

## PERSONAL INFORMATION

## Andrea Mignone

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 <http://personalpages.to.infn.it/~mignone/>

Gender Male | Date of birth 24 February 1973

## WORK EXPERIENCE

Jan 2022 – Now

**Full Professor**

Physics Department - University of Turin  
Via Pietro Giuria 1, 10125 Torino (Italy)

Dec 2016 – Dec 2021

**Associate Professor**

Physics Department - University of Turin  
Via Pietro Giuria 1, 10125 Torino (Italy)

2008 – 2016

**Permanent Researcher**

Physics Department - University of Turin  
Via Pietro Giuria 1, 10125 Torino (Italy)

Research topics: development of numerical methods for classical and relativistic magneto-hydrodynamics in the PLUTO code / dynamics and stability of relativistic extragalactic jets / propagation and spectral signature from Herbig-Haro objects / angular momentum transport in accretion disks. During this time I have undertaken more than 10 collaborations with national and international research groups for which my expertise and contribution to the numerical modeling of specific astrophysical problems was required.

2007 – 2008

**Postdoctoral Fellowship**

Turin Astrophysical Observatory

Research topics: dynamics and radiative processes of stellar jets through advanced computational modeling. During this time, I played a major role in leading a team of Ph.D. students part of the JETSET Research Training Network at UniTo. Our team achievements had a noticeable impact in the international community of stellar jets and disk/jet launching with 9 peer-reviewed articles for a total of 133 citations.

2005 – 2007

**Postdoctoral Fellowship**

Physics Department, University of Turin

Computer-aided simulation models of stellar jets with application to young stellar objects.

2004 – 2005

**Postdoctoral Fellowship**

Turin Astrophysical Observatory

Initial stage development of the PLUTO code and computational model of relativistic magnetized jets.

## Research Field

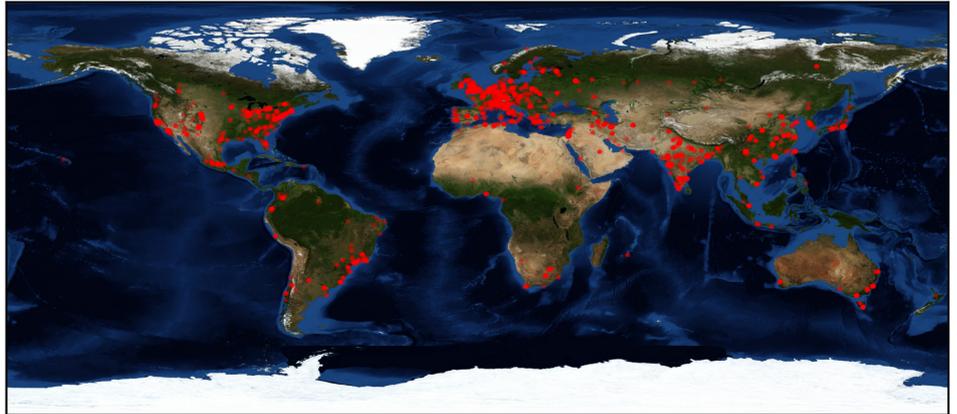
My active field of research is plasma physics and computational modeling of astrophysical magnetized flows using classical and relativistic magneto-hydrodynamics numerical simulations. My primary scientific applications target the dynamics, morphologies and instabilities of jets from active galactic nuclei (AGN), pulsar wind nebulae as well as stellar jets.

Most scientific results during my career have been achieved through computer-aided numerical simulations as well as through more theoretical tools, primarily linear perturbation theory. Other fields of investigation include angular momentum transfer in disks and, more recently, gas-particle hybrid numerical models with applications to magnetic reconnection physics as well as dust physics in proto-planetary disk.

As an expert in the field of numerical solutions of hyperbolic partial differential equations, I have been involved either as a collaborator or scientific consultant in a number of related fields including: pulsed jet propulsion (see the work with G. Romanelli), solar physics (A. Bemporad), laboratory experiments and large eddy fluid simulations (D. Tordella, M. Belan).

## PLUTO Code Development and Distribution

Since 2005 I am leading the development, maintenance and distribution of the PLUTO code for astrophysical gas dynamics (<http://plutocode.ph.unito.it>), which has now reached world-leading excellence in a variety of astrophysical research fields from several institutions around the world. This effort is witnessed by two main publications - Mignone et al. ApJS (2007) & Mignone et al. (2012) - which received over 1000 citations from top-ranked peer-reviewed journals. The latest releases of the code (Dec 2018 and Nov 2020) have received  $\sim 1500$  and  $\sim 500$  downloads, respectively. An IP-geolocation world map is shown below.



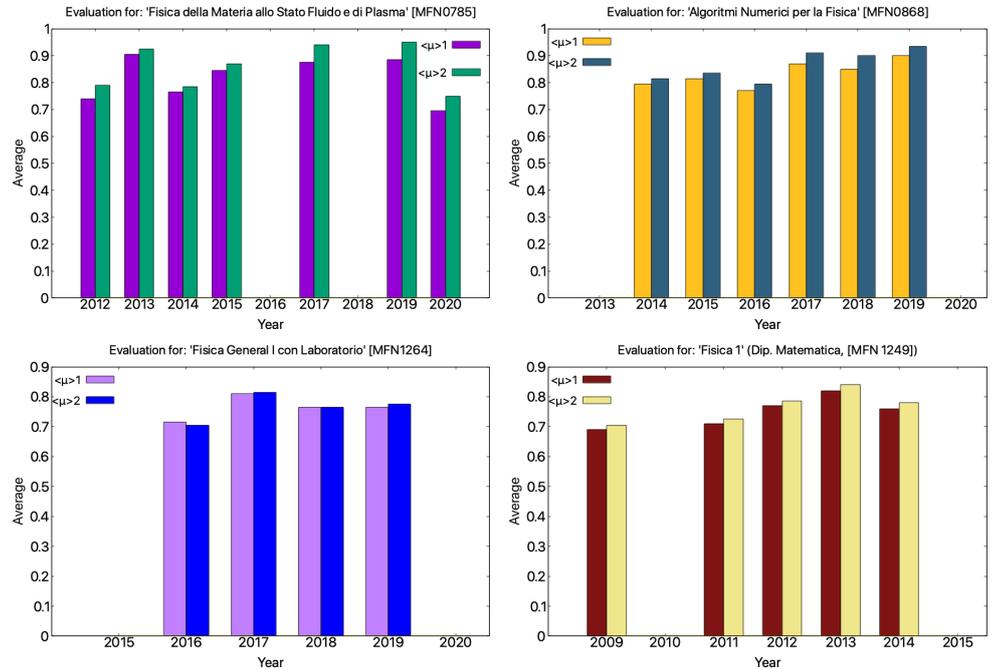
The code provides a well-tested framework that has been carefully designed according to the criteria of flexibility, extensibility and modularity on static and adaptive grids. Approximately 40% of my research activity time is devoted to the development, coordination, maintenance and distribution of the code. PLUTO is being used in the astrophysical community to model a variety of astrophysical environments including, for instance, angular momentum transport in accretion disks, protoplanetary disk simulations, magneto-centrifugal jet launching, colliding binaries, bow-shock nebulae, relativistic jets, pulsar wind nebulae, fluid dynamics instabilities to cite a few.

## Teaching Activities

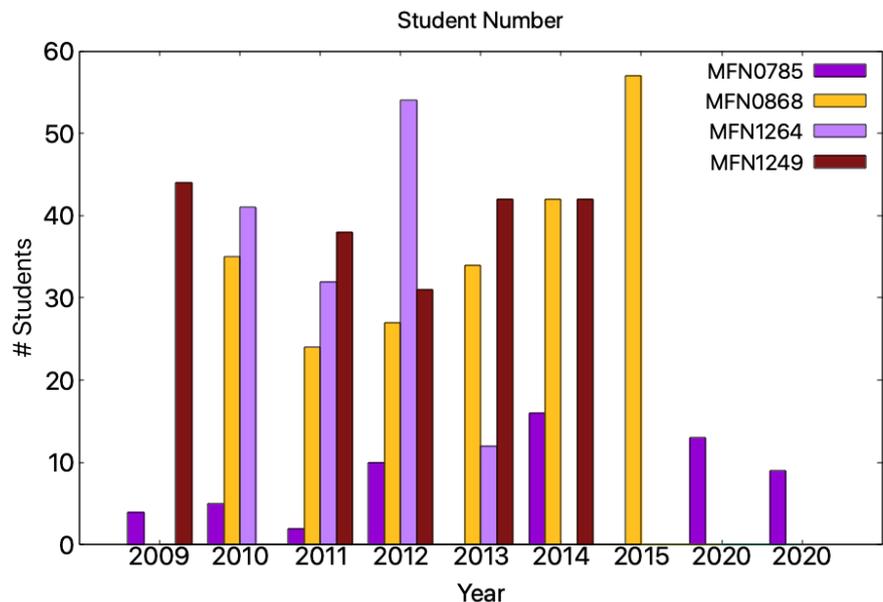
- 2019 – now Teacher in: *Introduction to Parallel Programming using MPI* (12 hrs/year, Ph.D. level)  
Degree Course: Physics & Astrophysics (University of Turin), code id: FIS0140  
Objectives: The course aims at deliver some basic knowledge of the Message-Passing-Interface (MPI) library for distributed memory parallel computations.
- 2016 – now Teacher / Assistant in: *General Physics with laboratory\** (20 hrs/year, Bachelor level)  
Degree Course: Scienza e Tecnologia dei Materiali (University of Turin), code id: MFN1264.  
Objectives: The course aims at introducing the students to the language and methodology of physical sciences in particular of mechanics and oscillatory phenomena to be ready to solve exercises and main applications.
- 2014 – now Teacher in: *Numerical Algorithms for Physics\** (60 hrs/year, Master level - Single Professor)  
Degree Course: Physics Dept. (University of Turin), code id: MFN0868  
Objectives: The course aims at making the students familiar with the use of algorithms to enable them to face various numerical issues that they deal with during their studies.
- 2012 – now Teacher in: *Physics of Matter in the Fluid and Plasma State* (48 hrs/year, Master level - Single Professor)  
Degree Course: Physics Dept. (University of Turin), code id: MFN0785  
Objectives: The course introduces the theoretical foundation of fluids and plasma physics with applications to astrophysics and the recent developments in this research field.
- 2009 – 2014 Teacher in: *Physics I* (24 hrs/year, Bachelor level)  
Degree Course: Math Dept. (University of Turin), code id: DM270  
Objectives: Knowledge of the fundamental laws of mechanics, waves and thermodynamics.
- 2008 – 2011 Assistant in: *Classical Mechanics* (Bachelor level)  
Degree Course: Physics Dept. (University of Turin)
- 2006 – 2007 Lecturer in: *Computational Astrophysics* (8 hrs/year, Ph.D. level)  
Degree Course: Physics Dept. (University of Turin)  
Objectives: Basic numerical techniques to solve hyperbolic partial differential equations.
- 2001 Assistant in: *Basic Astronomy* (Bachelor level)  
Degree Course: The University of Chicago (Chicago, IL, USA)

## Course Evaluation & Student Feedback

Courses previously marked with a \* receive annual student evaluation and have been purposely summarized (from the “*Grafica delle Statistiche*” section, available at <https://www.edumeter.unito.it/>) in the form of histograms showing both the average course evaluation ( $\mu_1$ ) as well as the average lecturing evaluation ( $\mu_2$ ) (when available). Courses MFN0785 and MFN0868 are single-teacher classes while MFN1264 and MFN1249 have been conducted in co-teaching with another professor. Scores have been re-normalized from their original values to unity for the sake of clarity. *To this end, I self-certify that the information reported below is conforming to the original data available in the academic reports.*



The number of students from which statistic is taken is also reported below:



More courses evaluation details can be found in a separate document.

Dec 2008 – Now

## Supervision of Students and Postdocs

Since my first appointment at the Physics Department, University of Turin, I've supervised approximately students at the bachelor (BS), master (MS) and Ph.D. level.

Here's a list:

### Bachelor (B.S.) Students:

- 2019 – 2020 Supervision of S. Gambino, Physics Dept. (University of Turin);
- 2016 – 2017 Supervision of L. Rickler, Physics Dept. (University of Turin);
- 2015 – 2016 Supervision of S. Ebagezio, Physics Dept. (University of Turin);
- 2015 – 2016 Supervision of L. Pezzini, Physics Dept. (University of Turin);
- 2015 – 2016 Supervision of E. Beratto, Physics Dept. (University of Turin);
- 2014 – 2015 Supervision of F. Tolino, Physics Dept. (University of Turin);
- 2014 – 2015 Supervision of V. Cesare, Physics Dept. (University of Turin);
- 2011 – 2012 Supervision of S. Madonna, Physics Dept. (University of Turin);

### Graduate (master-level) Students:

- 2020 – now Supervision of V. Berta, Physics Dept. (University of Turin);
- 2020 – 2021 Supervision of M. Rossazza, Physics Dept. (University of Turin);
- 2020 – 2021 Co-Supervision of L. Pezzini, co-tutorship between KU Leuven, (Centre for mathematical Plasma Astroph.) and Physics Dept. (University of Turin);
- 2020 – 2021 Supervision of H. Haudemand, Physics Dept. (University of Turin);
- 2020 – 2021 Supervision of M. Musso, Physics Dept. (University of Turin);
- 2018 – 2019 Supervision of E. Puzzone, Physics Dept. (University of Turin);
- 2018 – 2019 Supervision of R. Biondo, Physics Dept. (University of Turin);
- 2017 – 2018 Co-Supervision of M. Nurisso, Physics Dept. (University of Turin);
- 2016 – 2017 Supervision of G. Mattia, Physics Dept. (University of Turin);
- 2015 – 2016 Co-Supervision of G. Romanelli, Delft University of Technology;
- 2014 – 2015 Supervision of F. Ponzo, Physics Dept. (University of Turin);
- 2008 – 2009 Supervision of G. Blasotta, Physics Dept. (University of Turin);
- 2007 – 2008 Supervision of M. Ugliano, Physics Dept. (University of Turin);

### Ph.D. Students:

- 2019 – now Supervision of E. Puzzone, Physics Dept. (University of Turin);
- 2016 – 2019 Supervision of Z. Ahmane, co-tutorship between Batna University and Physics Dept. (University of Turin);
- 2012 – 2013 Supervision of M. Anjiri, co-tutorship between Ferdowsi University of Mashhad, Iran. GPA and Physics Dept. (University of Turin);
- 2012 – 2013 Co-Tutorship of S. Bertone, co-tutorship between Observatoire de Paris and Physics Dept. (University of Turin);
- 2007 – 2010 Supervision of P. Tzeferacos, Physics Dept. (University of Turin);
- 2005 – 2008 Co-supervision of T. Matsakos under the JETSET European Research and Training Network (RTN);
- 2005 – 2008 Co-supervision of O. Tesileanu under the JETSET European Research and Training Network (RTN);
- 2005 – 2007 Supervision of Z. Osmanov, co-tutorship University of Tbilisi (Georgia) - Physics Dept. University of Turin.

### Postdoctoral Fellowships:

- 2017 – 2018 Supervision D. Mukherjee. Research activity: *Implementation of hybrid fluid+particle modules in the PLUTO code*;
- 2015 – 2018 Supervision of E. Striani. Research Activity: *3D magnetic reconnection*;
- 2014 – 2017 Supervision B. Vaidya. Research activity: *Implementation of hybrid fluid+particle modules in the PLUTO code*.

2022 – Now

## “Referente AQ di Dipartimento”

Since 2022, I'm the contact person for University-wide quality assurance of the Physics department.

2016 – Now

## Member of Ph.D. Faculty Board

Since 2016, I'm a member of the Faculty Board for the Ph.D. program in physics at the University of Turin.

## 2013-Now Commissions of Trust (Ph.D.)

I have been an international committee member / official reviewer for the following Ph.D. students:

- V. Cesare (Physics Dept., UniTo). Ph.D. Thesis: “Dynamics of disk and elliptical galaxies in Refracted Gravity”, discussed on March 2021;
- Member of the selection committee for a fixed-term position for a researcher type b) (RTDb) (Academic Recruitment Field 02/C1 Astronomy, Astrophysics, Earth and Planetary Physics - Decree n. 601 Year 2020), Jan 2021, University of Florence.
- Member of the selection committee for the recruitment of a Scientific Technician, (Decree n. 2472 of 06/2019), University of Turin.
- B. Olmi (Dept. of Physics & Astronomy, UniFi). Ph.D. Thesis: “MHD numerical models for the dynamics and non-thermal emission of Pulsar Wind Nebulae”, discussed on Jan. 2016;
- M. Salz (Dept. of Physics, Hamburg University, Germany). Ph.D.Thesis: “Escaping atmospheres of hot extrasolar gas planets”, discussed on Dec. 2015;
- M. Nawaz (Mt Stromlo Observatory, ACT, Australia). Ph.D. Thesis: “Interaction of Hydra A Jets with the Intracluster Medium”, discussed on Nov. 2015.
- S. Bertone, (SYRTE, Observatoire de Paris). Ph.D. Thesis: “From time transfer functions to a model for relativistic astrometry in Gaia era”, discussed on Sep. 2013;
- L. Maurri (Dept. of Physics & Astronomy, UniFi). Ph.D. Thesis: “Clues on the launch mechanism from synthetic versus observed maps of the jet from DG tau”, discussed on March 2013.

## RESEARCH GRANTS & RESPONSIBILITIES

### 2023-2026 SPACE (HORIZON-EUROHPC-JU-2021-COE-01-01)

Principal Investigator for the Euro HPC project SPACE (“Scalable Parallel Astrophysical Codes for Exascale the MUR-awarded grant” - call HORIZON-EUROHPC-JU-2021-COE-01)

### 2022-2024 PNRR

Affiliate coordinator for the MUR-awarded grant “National Centre for HPC, Big Data and Quantum Computing” within the national plan for recovery and resilience (PNRR) program.

### 2017-2019 PRIN MIUR 2015

Grant awarded as PI by MIUR (Ministero dell’Istruzione, dell’Università e della Ricerca), Project title: “Multi-scale Simulations of High-Energy Astrophysical Plasmas” - Amount = €254,584. URL: [http://attiministeriali.miur.it/anno-2016/novembre/dd-07112016-\(1\).aspx](http://attiministeriali.miur.it/anno-2016/novembre/dd-07112016-(1).aspx) [Allegato 2].

### 2011-2013 PRIN INAF 2010

Responsible as coordinator of the 2<sup>nd</sup> research unit for the awarded INAF grant, PI: G. Bodo, Project title: “Turbulence and Angular Momentum Transport in Accretion Discs” - Amount = €38,000.

### 2009-2012 PRIN INAF 2008

Responsible as coordinator of the 2<sup>nd</sup> research unit for the awarded INAF grant (PI: G. Bodo), Project title: “Large scale numerical simulations of magnetized relativistic flows” - Amount = €69,948.

### 2010-2020 Awarded Computational time at CINECA

Responsible as PI for several computational resources granted on Cineca HPC systems. Projects and awarded CPU hours, relative to the last 6 years, are listed below:

- “Numerical Convergence of Magnetic Reconnection in Relativistic Plasma”. Award: 330,000 CPU hrs (Active);
- “Synthetic Maps from Low-Power FRI Jets”. Award: 450,000 CPU hrs (May 2019-May 2020);
- “CR Acceleration in Shear Layer”. Award: 237.500 CPU hrs (Feb 2018-Feb 2019);
- “Large Scale Reconnection in 3D Relativistic Jets”. Award: 62,500 CPU hrs (Dec 2016-Dec 2017);
- “Three Dimensional Reconnection in Jets”. Award; 5,700,000 CPU hrs (Oct 2015-Dec 2016);
- “Current-Driven Instabilities in Three Dimensional Relativistic Jets”. Award 140,000 CPU hrs (Dec 2010-Feb 2012);
- “Nonlinear evolution of current-carrying relativistic jet”. Award: 4,500,000 CPU hrs (Mar 2013-Mar 2014);
- “Pressure-Balanced and Force-Free Magnetized Jets”. Award: 4,950,000 CPU hrs (Dec 2014-Dec 2015).

- 2008-Now** **Reviewer Activity**  
I've contributed as referee to the peer-review process for the following (major) journals:
- Astrophysical Journal (ApJ) & Astrophysical Journal Supplement (ApJS), from 2008-present;
  - Astronomy & Astrophysics (AA), from 2008-present;
  - Monthly Notices of the Royal Astronomical Society (MNRAS), from 2008-present;
  - Journal of Computational Physics (JCP), from 2007-present;
  - New Astronomy, from 2009-present;
  - IEEE Transactions on Plasma Science, from 2010-present;
  - Computer Physics Communications, from 2014-present;

**2021** **Member of the LOFAR.IT Board**  
Coordinator within the UniTo partnership in the LOFAR Consortium.

- 2005-now** **Participation to Networks / Collaborations**  
I've participated as expert or academic advisor to a number of collaboration listed below:
- 2005-2008 Participation to the JETSET (Jet Simulations, Experiments and Theory) Marie Curie Research Training Network, oriented to protostellar jets and plasma physics. Co-supervision of Ph.D. students Ovidiu Tesileanu (Nov 2005-Nov 2008) and Titos Matsakos (Dec 2005 - Oct 2008).
  - 2008-2015 Participation - as expert in plasma physics and numerical techniques - to the Center for Magnetic Self Organization in Astrophysical and Laboratory Plasmas (CMSO), The University of Chicago URL: <https://astro.uchicago.edu/research/cmso.php>
  - 2010-Today Collaboration with the *Computational Research Division, Lawrence Berkeley National Laboratory (USA)* (P. Colella, B. Van Straalen) aimed to the implementation of the CHOMBO library for adaptive mesh refinement in the PLUTO code, (<https://ui.adsabs.harvard.edu/abs/2012ApJS..198....7M/abstract>)
  - 2011-2015 Participation (as expert in MHD instabilities and numerical simulations) to the *Plasma Astrophysics Laboratory (PAL)* project (PI: Bruno Coppi).

## EDUCATION AND TRAINING

- Mar 2001 – Dec 2004** **Ph.D. in Astrophysics**  
FLASH Center, The University of Chicago (Chicago), USA  
Thesis title: "The Dynamics of Radiative Shock Waves", Advisor: R. Rosner
- Sep 1999 – Mar 2001** **M.S. in Astrophysics**  
Dept. of Astronomy & Astrophysics, The University of Chicago (Chicago), USA
- Jan 1999** **Master Thesis in Physics**  
Physics Department, University of Turin, 10125 Torino (Italy)  
Grade: 110/110 *cum laude*

## PERSONAL SKILLS

**Mother tongue(s)** Italian

Other language(s)	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	C2	C2	C2	C2	C2

Levels: A1/A2: Basic user - B1/B2: Independent user - C1/C2: Proficient user  
Common European Framework of Reference (CEF) level

**Computer skills**    Advanced expertise with major operating systems (UNIX/Linux, Mac OS, Windows). Knowledge of the following programming / scripting languages:

- Fortran (Intermediate)
- C / C++ (Advanced)
- IDL (Advanced)
- Python (Intermediate)
- General bash programming (Low-Intermediate)
- MAPLE, Matlab, VisIt, Gnuplot (Basic)

**Driving license**    B

## Publications

I presently have a total of 142 publications distributed among the fields of astrophysics, fluid-dynamics, computational physics and general physics (theoretical plasma physics, nuclear propulsion, space climate). 103/142 are peer-reviewed articles in major international journals for a total number of  $\sim 3,360$  citations (source: NASA ADS database). Bibliometric information:

- Total number of publications: 142
- Peer-reviewed publications: 103
- Number of publications as 1<sup>st</sup> author: 40 (29 refereed)
- H-index: 28

Here I list the publications over the last 10 years:

- 2021 Nikhil Borse, Sriyasriti Acharya, Bhargav Vaidya, Dipanjan Mukherjee, Gianluigi Bodo, Paola Rossi, and Andrea Mignone. Numerical study of the Kelvin-Helmholtz instability and its effect on synthetic emission from magnetized jets. *A&A*, 649:A150, May 2021
- 2021 Andrea Mignone, Gabriele Inghirami, Francesco Rubini, Raniero Cazzaniga, Monica Cicu, and Marco Rosa-Clot. Numerical simulations of wind-loaded floating solar panels. *Solar Energy*, 219:42–49, May 2021
- 2021 Andrea Pavan, Riccardo Ciolfi, Jay V. Kalinani, and Andrea Mignone. Short gamma-ray burst jet propagation in binary neutron star merger environments. *MNRAS*, July 2021
- 2021 Dipanjan Mukherjee, Gianluigi Bodo, Paola Rossi, Andrea Mignone, and Bhargav Vaidya. Simulating the dynamics and synchrotron emission from relativistic jets - II. Evolution of non-thermal electrons. *MNRAS*, 505(2):2267–2284, August 2021
- 2021 Mario Flock and Andrea Mignone. Streaming instability in a global patch simulation of protoplanetary disks. *A&A*, 650:A119, June 2021
- 2021 Siddhartha Gupta, Prateek Sharma, and Andrea Mignone. A numerical approach to the non-uniqueness problem of cosmic ray two-fluid equations at shocks. *MNRAS*, 502(2):2733–2749, April 2021
- 2021 Ruggero Biondo, Alessandro Bemporad, Andrea Mignone, and Fabio Reale. Reconstruction of the Parker spiral with the Reverse In situ data and MHD Approach - RIMAP. *Journal of Space Weather and Space Climate*, 11:7, January 2021
- 2021 G. Revet, B. Khair, E. Filippov, C. Argiroffi, J. Béard, R. Bonito, M. Cerchez, S. N. Chen, T. Gangolf, D. P. Higginson, A. Mignone, B. Olmi, M. Ouillé, S. N. Ryazantsev, I. Yu. Skobelev, M. I. Safronova, M. Starodubtsev, T. Vinci, O. Willi, S. Pikuz, S. Orlando, A. Ciardi, and J. Fuchs. Laboratory disruption of scaled astrophysical outflows by a misaligned magnetic field. *Nature Communications*, 12:762, January 2021
- 2021 Julio David Melon Fuksman, Hubert Klahr, Mario Flock, and Andrea Mignone. A Two-moment Radiation Hydrodynamics Scheme Applicable to Simulations of Planet Formation in Circumstellar Disks. *ApJ*, 906(2):78, January 2021
- 2021 P. Dominguez-Fernandez, M. Bruggen, F. Vazza, W. E. Banda-Barragan, K. Rajpurohit, A. Mignone, D. Mukherjee, and B. Vaidya. Morphology of radio relics - I. What causes the substructure of synchrotron emission? *MNRAS*, 500:795–816, January 2021
- 2021 A. Mignone and L. Del Zanna. Systematic construction of upwind constrained transport schemes for MHD. *Journal of Computational Physics*, 424:109748, January 2021
- 2020 Dipanjan Mukherjee, Gianluigi Bodo, Andrea Mignone, Paola Rossi, and Bhargav Vaidya. Simulating the dynamics and non-thermal emission of relativistic magnetized jets I. Dynamics. *MNRAS*, 499(1):681–701, September 2020
- 2020 A. Mignone, B. Vaidya, E. Puzzone, D. Mukherjee, G. Bodo, and M. Flock. Particle-Gas Hybrid Schemes in the PLUTO Code. In *Journal of Physics Conference Series*, volume 1623 of *Journal of Physics Conference Series*, page 012007, September 2020
- 2020 Rolf Kuiper, Harold W. Yorke, and Andrea Mignone. Makemake + Sedna: A Continuum Radiation Transport and Photoionization Framework for Astrophysical Newtonian Fluid Dynamics. *ApJS*, 250(1):13, September 2020
- 2020 Z. Ahmane, A. Mignone, C. Zanni, S. Massaglia, and A. Bouldjderi. Simulations of protostar-driven photoionization in Herbig-Haro jets. *Ap&SS*, 365(6):94, June 2020

- 2019 A. Mignone, M. Flock, and B. Vaidya. A Particle Module for the PLUTO Code. III. Dust. *ApJS*, 244(2):38, October 2019
- 2019 A. Mignone, G. Mattia, G. Bodo, and L. Del Zanna. A constrained transport method for the solution of the resistive relativistic MHD equations. *MNRAS*, 486(3):4252–4274, Jul 2019
- 2019 Julio David Melon Fuksman and Andrea Mignone. A Radiative Transfer Module for Relativistic Magnetohydrodynamics in the PLUTO Code. *ApJS*, 242(2):20, Jun 2019
- 2019 G. Bodo, G. Mamatsashvili, P. Rossi, and A. Mignone. Linear stability analysis of magnetized relativistic rotating jets. *MNRAS*, 485(2):2909–2921, May 2019
- 2019 G. Bodo, F. Cattaneo, A. Mignone, and P. Rossi. Magnetorotational Turbulence, Dynamo Action and Transport in Convective Disks. *Astrophysics and Space Science Proceedings*, 55:3, Jan 2019
- 2019 S. Massaglia, G. Bodo, P. Rossi, S. Capetti, and A. Mignone. Making Faranoff-Riley I radio sources. II. The effects of jet magnetization. *A&A*, 621:A132, Jan 2019
- 2018 Bhargav Vaidya, Andrea Mignone, Gianluigi Bodo, Paola Rossi, and Silvano Massaglia. A Particle Module for the PLUTO Code. II. Hybrid Framework for Modeling Nonthermal Emission from Relativistic Magnetized Flows. *ApJ*, 865(2):144, Oct 2018
- 2018 A. Mignone, G. Mattia, and G. Bodo. Linear wave propagation for resistive relativistic magnetohydrodynamics. *Physics of Plasmas*, 25(9):092114, Sep 2018
- 2018 A. Mignone, G. Bodo, B. Vaidya, and G. Mattia. A Particle Module for the PLUTO Code. I. An Implementation of the MHD-PIC Equations. *ApJ*, 859(1):13, May 2018
- 2017 Bhargav Vaidya, Deovrat Prasad, Andrea Mignone, Prateek Sharma, and Luca Rickler. Scalable explicit implementation of anisotropic diffusion with Runge-Kutta-Legendre super-time stepping. *MNRAS*, 472(3):3147–3160, Dec 2017
- 2017 Valentí Bosch-Ramon, Maxim V. Barkov, Andrea Mignone, and Pol Bordas. HESS J0632+057: hydrodynamics and non-thermal emission. *MNRAS*, 471(1):L150–L154, Oct 2017
- 2017 Gherardo Romanelli, Andrea Mignone, and Angelo Cervone. Pulsed fusion space propulsion: Computational Magneto-Hydro Dynamics of a multi-coil parabolic reaction chamber. *Acta Astronautica*, 139:528–544, Oct 2017
- 2017 G. Bodo, F. Cattaneo, A. Mignone, and P. Rossi. Magnetic Helicities and Dynamo Action in Magneto-rotational Turbulence. *ApJ*, 843(2):86, Jul 2017
- 2017 D. Wójcik, K. Murawski, Z. E. Musielak, P. Konkol, and A. Mignone. Numerical Simulations of Torsional Alfvén Waves in Axisymmetric Solar Magnetic Flux Tubes. *Sol. Phys.*, 292(2):31, Feb 2017
- 2017 D. M. A. Meyer, A. Mignone, R. Kuiper, A. C. Raga, and W. Kley. Bow shock nebulae of hot massive stars in a magnetized medium. *MNRAS*, 464(3):3229–3248, Jan 2017
- 2017 A. Mignone. MHD Modeling: Aims, Usage, Scales Assessed, Caveats, Codes. In Diego F. Torres, editor, *Modelling Pulsar Wind Nebulae*, volume 446, page 187, Jan 2017
- 2017 B. Kuźma, K. Murawski, T. V. Zaqarashvili, P. Konkol, and A. Mignone. Numerical simulations of solar spicules: Adiabatic and non-adiabatic studies. *A&A*, 597:A133, Jan 2017
- 2016 B. Olmi, L. Del Zanna, E. Amato, N. Bucciantini, and A. Mignone. Multi-D magnetohydrodynamic modelling of pulsar wind nebulae: recent progress and open questions. *Journal of Plasma Physics*, 82(6):635820601, Dec 2016
- 2016 G. Bodo, G. Mamatsashvili, P. Rossi, and A. Mignone. Linear stability analysis of magnetized jets: the rotating case. *MNRAS*, 462(3):3031–3052, Nov 2016
- 2016 E. Striani, A. Mignone, B. Vaidya, G. Bodo, and A. Ferrari. MHD simulations of three-dimensional resistive reconnection in a cylindrical plasma column. *MNRAS*, 462(3):2970–2979, Nov 2016
- 2016 S. Massaglia, G. Bodo, P. Rossi, S. Capetti, and A. Mignone. Making Faranoff-Riley I radio sources. I. Numerical hydrodynamic 3D simulations of low-power jets. *A&A*, 596:A12, Nov 2016
- 2016 F. Reale, S. Orlando, M. Guarrasi, A. Mignone, G. Peres, A. W. Hood, and E. R. Priest. 3D MHD modeling of twisted coronal loops. *ApJ*, 830(1):21, Oct 2016

Publications (2012-2015)

- 2015 G. Bodo, F. Cattaneo, A. Mignone, F. Ponzio, and P. Rossi. Global Properties of Fully Convective Accretion Disks from Local Simulations. *ApJ*, 808(2):141, Aug 2015
- 2015 B. Vaidya, A. Mignone, G. Bodo, and S. Massaglia. Astrophysical fluid simulations of thermally ideal gases with non-constant adiabatic index: numerical implementation. *A&A*, 580:A110, Aug 2015
- 2015 M. Salz, R. Banerjee, A. Mignone, P. C. Schneider, S. Czesla, and J. H. M. M. Schmitt. TPCI: the PLUTO-CLOUDY Interface . A versatile coupled photoionization hydrodynamics code. *A&A*, 576:A21, Apr 2015
- 2015 G. Bodo, F. Cattaneo, A. Mignone, F. Ponzio, and P. Rossi. Global Properties of Fully Convective Accretion Disks from Local Simulations. *ApJ*, 808(2):141, Aug 2015
- 2014 D. M. A. Meyer, J. Mackey, N. Langer, V. V. Gvaramadze, A. Mignone, R. G. Izzard, and L. Kaper. Models of the circumstellar medium of evolving, massive runaway stars moving through the Galactic plane. *MNRAS*, 444(3):2754–2775, Nov 2014
- 2014 M. Belan, D. Tordella, S. De Ponte, A. Mignone, and S. Massaglia. Hypersonic jets in astrophysical conditions: focus on spreading and asymmetric stability properties. *New Journal of Physics*, 16(8):085002, Aug 2014
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## Conferences & Workshops

I have participated as invited speaker or lecturer to more than 30 among international conferences and schools. Here I report the most significant contributions over the last five years:

- |      |            |   |
|------|------------|---|
| 2021 | Symposium  | The 1 <sup>st</sup> PLUTO Symposium, University of Turin & Heidelberg Joint Online Event, Jun 2021 (online) - Talk: <i>"PLUTO. Introduction: Past, Present and Future of the PLUTO code"</i> .  |
| 2020 | Colloquium | Heidelberg Joint Astronomical Colloquium, Dec 01 2020 (online) - Talk: <i>"Frontiers of high-energy computational astrophysics: bridging gaps between large and small scales"</i> .   |
| 2020 | Conference | <b>The Building Block of Planet</b> , Online meeting, 14 - 17 April 2020 - Talk: <i>"Numerical Methods for Dust-Gas Interaction: a Review"</i>  |
| 2020 | School     | <b>AstroSim2019: Ecole AstroSim pour l'astrophysique numérique</b> , 27 Jan-7 Feb 2020 CINES Montpellier (France) - Lectures: <i>"Finite Volume Numerical Methods for Hydrodynamics: I-discretization techniques / II-MHD, Riemann solvers &amp; the PLUTO Code / III-The PLUTO Code, relativistic MHD, particle-gas hybrid schemes, radiation transport"</i> ; Practice Session: <i>"A Practical Introduction to the PLUTO Code"</i> |
| 2019 | Conference | <b>The 3C Extragalactic Radio Sky: Legacy of the Third Cambridge Catalogue</b> . 16-20 Sep, 2019 Torino (Italy) - Talk: <i>"Frontiers in Computational Plasma Astrophysics: connecting small and large scales"</i> .  |
| 2019 | School     | <b>NBIA Summer School on protoplanetary disks and planet formation</b> , 5-9 Aug, 2019 Niels Bohr Institute, Copenhagen (Denmark) - Lectures: <i>"Finite Volume Numerical Methods for Hydrodynamics"</i> .  |
| 2019 | Conference | <b>ASTRONUM 2019 - The 14th International Conference on Numerical Modeling of Space Plasma Flows</b> , Paris (France) 1-5 July, 2019 - Talk: <i>"Particle-Gas Hybrid Schemes in the PLUTO Code"</i> .   |
| 2019 | Colloquium | Department of Physics and Astronomy, University of Bologna (Italy), June 2019 - Talk: <i>"Frontiers of High-Energy Computational Astrophysics: Bridging Gaps between Large and Small Scales"</i> .  |
| 2019 | School     | <b>The multiple approaches to plasma physics from laboratories to astrophysics</b> , Les Houches (France) 13-24 May, 2019 - Lectures: <i>"Numerical Methods for Astrophysical Fluid Dynamics"</i> .   |
| 2018 | School     | <b>CINECA: HPC Methods for Computational Fluid Dynamics</b> , Roma (Italy) 3-5 Dec, 2018 - Lectures: <i>"Numerical Methods for Hydrodynamics"</i> , <i>"Introduction to the PLUTO code"</i> .   |
| 2018 | Colloquium | Max Planck Institute for Astronomy, Heidelberg (Germany) July 2018 - Talk: <i>"The PLUTO Code for Astrophysical Plasma: Present and Future Directions"</i> .  |
| 2018 | Conference | <b>Blazars &amp; Beyond</b> , Half a Century of Blazars and Beyond, Torino (Italy) 11-15 June, 2018 - Talk: <i>"Extragalactic Jet Dynamics after Half a Century of MHD modeling. Where are we ?"</i> .  |
| 2018 | Colloquium | Institut de planétologie et d'astrophysique (IPAG), Grenoble (France), May 2018 - Talk: <i>"High Energy Astrophysics with the PLUTO Code: where we are and where we are going"</i> .  |

## Conferences & Workshops

- 2017 Symposium **A DECADE OF AGILE: RESULTS, CHALLENGES AND PROSPECTS OF GAMMA-RAY ASTROPHYSICS**, Accademia dei Lincei, Rome (Italy) Dec 11-13, 2017 - Talk: *"MHD Simulations of the Crab-Nebula Jet"*.
- 2017 School **CINECA**: HPC Methods for Computational Fluid Dynamics & Astrophysics, Bologna (Italy) 13-15 Nov, 2017 - Lectures: *"Numerical Methods for Hydrodynamics"*, *"Introduction to the PLUTO code"*.
- 2017 Conference **ICNSP 2017**: International Conference on Numerical Simulation of Plasmas, Leuven (Belgium) 18-20 Sept, 2017 - Talk: *"RECENT ADVANCES IN THE PLUTO CODE: towards fluid-particle hybrid models"*.
- 2017 Workshop **Workshop in honor of R. Rosner**, Dept. of Astronomy & Astrophysics, Chicago (USA), Sep 2017 - Talk: *"Computational Astrophysics with the PLUTO code: from past to present and future directions"*.
- 2017 School **From Laboratories to Astrophysics: The expanding universe of plasma physics**. Les Houches (France) 2-12 May, 2017 - Lecture: *"Numerical Methods for Astrophysical Fluid Dynamics"*.
- 2016 Workshop **Modeling Pulsar Wind Nebulae**, Sant Cugat, Barcelona (Spain) 14-17 June, 2016. Talk: *"MHD modeling: aims, usage, scales assessed, caveats, codes"*.
- 2016 School **CINECA**: HPC Methods for Computational Fluid Dynamics & Astrophysics, Bologna (Italy) 2-4 Nov, 2016 - Lecture: *"Numerical Approaches to Fluid- and Magnetohydrodynamics in Astrophysics"*.
- 2015 Conference **ASTRONUM - 2015**, the 10th Annual International Conference on Numerical Modeling of Space Plasma Flows in Avignon, France 8 - 12 June, 2015 - Talk: *"Jacobian-Free Riemann Solvers for Hyperbolic Conservation Laws"*.
- 2014 Conference **Accretion and outflows throughout the scales: from YSO to AGN**, Lyon (France) - Talk: *"Instabilities of Current-Carrying Relativistic Jets"*.
- 2013 Conference **Summer School on Computational Astrophysics**, Niels Bohr Institute (Copenhagen, Denmark) - Lecture: *"Discretization methods and accretion disk modeling"*.
- 2013 Conference **ASTRONUM 2013**, Biarritz (France) - Talk: *"Fluid Instabilities in the Crab Nebula"*.
- 2013 Conference **Physical Processes in Astrophysical Plasmas**, University of Turin, Torino (Italy) - Talk: *"Simulations of Jets in the Crab Nebula"*.
- 2012 Conference **International School of Space Science**, L'Aquila (Italy) - Lecture: *Numerical Methods, MHD*.
- 2012 Conference **Flaring Crab Meeting**, Rome (Italy) - Talk: *"Kink Instabilities in the Crab Jet: Results from Numerical Simulations"*.
- 2012 Conference **EWASS - Formation and Disruption of jets in black-hole binaries and AGNs**, Pontificia Università Lateranense, Rome (Italy) - Talk: *"Numerical Simulations of Relativistic Jets from Accreting Black Holes"*.

## Conferences & Workshops

2011	School	<b>School and Conference on ANALYTICAL and COMPUTATIONAL ASTROPHYSICS</b> , ICTP (Trieste, IT), 14-25 November 2011 - Lecture(s): <i>“Numerical Simulations of Astrophysical Fluids”</i> .
2011	Conference	<b>Numerical Methods for Hyperbolic Equations Theory and Applications</b> , Faculty of Mathematics, Santiago de Compostela (SPAIN), July 4-8, 2011 - Talk: <i>“An Approximate Harten-Lax-van Leer Riemann Solver for Relativistic Magnetohydrodynamics”</i> .
2011	Conference	<b>ASTRONUM - 2011: 6th International Conference on Numerical Modeling of Space Plasma Flows</b> , June 13th - June 17th 2011 Valencia (SPAIN) - Talk: <i>“Adaptive Mesh Computations with the PLUTO code for Astrophysical Fluid Dynamics”</i> .
2011	Workshop	<b>Cray-TIFR Workshop on High Performance Computing in Physics</b> , Tata Institute of Fundamental Research, Mumbai 400005, India, February 7th - 8th 2011 - Talk: <i>“Computational Astrophysics: present and future challenges”</i> ; Lecture: <i>“Numerical Methods for Compressible Flows”</i> .
2010	Workshop	<b>Computational Relativistic Astrophysics: Frontiers of MHD</b> , Princeton Center for Theoretical Science, January 13th - 16th 2010 - Talk: <i>“On the fate of relativistic magnetized jets: computational and theoretical challenges”</i> .
2009	Conference	<b>ASTRONUM - 2009: 4th International Conference on Numerical Modeling of Space Plasma Flows</b> , June 29th - July 3rd 2009 Chamonix, FRANCE - Talk: <i>“High-Order Finite Difference Schemes for computational MHD”</i> .
2009	Conference	<b>The high energy astrophysics of outflows from compact objects</b> , Ringberg Castle, Tegernsee, December 7th - 13th 2008 - Talk: <i>“Deceleration of 3D relativistic magnetized jets in FRI sources”</i> .
2008	Conference	<b>Protostellar Jets in Context</b> , 7-12 July 2008, island of Rhodes, Greece - Talk: <i>“Aspect Ratio Dependence in MRI Shearing Box Simulations”</i> .
2008	Conference	<b>ASTRONUM 2008: 3RD International Conference on Numerical Modeling of Space Plasma Flows</b> , Westin Hotel, St. John, U.S. Virgin Islands, 8-13 June 2008 - Talk: <i>“The PLUTO Code for computational astrophysics”</i> .
2007	School	<b>JETSET School and Workshop: Numerical MHD and Instabilities Visualization techniques and virtual reality</b> Sauze d'Oulx, Torino, Italy January 8-13, 2007 - Talk 1: <i>“Oscillatory Instability of Radiative Shock Waves”</i> ; Talk 2: <i>“Understanding Numerical Codes and Application to Astrophysical Problems”</i> ; Talk 3: <i>“Code to Code comparison”</i> .
2007	Workshop	<b>JETSET Workshop On Global Jet Simulations</b> , Landessternwarte Knigstuhl, Heidelberg(Germany), January 2007 - Talk: <i>“Recent development in the PLUTO code”</i> .
2007	Conference	<b>XCII Congresso Nazionale della Società Italiana di Fisica(SIF)</b> , Torino 2007 - Talk: <i>“PLUTO: a modular code for computational astrophysics”</i> .
2007	School	<b>School on Astrophysical Fluid Dynamics</b> , 15-26 October 2007, Abdus Salam International Centre for Theoretical Physics, Miramare, Trieste, Italy - Lecture: <i>“Computational Astrophysics”</i> .
2004	Conference	<b>Large-Scale Computation in Astrophysics</b> , Isaac Newton Institute, Cambridge, UK, 13 Oct. 2004 - Talk: <i>“PLUTO: a modular code for computational astrophysics”</i> .
2003	Conference	<b>Virtual Astrophysical Jets</b> Dogliani(IT), October 2003 - Talk: <i>“Astrophysical Jet Simulations: Comparing Different Numerical Methods”</i> .