
39. XVII Italian Corean Symposium on Relativistic Astrophysics, 2D L_aT_a correlation and the 3D fundamental plane in multi-wavelengths, 2-6 August 2021, INVITED TALK.
40. The review on GRB correlations, at the Marcell GrossMann Meeting, MG XVI, https://indico.icranet.org/event/1/program), organizer of 3 parallel sessions, 6th July 2021, INVITED TALK.
41. NAOJ mini workshop on GRBs and machine learning in astronomy, 29-30 July 2021, organized by me with all my students giving a talk, Contributed TALK.
42. The 3D optical fundamental plane for optical afterglows and the GRB catalog, AAS 238, online, June 2021, Contributed TALK.
43. The Hubble constant tension evolution, Applications of Machine Learning in the Space Sciences (ASMMLS, http://spacescience.org/workshops/mlconference2021.ph.), 17-21 May 2021 and leader of the panel discussion of the ASMMLS, Contributed TALK.
44. **"**The 3D fundamental plane with the Fermi-LAT", March 2021, online, Fermi-LAT collaboration meeting, Contributed TALK.
45. "GRB correlations as cosmological tools", 26th March 2021, at Ithems, online, INVITED TALK.
46. The 3D optical fundamental plane for optical afterglows and the GRB catalog, AAS 237, online, January 2021, Contributed TALK.

47. "GRB correlations, seminar at Jagiellonian University, online invited, 25 November 2020

48. "*The fundamental plane relation in gamma-rays with the Fermi-LAT"*, seminar at Space Jam,20 September 2020, INVITED TALK.

49. The role of Gamma-ray bursts in high energy and the connection with GRB correlations Dainotti, M., the 6th Conference of the Polish astronomical Society, 2020, 19 September 2020, INVITED TALK.

50. The GRB fundamental plane correlation with Fermi-LAT and in X-rays work in progress, Fermi-LAT collaboration meeting, March 2020, Contributed TALK.

51. "The platinum sample of the fundamental plane relation", AAS 235th Meeting, Honolulu, Hawai'i : 4-8 January 2020, Contributed TALK.

52. "Selection biases in Gamma-Ray Bursts and the connection with philosophical choices", University of Milan, Philosophy Department, 26th November 2019, INVITED Seminar.

53. "GRBs as machine learning tools", Yokohama GRB Conference, 30 October- 2 November 2019, INVITED TALK.

54. Honour Guest Invited speaker "Gamma Ray Bursts", Fulbright Alumni Meeting, 30 September 2019, Rome, Italy, INVITED TALK.

55. "Gamma Ray Bursts correlations", University of San Luis Odispo, 26 September 2019, California, INVITED Seminar.

56. "A fundamental plane for Gamma Ray Bursts", Ioffe Workshop on GRBs and other transient sources: Twenty-Five Years of Konus-Wind Experiment., 9-13 September 2019, INVITED TALK.

57. "Machine learning tools to infer GRB redshifts", Nanjing GRB Conference, 13-17 May 2019, Contributed TALK.

58. An overview on Gamma Ray Burst correlations, Frascati WORKSHOP 2019 Multifrequency Behaviour of High Energy Cosmic Sources – XIII, Palermo, Italy, 3-8 June, 2019, INVITED TALK.

59. "Machine learning tools to extract the redshift of GRBs", 7 November 2018, Stanford, Micro-Statistical Workshop. Contributed TALK.

60. "GRB cosmology", Workshop on Astrophysical Big Bangs at Riken, 6-10 November 2017, INVITED TALK.

61. "A fundamental plane for GRB afterglows and perspective with Theseus mission", 5-6October 2017, Theseus Conference, Observatory of Capodimonte, Naples, Italy, INVITED TALK.

62. "Study of a fundamental plane", Grapevine AAS 229 Meeting, 7 January 2017, Contributed TALK.

63. "The study of the fundamental plane for GRB afterglows", INAF Conference, Bologna, 9 Feb. 2017, INVITED Seminar.

64. GRBs and machine learning, invited talk at Wroclaw University, 30th January 2017, INVITED Seminar.

65. "The study of the fundamental plane for GRB afterglows and its implication for cosmology", FLASH talk at Santa Cruz University, 3 March 2017, INVITED TALK.

66. "GRB relations as standard candles", in the cycle of lectures of "What Physics do", talk at Sonoma State University, 17 October 2016, INVITED TALK see: https://video.search.yahoo.com/yhs/search;_ylt=AwrTcdQyd8dYrrcA9EMnnIlQ?p=mariagi o vanna+dainotti&fr=yhs-mozilla-001&fr2=pivweb&hspart=mozilla&hsimp=yhs-001#id=1&vid=13dbb9679e36fedd7d20bb079f4d8c6b&action=view

67. "Swift GRBs: A 3D Step Toward Standard candles", AAS 228 Meeting: INVITED PRESS BRIEFING and PRESS RELEASE, 12-16 June 2016, San Diego. The press briefing can be found at https://aas.org/media-press/archived-aas-press-conference- webcasts. Press release of Swift is

present at the following web page http://swift.gsfc.nasa.gov/news/2016/grbs_std_candles.html

68. "A fundamental plane for GRB afterglows", AAS 228 Meeting, 12-16 June 2016, Contributed TALK.

69. "Gamma Ray Burst cosmology", "Texas Symposium 2015", Geneva, Switzerland, 14- 18, December 2015, Contributed TALK.

70. "Gamma Ray Burst relations and their cosmological use", Workshop on "GRB-SNe", Tokyo, Riken, August 31-2 September 2015, INVITED TALK.

71. "GRB correlations, the problem of selection effects and their application as cosmological tool", Marcell GrossMann Meeting Conference, 12-18 July 2015, Rome, Italy, INVITED TALK.

72. "Gamma Ray Burst, selection effects and cosmology", Stanford University, California, 7th of April, 2015, INVITED Seminar.

73. "Gamma Ray bursts correlations and their application as cosmological tools and model discriminator", Waseda University, Tokyo, Japan, 15 November 2014, INVITED Seminar.

74. "Gamma Ray bursts correlations and their application as cosmological tools", Japan Aerospace Exploration Agency, JAXA, Tokyo, Japan, 15 October 2014, INVITED Seminar.

75. "An intrinsic luminosity-time correlation in X-ray afterglows: study of selection effects, implication for cosmology and for theoretical models", IOFFE Workshop on GRBs: 20 Years of Konus Wind Experiment, 22-26 September 2014, INVITED TALK.

76. "Cosmological application through GRB correlations", Workshop Meeting on GRBs-SNe, Riken Research Institute, Wako, Japan, 25-27 August 2014, INVITED TALK.

77. "Cosmological application through the Lx-Ta correlation", Workshop Meeting between RIKEN-REUSCU-IPMU, Riken Research Institute, Wako, Japan, 7-8 July 2014, INVITED TALK.

78. "GRBs correlations and selection bias", Aoyama Gakuin University, Tokyo, Japan, 16 May 2014, INVITED Seminar.

79. "GRBs correlations and selection bias", Maxi Team, Riken, Japan, 15 May 2014, INVITED Seminar.

80. "Prompt-afterglow correlations and possible hints for theoretical models", Workshop between Tokyo Resceu University and RIKEN, Research Institute, Wako, Japan, 8 December 2013, INVITED TALK.

81. "Gamma Ray Bursts, selection effects and their use as cosmological standard candles", Joint meeting Astrophysical Big Bang Laboratory and Theoretical Nuclear Physics Laboratory, Riken Research Institute, Tokyo, 27 November 2013, INVITED TALK.

82. "GRB cosmology caveat on selection effects", Conference on GRB-SNe, Kyoto, Japan, 11- 15 November 2013, Contributed TALK.

83. "Study of evolution of the slope of the luminosity- time correlation in the X-ray afterglows of GRBs and application for cosmological purposes", UNAM Mexico University, Mexico City, 25 May 2013, INVITED Seminar.

84. "Study of luminosity and time evolution in X-ray afterglows of GRBs", Huntsville GRBs Symposium, Nashville, 14-18 April 2013, Contributed TALK.

85. "Introduction to GRBs", Ana Mendez University, Puerto Rico, USA, 17 March 2013, INVITED Seminar

86. "Possible application of the X-ray luminosity-time correlation to radio afterglows", Arecibo Observatory, Puerto Rico, 18 March 2013, INVITED Seminar.

87. "GRBs correlations", National Polish Astrophysics Meeting, 3-6 March 2013, Contributed TALK.

88. "The intrinsic nature of the LT correlation", Observatory of Capodimonte, Naples, Italy, 25 September 2012, INVITED Seminar.

89. "GRBs correlations used as cosmological tools: caveat on possible selection effects", XIII Marcel GrossMann Meeting, Stockholm, Sweden, 1-7 July 2012, INVITED TALK.

90. `Study of possible selection effects in the luminosity-time correlation', 220th Meeting of the American Astronomical Society, Anchorage, Alaska, June 2012, Contributed TALK.

91. `Study of possible selection effects in the luminosity-time correlation', the Astrophysical Colloquia at Astronomy Department, Stanford University, Stanford, California, 27 March 2012, INVITED Seminar.

92. `On the intrinsic nature of Luminosity-time correlation in GRBs', IAU Symposium `Death of Massive Stars: Supernovae & Gamma-Ray Bursts', Nikko, Japan, 12-16 March 2012, Contributed TALK.

93. `The canonical GRBs X-ray Afterglows and tight correlation among plateau phase's luminosity and luminosities of the prompt emission", University of Torun, Poland, 16 May 2011, INVITED Seminar.

94. "The canonical Gamma Ray Bursts X-ray Afterglows due to tight luminosity correlations", Wurzburg's University, Germany, January 2011, INVITED Seminar.

95. "Application of the luminosity time correlation as a cosmological tool", Observatory of Capodimonte, Naples, Italy, 10 January 2011, INVITED Seminar.

96. "A tight correlation in the Gamma Ray Bursts X-ray Afterglows and its relationship with the prompt emission", University of Naples, Italy, 7 January 2010, INVITED Seminar.

97. "A tight correlation in the Gamma Ray Bursts X-ray Afterglows", University of Bologna, Bologna, Italy, 10 January 2011, INVITED Seminar.

98. "GRB 060418 within the fireshell model", the III Stueckelberg Workshop on Relativistic Field Theories, Pescara, (Italy), July 2008, Contributed TALK.

99. "Review of GRBs correlations", Wurzburg's University, Germany, May 2008, INVITED Seminar.

100. "Standardizing GRBs in the X-rays Afterglows", MPA, Garching, Germany, July 2008, INVITED Seminar.

101. "GRB 060218: its peculiarity compared to the other sources", "The Second Kolkata Conference on experimental evidence for Black holes in the Universe", India, Feb 2008, Contributed TALK

102. "GRB 060218", the "10th Italian-Korean Symposium on Relativistic Astrophysics", Pescara Italy, June 2007, Contributed TALK.

103. "GRB 060218 and the binaries as progenitors of GRB-SN system", 4th Italian- Sino Workshop on Relativistic Astrophysics, Pescara, Italy July 2007, Contributed TALK.

104. "GRB 060218 and the binaries as progenitors of GRB-SN system", Meeting of the American Physical Society", Jacksonville (Florida), 14-17 April 2007, Contributed TALK.

105. "The GRB-SN system and the case of GRB 060218", "XI Marcel Grossmann Meeting on General Relativity", Berlin, Germany, 23-29 July 2006, Contributed TALK.

106. "GRB 060418 within the fireshell model", Cesare Lattes meeting on Gamma-Ray Bursts, Black Holes and Supernovae, Mangaratiba, Brazil, Feb 2007, Contributed TALK.

107. "GRB 060218: and GRB-SNe connection", "XII Brazilian School of Gravitation and Cosmology", Mangaratiba (Brazil), September 2006, Contributed TALK.

Professional Memberships and Major Collaborations

- Member of the WST working team
- Affiliated Member of the Fermi-LAT collaboration since March 2016,
- Member of the Mentor Program in the Fermi-LAT collaboration since 2020,

- Member of Snowmass, honorary member of the Scientific Caribbean Foundation for the work conducted to supervise Puerto Rico students, since 2021.
- American Astronomical Society (AAS), 2012, and since 2016
- American Association University Women from 2017.
- Science Core Member of the Theseus collaboration from 2016
- The International Center for Relativistic Astrophysics (ICRA) 2005-2008
- International Network of the Centers for Relativistic Astrophysics (ICRAnet) 2005-2008
- The American Physical Society (APS), 2005-2008
- La Societa' italiana di Fisica (SIF), 2005-2008

She is advocate for the inclusion of Women and underrepresented Minorities in Science. She is member of the L'Oreal Italia Women in Science Alumni where activities take place about this topic. She was invited speakers at several events to discuss about these topics, how to overcome such issues globally by comparing the problems and solutions in different countries. These events were: the "Women Breakfast" in February 2023; the LEAF (Advancement for the Latino Educational Foundation) Summit Program; the Fulbright Lecture Program, hosted by the Caribbean Foundation. She also participated in the kick-off meeting for the Fermi-LAT Mentoring Program to discuss how to help students to navigate into academia.