Francesco Guarneri

https://g-francio.github.io/ | GitHub | ORCID: 0000-0003-4740-9762
Email: francesco.guarneri@eso.it
Tel: + 49 89 3200 6237

European Southern Observatory
Karl-Schwarzschild-Straße 2
85748 Garching bei München
Germany

Research Interest

High redshift QSO - QSO surveys - High resolution spectroscopy

Education

Ph. D. Nov. 2020 – Present
University of Trieste, European Southern Observatory

- *Ph. D. project title*: Science with ESPRESSO
- *Supervisors*: prof. Stefano Cristiani, Dr. Luca Pasquini

Master degree in Physics, 110/110 Cum Laude 2018 – 2020
University of Trieste, dept. of Physics *Trieste, IT*

- *Thesis title*: A machine learning approach to a wide-angle selection of bright, high-redshift QSOs: the QUBRICS survey
- *Supervisors*: prof. Cristiani Stefano, Dr. Giorgio Calderone

Master degree in Physics, 110/110 Cum Laude 2015 – 2018
University of Trieste, dept. of Physics *Trieste, IT*

- *Thesis title*: Study of the population of GRBs detectable from the South site of CTA
- *Supervisors*: prof. Longo Francesco, Dr. Gasparetto Thomas

Papers (First author)

- **Fundamental physics with ESPRESSO: a new determination of the D/H ratio towards PKS1937-101**
  Submitted to MNRAS
- **The probabilistic random forest applied to the QUBRICS survey: improving the selection of high-redshift quasars with synthetic data**
  2022 MNRAS, 517, 2436
- **The Probabilistic Random Forest applied to the selection of quasar candidates in the QUBRICS Survey**
  2021 MNRAS, 506, 2471

A complete list of publications is available at the end of the CV or online at NASA/ADS and https://g-francio.github.io/.

Studentship and awards

ESO Studentship 2022 – 2023
Garching bei München, Germany

Premio allo studio BCC Agrobresciano 2015, 2019, 2021
Brescia, Italy (IT)

MIUR Eccellenze Esami di Stato a.s. 2014/2015 2015
Cremona, Italy (IT)

Programming experience

Languages	:	Python, Julia (good knowledge); SQL, Bash (basic)
Data reduction	:	PypeIt, ESO DRS (ESPRESSO)
Editing/version control	:	VS Code, Git, Latex
Other	:	Cloudy, Jupyter Notebooks, Topcat

Studentship and awards

ESO Studentship 2022 – 2023
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Brescia, Italy (IT)

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Cremona, Italy (IT)

Conference and schools

Conferences

- July. 2023 – Invited talk at StEm65 (Stexten, Italy)
  A new measurement of the primordial deuterium abundance with ESPRESSO
- Feb. 2023 – Contributed (remote) talk at ESPRESSO face-to-face meeting (Lanzarote, Spain)
  Measuring the primordial abundance of Deuterium with ESPRESSO
- Jun. 2022 – Poster at Hack 100 conference (Trieste, Italy)
  Re-measuring the primordial deuterium abundance toward PKS1937-101 with ESPRESSO
- May 2022 – Poster at SciOPS workshop (Garching bei München, Germany)
  QUBRICS: machine learning for searching bright, high-redshift quasars
- Oct. 2021 – Contributed talk at IAP Colloquim 2021 (Paris, France)
  Machine learning: lessons learnt with the QUBRICS survey

Schools

- Jun. 2023 – Vatican Observatory Summer School Learning the Universe, Data Science Tools for Astronomical Surveys, Castel Gandolfo, Italy
- Sept. 2021 – 4th Azores School on Observational Cosmology, Angra do Heroísmo, Açores, Portugal

Successful Telescope Proposals (PI and selected CoI)

- **PI – ESO NTT** – Period P108 (delegated visitor), P109 (visitor), P110 (visitor), P111 (delegated to CoIs), P112 (scheduled)
  4 nights each – Spectroscopic confirmation of high redshift QSO candidates.
- **PI – TNG** – AOT43, AOT44, AOT45, AOT46, AOT48
  1 to 4 nights each, service mode – Spectroscopic confirmation of high redshift QSO candidates.
- **CoI – ESO ESPRESSO** P112, ESPRESSO Large Program
  Put the title once the P1 thing starts working again
- **CoI – ESO ESPRESSO** P110, P111, P112
  A redshift drift experiment with ESPRESSO

Community service

- 2023 – **LOC member** – Spectral Fidelity workshop
- 2023 – **Schülerpraktikum supervisor**
- 2022, 2023 – **ESO Journal Club Organiser**
- 2022, 2023 – **ESO Scientific Assistant** for proposal evaluation – P110, P112
- 2021 – **Mentoring**, General physics for bachelor's degree in biological sciences and technologies (Trieste)

Outreach

- 2023 – **Universe on Tour**
- 2022, 2023 – **ESO Supernova** – Tour guide for Italian groups
- 2015 – **La Matematica tra le mani** – Tour guide and Co-Organiser

Publication list

Guarneri Francesco

References

[1] **Guarneri, F.**, Calderone, G., Cristiani, S., Porru, M., Fontanot, F., Boutsia, K., Cupani, G., Grazian, A., D'Odorico, V., Murphy, M. T., Bongiorno, A., Saccheo, I., Nicastro, L., *The probabilistic random forest applied to the QUBRICS survey: improving the selection of high-redshift quasars with synthetic data*. In: MNRAS 517.2, 2022, pp. 2436–2453. arXiv: 2209.07257 [astro-ph.IM].

[2] **Guarneri, F.**, Calderone, G., Cristiani, S., Fontanot, F., Boutsia, K., Cupani, G., Grazian, A., D'Odorico, V., *The probabilistic random forest applied to the selection of quasar candidates in the QUBRICS survey*. In: MNRAS 506.2, 2021, pp. 2471–2481. arXiv: 2106.12990 [astro-ph.IM].

[3] Grazian, A., Boutsia, K., Giallongo, E., Cristiani, S., Fontanot, F., Bischetti, M., Bongiorno, A., Calderone, G., Cupani, G., D'Odorico, V., Feruglio, C., Fiore, F., **Guarneri, F.**, Porru, M., Saccheo, I., *Crossing the Rubicon of Reionization with z∼5 QSOs*. In: arXiv e-prints, arXiv:2307.12421, 2023, arXiv:2307.12421. arXiv: 2307.12421 [astro-ph.GA].

[4] Cristiani, S., Porru, M., **Guarneri, F.**, Calderone, G., Boutsia, K., Grazian, A., Cupani, G., D'Odorico, V., Fontanot, F., Martins, C. J. A. P., Marques, C. M. J., Maitra, S., Trost, A., *Spectroscopy of QUBRICS quasar candidates: 1672 new redshifts and a golden sample for the Sandage test of the redshift drift*. In: MNRAS 522.2, 2023, pp. 2019–2028. arXiv: 2304.00362 [astro-ph.CO].

[5] Cupani, G., Calderone, G., Cristiani, S., **Guarneri, F.,** *Advanced Data Analysis for Observational Cosmology: applications to the study of the Intergalactic Medium*. In: arXiv e-prints, arXiv:2305.10182, 2023, arXiv:2305.10182. arXiv: 2305.10182 [astro-ph.IM].

[6] Fontanot, F., Cristiani, S., Grazian, A., Haardt, F., D'Odorico, V., Boutsia, K., Calderone, G., Cupani, G., **Guarneri, F.**, Fiorin, C., Rodighiero, G., *Eddington accreting black holes in the epoch of reionization*. In: MNRAS 520.1, 2023, pp. 740–749. arXiv: 2301.07129 [astro-ph.CO].

[7] Cristiani, S., Boutsia, K., Calderone, G., Cupani, G., D'Odorico, V., Fontanot, F., Grazian, A., **Guarneri, F.**, Martins, C., Pasquini, L., Porru, M., Vanzella, E., *Spectrographs and Spectroscopists for the Sandage Test*. In: arXiv e-prints, arXiv:2302.04365, 2023, arXiv:2302.04365. arXiv: 2302.04365 [astro-ph.CO].

[8] Cupani, G., Calderone, G., Selvelli, P., Cristiani, S., Boutsia, K., Grazian, A., Fontanot, F., **Guarneri, F.**, D'Odorico, V., Giallongo, E., Menci, N., *Near-infrared spectroscopy of extreme BAL QSOs from the QUBRICS bright quasar survey*. In: MNRAS 510.2, 2022, pp. 2509–2528. arXiv: 2112.02594 [astro-ph.CO].

[9] Grazian, A., Giallongo, E., Boutsia, K., Calderone, G., Cristiani, S., Cupani, G., Fontanot, F., **Guarneri, F.**, Ozdalkiran, Y., *The Space Density of Ultra-luminous QSOs at the End of Reionization Epoch by the QUBRICS Survey and the AGN Contribution to the Hydrogen Ionizing Background*. In: ApJ 924.2, 62, 2022, p. 62. arXiv: 2110.13736 [astro-ph.GA].

[10] Boutsia, K., Grazian, A., Fontanot, F., Giallongo, E., Menci, N., Calderone, G., Cristiani, S., D'Odorico, V., Cupani, G., **Guarneri, F.**, Omizzolo, A., *The Luminosity Function of Bright QSOs at $z \sim 4$ and Implications for the Cosmic Ionizing Background*. In: ApJ 912.2, 111, 2021, p. 111. arXiv: 2103.10446 [astro-ph.GA].

[11] Boutsia, K., Grazian, A., Calderone, G., Cristiani, S., Cupani, G., **Guarneri, F.**, Fontanot, F., Amorin, R., D'Odorico, V., Giallongo, E., Salvato, M., Omizzolo, A., Romano, M., Menci, N., *The Spectroscopic Follow-up of the QUBRICS Bright Quasar Survey*. In: ApJS 250.2, 26, 2020, p. 26. arXiv: 2008.03865 [astro-ph.GA].

[12] **Guarneri, F.**, Cristiani, S., Calderone, G., Boutsia, K., Grazian, A., Cupani, G., Fontanot, F., D'Odorico, V., Porru, M., *QUBRICS: machine learning for searching bright, high-redshift quasars*. In: SciOps 2022: Artificial Intelligence for Science and Operations in Astronomy (SCIOPS). Proceedings of the ESA/ESO SCOPS Workshop held 16-20 May. 2022, 34, p. 34.

[13] Boutsia, K., Grazian, A., Cristiani, S., Calderone, G., **Guarneri, F.**, Cupani, F., Fontanot, F., D'Odorico, V., *The QUBRICS Survey*. In: Joint Observatories Kavli Science Forum in Chile (joksfic2022). Proceedings of the conference held 25-29 April. 2022, 8, p. 8.