

# FEDERICO FRASCHETTI

## Present Address

Departments of Planetary Sciences  
Theoretical Astrophysics Program  
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## • PROFILE

Theoretical astrophysicist with wide interests in space physics, high energy astrophysics and laboratory astrophysics: non-relativistic and relativistic shocks, particle acceleration, particle transport in magnetic turbulence, origin of cosmic-rays, relativistic hydrodynamics.

## • APPOINTMENTS

- 2018-present** Visiting Scientist at the Harvard/Smithsonian Center for Astrophysics.
- 2012-present** Associate Staff Scientist/Guest Lecturer, Dept.s Planetary Sciences/Astronomy, Univ. of Arizona, Tucson, USA.
- 2012-present** Faculty Affiliate Member, Theoretical Astrophysics Program, Univ. of Arizona, Tucson, USA.

## • RESEARCH EXPERIENCE

- 2009-12** Research Associate, Dept.s Planetary Sciences/Physics, Univ. of Arizona, Tucson, USA.
- 2008-09** Post Doc Fellow/Invited Researcher at LUTh, Observatory Paris-Meudon, Paris.
- 2007-17** Qualification for Assistant Professor (“Maître de conférences”) in CNU sections 29, Particle Physics, (“Constituants élémentaires”) and 34, Astrophysics (“Astronomie, astrophysique”).
- 2006-08** Post Doc Fellow at CEA Saclay, DSM/IRFU/Service d’Astrophysique.
- 2005** Post Doc Fellow at *Brera Astronomical Observatory* (Merate) within *Swift* mission for GRB and ICRA at Physics Department of University of Rome *La Sapienza*.

## • EDUCATION

- 2004** PhD with full marks in High Energy Astrophysics: “On the afterglow of Gamma-Ray Bursts within the EMBH model” advisors: Prof. R. Ruffini (University of Rome *La Sapienza*) and Dr. L. Vanzo (University of Trento).
- 2001** “Laurea” in Physics (B.S. and M.S.) with *110/110 cum laude* at University of Rome *La Sapienza*; supervision of Prof. R. Ruffini.

## • GRANTS, FELLOWSHIPS

- 2019** Co-I on Chandra Theory proposal *The ionization of M dwarf exoplanet atmospheres by flare energetic particles* (PI: J. Drake, Center for Astrophysics — Harvard & Smithsonian).
- 2018-19** PI on NSF-EAGER proposal *Novel approach to acceleration and escape of charged particles at interplanetary and astrophysical shock waves*
- 2018-21** PI on NASA Supporting Research proposal *Anisotropy and particle injection at localized enhancements of supra-thermal particles at oblique collisionless shocks at 1 AU*.
- 2018** Fellowship at the Collaborative Research Center 676 (Sonderforschungsbereich 676) at Hamburg University/DESY (Germany, 3 months, declined).
- 2017 & 18** American Astronomical Society International Travel Grant.

- 2015 & 16 & 17 PI on Travel Grant, Theoretical Astrophysics Program, University of Arizona.
- 2015-16 Co-I on Veritas proposal *Observations of the hot spot in W44 SNR* (PI: V. Bugaev, U St. Louis, WA)
- 2016 Co-I on Chandra Theory proposal *The contribution to protoplanetary disk ionization from T-Tauri flare energetic particles* (PI: J. Drake, Harvard/Smithsonian Center for Astrophysics).
- 2015 PI of the Crowdfunding campaign *Help Solve the Mystery of Cosmic Rays* at [www.fiatphysica.com](http://www.fiatphysica.com).
- 2015-18 Co-I on NASA Supporting Research proposal *Analysis of Spacecraft Observations and Numerical Modeling of Solar-Energetic Particles Associated with Strong Interplanetary Shock Waves* (PI: J. Giacalone, U. of Arizona).
- 2015-16 Co-I on *Particle acceleration in laser-produced shocks by lower-hybrid wave turbulence*, LASER-LAB-EUROPE proposal (PI: G. Gregori, U. of Oxford, UK).
- 2013-16 PI on NASA Supporting Research proposal *Time-dependent perpendicular transport of charged energetic particles in three-dimensional anisotropic magnetic turbulences*.
- 2014 Co-I on “Studies of high energy gamma-ray emissions from Tycho with Fermi and VERITAS”, VERITAS proposal (PI: N. Park, U. of Chicago).
- 2012-14 PI of working team “First principles physics for charged particle transport in strong space and astrophysical magnetic turbulence”, ISSI (Switzerland);  
URL: <http://www.lpl.arizona.edu/~ffrasche/ISSI.html>.

- **AWARDS**

- 2016 APAC Award, University of Arizona.
- 2005 “Pietro Tacchini” prize for PhD thesis in astrophysics by SAIIt (Società Astronomica Italiana).
- 1998, '99, 2001 Awards by Department of Physics, University of Rome *La Sapienza*.

- **SERVICES**

- 2014-2018 Organiser of biweekly heliophysics-space physics group meetings at University of Arizona, Dept. of Planetary Sciences and NOAO.
- Peer-reviewer: Nature, Nature Physics, Nature Communications, ApJ, MNRAS, A&A, Solar Physics, Phil. Trans. A of Royal Society, J. Atmospheric and Solar-Terrestrial Physics, VERITAS papers committee.
- NSF/NASA panelist and mail-in reviewer (2010-present): peer-reviewer of NSF/NASA proposals.

- **TEACHING EXPERIENCE**

- AY 13-14 – Instructor, High-Energy Astrophysics (599, graduate course), Dep. Physics/Astronomy, Univ. of Arizona, Tucson.
- Guest Lecturer, Theoretical Astrophysics (589, graduate course), Dep.s Physics/Astronomy/ Planetary Sciences, Univ. of Arizona, Tucson.
- AY 06-07 Lab. TA, Optics-electr., Dép. Physique, Univ. de Versailles, Paris.
- AY 02-05 Co-Supervision Degree theses Astrophysics, Dep. Physics, Univ. *La Sapienza* of Rome.
- AY 99-00 Lab. TA, Optics-electr., Dep. Physics, Univ. *La Sapienza* of Rome.
- AY 98-99 Lab. TA, Mechanics-electr., Dep. Physics, Univ. *La Sapienza* of Rome.

- **RESEARCH STUDENT OR THESIS ADVISOR (CO-ADVISOR)**

M. Rassel (undergraduate, Harvard Univ., Cambridge, MA, and Univ. of Colorado, Boulder), C. Zhou (Winsor School, Boston, MA and Harvard Univ., Cambridge, MA), E. MacEvoy (University of Arizona, Dept. of Applied Mathematics), F. Guo (University of Arizona/LPL, now LANL), F. Acero (CEA/Saclay), M. G. Bernardini (Université de Montpellier, France), A. Corsi (University of Rome *La Sapienza*, now Texas Tech University), R. Guida (University of Rome *La Sapienza*, now senior quantum analyst in Los Angeles, CA).

- **VISITING SCIENTIST (> 1 week)**

- 2016/08 Center for Astrophysics, Harvard Univ.

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|-------------------|--|
| <b>2013/06</b>    | Observatory Paris-Meudon, LUTh, Paris (France).                            |
| <b>2011/04</b>    | Observatory Paris-Meudon, LUTh, Paris (France).                            |
| <b>2011/01</b>    | University of Chicago, Dept. of Astronomy.                                 |
| <b>2010/08</b>    | Rutgers University, Dept. of Physics and Astronomy.                        |
| <b>2010/06</b>    | Princeton University, Dept. of Astrophysical Sciences.                     |
| <b>2010/04</b>    | New York University, Center for Cosmology and Particle Physics.            |
| <b>2009/09</b>    | APC, “Astroparticule et Cosmologie”, University Paris VII, Paris (France). |
| <b>2009/05-06</b> | Ruhr Universität Bochum, Theoretical Physics Dept., Germany.               |
| <b>2007/01</b>    | University of Leicester, Dept. of Physics and Astronomy, UK.               |
| <b>2006/07</b>    | University of Leicester, Dept. of Physics and Astronomy, UK.               |
| <b>2002/06</b>    | Max-Planck-Institut fuer Astrophysik, Garching, Germany.                   |

- **MEMBERSHIPS**

- Multimessenger Astronomy Science Advisory Group, stellar-mass BH-BH binaries, 2018–present;
- eXTP Working Group, 2017–present;
- Athena Study Science Team Working Group 3.4, *The astrophysics of supernova remnants and the interstellar medium*, 2015–present;
- Lynx, working groups *Physics of plasmas*, *Life-cycle of stars* and *Multiwavelength Synergy*, 2016–present;
- American Astronomical Society (AAS); High-Energy Astrophysics Division, 2010–present;
- Associate Member of VERITAS collaboration, 2011–present;
- International Astronomical Union (IAU; High Energy Phenomena and Fundamental Physics, Interstellar Matter and Local Universe, Sun and Heliosphere), 2011–present;
- American Geophysical Society (AGU), 2010 – 2014.

- **SPOKEN AND WRITTEN LANGUAGES**

- Italian: mother tongue.
- English, French: fluent.
- German, Russian: basics.

- **OUTREACH**

**2012** ”Origin of Cosmic-Rays” at Tucson High Magnet School, Tucson, AZ (USA).

**2016** Advisor for series *How The Universe Works* by Pioneer Productions (British television company).

- **COMPUTER SKILLS**

Operating systems: Mac OS-X, LINUX, Microsoft Windows (NT & XP); the algebraic tensorial manipulator Maple V; IDL, DS9, Gnuplot, Mathematica; Latex; FORTRAN, C languages. XSPEC software; XRT pipeline for Swift data analysis; XMM V&V for screening of 2XMM pipeline.

- **CERTIFICATES**

**2018-21** Certificate Minors Protection Training for Responsible Adults (Harvard University).

Cambridge, USA, October 24<sup>th</sup>, 2018