

FEDERICO FRASCHETTI

Present Address

Harvard/Smithsonian Center for Astrophysics
60 Garden Street
Cambridge, MA
02138, USA

on leave from

Departments of Planetary Sciences and Astronomy
Theoretical Astrophysics Program
1629 E. University Blvd, Room 429-G
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Contact

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• PROFILE

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

• APPOINTMENTS

- 2012-present** Associate Staff Scientist/Guest Lecturer, Dept.s Planetary Sciences/Astronomy/Astrophysics, Univ. of Arizona, Tucson, USA.
- 2012-present** Faculty Affiliate Member, Theoretical Astrophysics Program, The University 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 the sections of CNU 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

- 2018** Fellowship Scholarly Studies at Harvard/Smithsonian Center for Astrophysics (9 months).
- 2018** Fellowship at the Collaborative Research Center 676 (Sonderforschungsbereich 676) at Associate Professor Level at Hamburg University/DESY (Germany, 3 months to be scheduled).
- 2017** American Astronomical Society International Travel Grant.

- 2016** 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 proposal *The contribution to protoplanetary disk ionization from T-Tauri flare energetic particles* (PI: J. Drake, Smithsonian Center for Astrophysics, Harvard University).
- 2015** PI of the Crowdfunding campaign *Help Solve the Mystery of Cosmic Rays* at www.fiatphysica.com.
- 2015-18** Co-I on NASA 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).
- 2015** PI on Travel Grant, Theoretical Astrophysics Program, University of Arizona.
- 2013-16** PI on NASA 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-present Organiser of biweekly heliophysics-space physics group meetings at University of Arizona, Dept. of Planetary Sciences and NOAO.
- Peer-reviewer: Nature, Nature Physics, Nature Comm., ApJ, A & A, VERITAS papers committee, Phil. Trans. A of R. Soc., J. Atmospheric and Solar-Terrestrial Physics.
- NSF/NASA panelist and mail-in reviewer (2010-present): peer-reviewer of NSF/NASA proposals.
- 2017 Member of the 15th Marcel Grossmann Meeting International Coordinating Committee.

- **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)**

- Thesis: 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).

- **INVITED TALKS**

- 2018/02 *NIF and JLF User Group Meeting 2017*, Livermore, USA
- 2015/01 *Cosmic Ray Anisotropies*, Bad Honnef, Germany.
- 2013/01 AAS meeting, *SNRs and PNe: Theory and Observation*, Long Beach, USA.
- 2012/03 *11th Annual international Astrophysics Conference*, Palm Springs, USA.
- 2007/05 *Ecole Internationale d'Astrophysique Daniel Chalonge*, Rencontre at Colegio de España, Paris.
- 2005/05 *Congresso annuale della SAIt*, Catania.

- **INVITED SEMINARS, COLLOQUIA**

- 2016/09 “Local enhancements of energetic particles at collisionless interplanetary shocks”, Univ. of New Hampshire.
- 2016/08 “Interaction of supernova remnant shocks with turbulent media”, Harvard-Smithsonian CfA.
- 2016/03 “Local enhancements of energetic particles at collisionless interplanetary shocks”, GSFC.
- 2015/12 “Fine structure of interplanetary shock waves in the Solar Probe Plus era”, Observatory of Rome, Monte-Porzio Catone.
- 2013/06 “Efficient turbulent amplification of magnetic field driven by small-scale dynamo at supernova remnant shocks”, Observatory Paris-Meudon
- 2012/11 “Magnetic field amplification at supernova remnant shocks”, Los Alamos National Lab.
- 2011/12 “Toward a model for perpendicular diffusion: early-time diffusion and particle velocity auto-correlation in a static magnetic turbulence”, Stanford University, Dep. of Physics.
- 2011/04 “Perpendicular transport of charged particles in a turbulent magnetic field beyond quasi-linear theory”, Observatory Paris-Meudon.
- 2011/02 “Time-dependent perpendicular transport of charged particles in a turbulent magnetic field beyond quasi-linear theory”, University of California, Berkeley, Dept.s of Space Science and Astronomy,
- 2010/08 “Impact of accelerated particles on Rayleigh-Taylor instabilities in supernova remnant”, Rutgers University, Dept. of Physics and Astronomy.
- 2010/06 “Impact of accelerated particles on Rayleigh-Taylor instabilities in supernova remnant”, Princeton University, Dept. of Astrophysical Sciences.
- 2009/07 “Production of cosmic rays in SNR through 3d numerical simulations and search for confirmation in HESS observations”, DFG, Frankfurt (Germany).
- 2009/06 “Cosmic Ray spectrum: particle acceleration mechanism”, Univ. Nijmegen (Netherlands).
- 2009/02 “On the acceleration of Ultra-High-Energy Cosmic Rays”, Oskar Klein Centre, Stockholm (Sweden).
- 2008/03 “Ultra-High Energy Cosmic Rays from Radio Lobes of AGNs” Max-Planck-Institut fuer Kernphysik, Heidelberg, Germany.
- 2008/01 “Ultra-High Energy Cosmic Rays from the Radio Lobes of AGNs”, LAPP-LAPTh, Annecy-Le-Vieux (France).
- 2007/02 “Afterglow of Gamma-Ray Bursts”, Univ. Orleans (France).
- 2005/01 “Afterglow of Gamma-Ray Bursts”, Brera Astronomical Osservatory, Merate (Italy).
- 2003/11 “On the spectrum of the Afterglow of Gamma-Ray Bursts”, Max-Planck-Institut fuer Astrophysik, Garching (Germany).

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

- 2016/08 Center for Astrophysics, Harvard Univ.
- 2013/06 Observatory Paris-Meudon, LUTh, Paris (France).
- 2011/04 Observatory Paris-Meudon, LUTh, Paris (France).

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

• **MEMBERSHIPS**

- Member of eXTP Working Group.
- Member of Athena Study Science Team Working Group 3.4, *The astrophysics of supernova remnants and the interstellar medium*, 2015–present;
- Member of 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);
- 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.

Cambridge, USA, March 4th, 2018