



Pierre Marchand

Postdoc researcher in astrophysics

Experience

Research

- Since Jan 2022 **Postdoc**, *Institut de Recherche en Astrophysique et Planétologie (IRAP)*, Toulouse, France.
Chemistry in star formation, synthetic observations, radio-astronomy.
- Dec 2019 – **Postdoc**, *American Museum of Natural History*, New-York, USA.
Dec 2021 Star formation simulations with non-ideal MHD, grain physics and chemistry.
- Oct 2017 – **Postdoc**, *Osaka University*, Osaka, Japan, JSPS Fellowship.
Oct 2019 Star formation simulations with non-ideal MHD.
- Oct 2014 – **PhD Thesis**, *CRAL*, Lyon, France.
Sep 2017 Study of physical processes involved in star formation.
 - Non-ideal Magnetohydrodynamics,
 - Numerical simulations,
 - Chemistry.
- Mar-Jul 2014 **Internship**, *CRAL*, Lyon, France.
Study of the early phases of the protostellar collapse.
- Mar-Jul 2013 **Internship**, *CRAL*, Lyon, France.
Study of the pulsations of gaseous planets.
- May-Jul 2012 **Internship**, *Tohoku University*, Sendai, Japan.
Study of the light profiles of distant galaxies from observational data.

Teaching

- Jul. – Aug. 2020,2021 **Supervision of internships**, *American Museum of Natural History*, New-York, USA.
6 weeks of research internships for future Earth Science Teachers. Astrophysics, computer simulations.
- 2015 – 2017 **Teaching assistant in mathematics**, *Université Claude Bernard Lyon 1*, Lyon, France.
Tutorial classes and oral examinations in first and second year of University (192h).
- 2015 **Teaching assistant in sustainable development**, *Université Claude Bernard Lyon 1*, Lyon, France.
Short lectures on energy sources for second year students (7x90min).

08/10/1990 – French – 1 child (2016)

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- 2013 – 2017 **Private tuitions**, *Methodia*, Lyon & Paris, France.
Private tuitions for students in mathematics and physics from Middle School to 3rd year of University. Training classes in mathematics to prepare competitive examinations.
- Other
- 2020 – 2021 **Admission committee for the Master of Art in Teaching of the American Museum of Natural History**, New-York, USA.
Reviewing applications, conducting interviews, admission jury.
- 2018 – 2022 **Referee for 4 articles submitted to *Monthly Notices of the Royal Astronomical Society***, Chemistry, star formation simulations, non-ideal MHD..

Publications and communications

Published papers

- 2022 Lebreuilly, U., Valluci-Goy, V., Guillet, V., Lombart, M., **Marchand, P.**, 2022, MNRAS, in press: *Protostellar collapse simulations in spherical geometry with dust coagulation and fragmentation*
- 2022 **Marchand, P.**, Guillet, V., Lebreuilly, U., Mac Low, M.-M., 2021, A&A, in press: *Fast methods for tracking grain coagulation and ionization. II. Extension to thermal ionization*
- 2021 Lee, Y.-N., **Marchand, P.**, Liu, Y.-H., Hennebelle, P., 2021, ApJ in press: *Universal protoplanetary disk size under complete non-ideal magnetohydrodynamics: The interplay between ion-neutral friction, Hall effect, and the Ohmic dissipation.*
- 2021 **Marchand, P.**, Guillet, V., Lebreuilly, U., Mac Low, M.-M., 2021, A&A, 649, 50: *Fast methods for tracking grain coagulation and ionization. I. Analytic derivation*
- 2020 Guillet V., Hennebelle P., Pineau des forêts G., Marcowith A., Commerçon B., **Marchand P.** 2020, A&A, 643, 17 : *Dust coagulation feedback on magnetohydrodynamic resistivities in protostellar collapse.*
- 2020 **Marchand P.**, Tomida K., Tanaka K.E.I., Commerçon B., Chabrier G. 2019, ApJ, 900, 180 : *Protostellar collapse: regulation of the angular momentum and onset of an ionic precursor..*
- 2019 **Marchand P.**, Tomida K., Commerçon B., Chabrier G. 2018, A&A, 631, A66 : *Impact of the Hall effect in star formation, improving the angular momentum conservation.*
- 2018 **Marchand P.**, Commerçon B., Chabrier G. 2018, A&A, 619, A37 : *Impact of the Hall effect in star formation and the issue of angular momentum conservation.*
- 2016 Hennebelle P., Commerçon B., Chabrier G. & **Marchand P.** 2016, ApJ, 830L, 8H : *Magnetically Self-regulated Formation of Early Protoplanetary Disks.*
- 2016 **Marchand P.**, Masson J., Chabrier G., Hennebelle P., Commerçon B., & Vaytet N. 2016, A&A, 592, A18 : *Chemical solver to compute molecule and grain abundances and non-ideal MHD resistivities in prestellar core-collapse calculations.*

Conferences and seminars

- Since Sep 2015 11 oral presentations at national and international conferences (Europe, USA).

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Since Nov 2017 11 seminars in astrophysics departments (France, USA, Japan, Canada).

Since Jun 2015 2 poster sessions at French and international conferences.

Outreach

Dec 2021 Scientific consultant for the French translation of the movie of the American Museum of Natural History "The Big Bang".

Sep 2021 Public talk for the Mid-Hudson Astronomical Association: non-ideal MHD in star formation.

Mar 2021 Chat moderator for a Youtube Live session of the American Museum of Natural History – answering chat questions about the universe.

Jun 2020 Participation to an astronomy panel for high school students for the end of their rocket project, New-York, USA.

Feb 2020 Scientific consultant for the French translation of the new planetarium show of the American Museum of Natural History "Worlds Beyond Earth".

Jun 2019 Conference on star formation for high school students, Takamatsu, Japan.

Dec 2018 Conference on the life cycle of stars for 2nd year scientific high school students, Kawanishi, Japan.

Apr 2015, 2016, 2017 "Astro week", Accompanying high school students to visit the planetarium, computing center and Lyon observatory, France.

2015 – 2017 Presentation of the astrophysics department at ENS of Lyon and astronomy-related subjects for visiting middle and high school students (~10x90 minutes).

May 2016 Presentation of astronomy subjects for 10 years old elementary school children (90 minutes).

Mar 2012 "Nuit de l'équinoxe", Stand at a public gathering of the astronomy clubs of Lyon.

Education

Sep 2013 – **Master Degree in Astronomy and Astrophysics**, *Paris observatory*.

Oct 2014 Theoretical astrophysics (fluid mechanics, radiative transfer, computational astrophysics). Ranking: 7th/33.

Sep 2010 – **Engineering degree**, *École Centrale*, Lyon.

Sep 2013 Specialised in Energy (electrical network, nuclear energy).

Sep 2008 – **Classes préparatoires**, *Lycée Chaptal*, Paris.

Jun 2010 Intensive courses of mathematics and physics to prepare competitive examinations. Accepted in École Centrale de Lyon.

Associations / lab life

2022- Journal club co-organizer at the Institut de Recherche en Astrophysique et Planétologie (IRAP), Toulouse, France

2018-2019 Seminar co-organizer at the Osaka University Theoretical Astrophysics Group, Osaka, Japan

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- 2015-2017 Welcoming middle-school students at the Centre de Recherche Astrophysique de Lyon (CRAL), Lyon, France
- 2011 President of the Astronomy club of École Centrale de Lyon in 2011
- 2011 Treasurer of the Theatrical improvisation club of the École Centrale de Lyon in 2011

Computer skills

Advanced Fortran 90, \LaTeX

Intermediate Office, Linux, Microsoft Windows, Parallel Computing

Basic Python, Julia, HTML, CSS, C++, Matlab, Maple, Blender

Public codes

Chemistry code <https://bitbucket.org/pmarchan/chemistry> - Marchand et al (2016)

Ishinisan <https://bitbucket.org/pmarchan/ishinisan> - Marchand et al (2021)

Languages

French **Mothertongue**

English **Fluent**

Japanese **Conversational**

Spanish **Basic**

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