

Raphaël Fabio Duque

Institut d'Astrophysique de Paris
98bis, boulevard Arago 75014 Paris France
telephone: +33 1 44 32 80 75
e-mail: duque@iap.fr

Personal data

Birth **October 3rd 1994, Paris**
Citizenships **France, USA**

Languages

French, English (Native proficiency).
Spanish, Italian (Working proficiency).
Mandarin Chinese (Elementary proficiency).

Education

- Since 2018 **Ph.D. in Astrophysics – Sorbonne Université, Paris, France**, Prepared under Prof. F. Daigne & Dr. R. Mochkovitch at the Institut d'Astrophysique de Paris. Dissertation entitled "The Physics of Gamma-Ray Bursts in the Gravitational-Wave Era" (defense in September 2021).
- 2017 – 2018 **Master's degree in Astronomy, Astrophysics and Space Engineering – Université Paris-Diderot, Paris, France**, Specializing in compact objects and high-energy astrophysics – *Graduated cum laude*.
- 2014 – 2017 **École Polytechnique – Université Paris-Saclay, Palaiseau, France**, This public engineering school accepts students after a nation-wide selection following a two-year intense scientific preparatory curriculum. While there, I prepared the *Polytechnique Multidisciplinary Diploma*, specializing in astrophysics and theoretical physics – *Prize for remarkable final internship at the European Gravitational Observatory (Cascina, Italy)*.

Research

My research activity concerns modeling of high-energy astronomical sources, and in particular **gamma-ray bursts** (GRB). My work develops in **three new axes of high-energy astrophysics studies** recently opened by the era of multimessenger astronomy with gravitational waves, which was inaugurated by GW170817.

These axes are **(i) population studies**, predicting features of the forthcoming population of gravitational-wave events with electromagnetic counterparts, **(ii) multimessenger prospective studies**, exploring ways to leverage future multimessenger observations to the benefit of understanding GRBs and their progenitors, and **(iii) upgraded classical GRB studies**, which look back to existing GRB data with a modeling perspective enhanced by the first lessons of the gravitational-wave era.

In addition to this theoretical activity, I am invested as a **Burst Advocate** in the French-Chinese high-energy satellite mission SVOM and have led **optical follow-up campaigns** of gravitational-wave alerts with the mission's ground segment.

Publications

Refereed

- A&A (2021) **Prospects for kilonova signals in the gravitational wave era**, R. Mochkovitch, F. Daigne, R. Duque, H. Zitouni.
- A&A (2021) **What role will binary neutron star merger afterglows play in multimessenger cosmology?**, S. Mastroianni, R. Duque, E. Chassande-Mottin, F. Daigne, R. Mochkovitch.
- A&A 639 (2020) **Probing high-density neutron star mergers with afterglow counterparts**, R. Duque, P. Beniamini, F. Daigne, R. Mochkovitch.
- MNRAS 492 (2020) **X-ray plateaus in gamma-ray bursts' light curves from jets viewed slightly off-axis**, P. Beniamini, R. Duque, F. Daigne, R. Mochkovitch.
- A&A 631 (2019) **Radio afterglows of binary neutron star mergers: a population study for current and future gravitational-wave observing runs**, R. Duque, F. Daigne, R. Mochkovitch.

Non-refereed

- GCN 26386 (2019) **LIGO/Virgo S191205ah: no counterpart candidate in SVOM/GWAC observations**, Report on GW signal follow-up with ground segment of SVOM mission.

PoS 357 (2019) **Neutron star merger afterglows: population prospects for the gravitational-wave era**, *R. Duque, F. Daigne, R. Mochkovitch.*

Publications (in prep.)

Gamma-ray burst X-ray flares as off-axis gamma pulses, *R. Duque, P. Beniamini, F. Daigne, R. Mochkovitch.*

Seminars and international conferences

- Fall & Winter 2020 **Astrophysics Seminars (invited)**, TAPIR at Caltech (USA), Hebrew University Jerusalem (Israel), Columbia University (USA), Osservatorio Astronomico Brera (Italy), Jagiellonian University (Poland).
- October 2020 **General Assembly of the National Gravitational-Wave Working Group**, *Paris, France*, Contributed talk on prospects for multimessenger cosmology and challenges.
- December 2019 **Texas Symposium**, *Portsmouth, UK*, Contributed talk – *Prize for best student talk in the "X-ray messenger" session.*
- May 2019 **Nanjing GRB Conference & SVOM mission workshop**, *Nanjing, China*, Contributed talk.
- March 2019 **Asterics Radioastronomy Conference**, *Groningen, Netherlands*, Contributed talk & poster.
- October 2018 **Eighth Fermi Symposium**, *Baltimore, USA*, Contributed poster.
- August 2018 **Lunch talk (invited)**, *Beijing, China*, Kavli Institute for Astronomy and Astrophysics.

Teaching and outreach experience

- Since 2018 **Instructor for exercise and practical sessions in the Astronomy & Astrophysics Master's curriculum of the *Observatoire de Paris***, Entailed composing and tutoring exercise sessions and homework assignments. Courses were "Statistical Physics", "Astronomical Data Analysis and Image Reduction" and "Astronomical Instrumentation and Observations". 64 hours of teaching per annum.
- Summer 2019 **Tutored Master-level interns in gamma-ray burst modeling**, Entailed guiding for analytical and numerical computation in high-energy astrophysics, project reporting and oral defense.
- Since 2018 **Gave courses and tutored practical sessions in General Astronomy for the public**, Part of the "Explorer et Comprendre l'Univers" program of the *Observatoire de Paris*. Comprised a yearly week-long observing session with professional astronomical facilities at the *Observatoire de Haute-Provence*.
- Since 2018 **Participated in various outreach events in the Paris area**, Involving own work presentation and discussions and astronomical observation sessions.