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 – Dec 2021 — **Postdoc**, *American Museum of Natural History*, New-York, USA.
Star formation simulations with non-ideal MHD, grain physics and chemistry

Oct 2017 – Oct 2019 — **Postdoc**, *Osaka University*, Osaka, Japan, JSPS Fellowship.
Star formation simulations with non-ideal MHD.

Oct 2014 – Sep 2017 — **PhD Thesis**, *CRAL*, Lyon, France.
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.

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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

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

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*.

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.
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'equinoxe", Stand at a public gathering of the astronomy clubs of Lyon.

Education

Sep 2013 – Oct 2014	**Master Degree in Astronomy and Astrophysics**, *Paris observatory*. Theoretical astrophysics (fluid mechanics, radiative transfer, computational astrophysics). Ranking: 7th/33.
Sep 2010 – Sep 2013	**Engineering degree**, *École Centrale*, Lyon. Specialised in Energy (electrical network, nuclear energy).
Sep 2008 – Jun 2010	**Classes préparatoires**, *Lycée Chaptal*, Paris. 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 Astrophysics et Planétologie (IRAP), Toulouse, France
2018-2019	Seminar co-organizer at the Osaka University Theoretical Astrophysics Group, Osaka, Japan
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
Basic	Parallel Computing,PYTHON, 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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