



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
- 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.
○ Numerical simulations (Fortran 90, AMR, Parallel Computing),
○ Non-ideal Magnetohydrodynamics,
○ Chemistry.
- 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).
- 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.

08/10/1990 – French – 1 child (2016)

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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

Publications and communications

Published papers

- 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

- Dec 2021 Oral Presentation at the conference "New paradigms for radiatively efficient accretion disks", CCA, New-York: *Grain coagulation in protoplanetary disk formation.*
- Sep 2021 Oral Presentation at the RAMSES User Meeting (online): *Fast methods to track grain coagulation and ionization.*
- Jun 2021 Oral Presentation at the American Astronomical Society 238, USA: *Fast methods to track grain coagulation and ionization.*
- Feb 2021 Seminar at Institut de Planétologie et d'Astrophysique de Grenoble, Grenoble, France: *The role of the grain size-distribution during the protostellar collapse.*
- Jan 2021 Oral Presentation at the American Astronomical Society 237, USA: *Grains and non-ideal MHD in star formation.*
- Jan 2021 Journal club at Centre de Recherche Astrophysique de Lyon, Lyon, France: *Fast methods to track the coagulation and ionization of grains.*

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- Dec 2020 Seminar at Laboratoire d'Astrophysique de Bordeaux, Bordeaux, France: *The angular momentum in star formation: chemistry, non-ideal MHD and disks.*
- Dec 2019 Seminar at American Museum of Natural History, New-York, USA: *Chemistry and regulation of the angular momentum in star formation.*
- Sep 2019 Seminar at Center for Computational Astrophysics (CCA), New-York, USA: *Regulating the angular momentum in star formation.*
- Sep 2019 Oral presentation at "GothamFest", New-York, USA: *Regulating the angular momentum in star formation.*
- Aug 2019 Seminar at Kagoshima University, Kagoshima, Japan: *Regulating the angular momentum in star formation.*
- Mar 2019 Seminar at University of Western Ontario, London, Canada: *Chemistry and the Hall effect in star formation.*
- Mar 2019 Seminar at Princeton University, Princeton, USA: *Chemistry and the Hall effect in star formation.*
- Nov 2018 Seminar at Tokyo University, Tokyo, Japan: *Chemistry and non-ideal MHD for star formation.*
- Sep 2018 Seminar at IPAG, Grenoble, France: *The Hall effect in star formation.*
- Sep 2018 Oral presentation at the RAMSES User Meeting, Lyon, France: *The Hall effect in RAMSES for star formation.*
- Mar 2018 Seminar at Kyushu University, Fukuoka, Japan: *The Hall effect in star formation.*
- Jun 2016 Oral presentation at the Astronomy and Astrophysics French Society (SF2A), stellar physics session (PNPS), Lyon, France: *Chemistry and non-ideal MHD in star formation.*
- Sep 2015 Oral presentation at the RAMSES User Meeting, Oxford, United Kingdom: *The Hall effect in RAMSES.*
- Jun 2015 Poster session at the *Disc Dynamics & Planet Formation* conference, Lanarka, Cyprus: *Chemistry for non-ideal MHD.*

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.

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- Apr 2015, "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'equinoxe", 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.

Computer skills

- Advanced Fortran 90, L^AT_EX
- Intermediate PYTHON, Office, Linux, Microsoft Windows
- Basic Parallel Computing, 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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