

Curriculum Vitae

Arthur Touati

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Personal information

- *Nationality* French,
- *Birth* August 4th 1995 in Bordeaux, France,
- *Address* Institut des Hautes Etudes Scientifiques, Office 0N7
35 route de Chartres, 91440 Bures-sur-Yvette, France,
- *Mail* `touati@ihes.fr`,
- *Website* `arthurtouati.fr`,
- *Languages* French (mothertongue), English (professional), German (B1 level).

Positions

- *2022-2024* **Postdoc** Huawei Young Talents Program at IHES.

Education

- *2019-2022* **PhD** at CMLS (Ecole Polytechnique):
 - Advisor: Cécile Huneau,
 - Title: Construction of high-frequency spacetimes,
 - Defended on October 6th 2022,
 - Referees : Lars Andersson and David Lannes,
 - Jury : Lars Andersson, Cécile Huneau, David Lannes, Frédéric Rousset, Jacques Smulevici and Jérémie Szeftel,
- *2017-2019* **Master in mathematics** at Université Paris-Sud,
- *2016-2017* **Licence in mathematics** at Université Paris-Sud,
- *2015-2016* **Licence in physics** at Université Paris-Sud,
- *2015-2019* Student in physics and mathematics at **Ecole Normale Supérieure**, Paris,
- *2013-2015* Student in *Classes préparatoires* at **Lycée Louis-le-Grand**.

Research interests

I am interested in the mathematical theory of **general relativity**. My research is twofold:

- construction of high-frequency solutions to the Einstein vacuum equations,
- stability of black holes as solutions to the Einstein vacuum equations.

Keywords : mathematical general relativity, Einstein equations, Burnett conjecture, Cauchy problem, geometric optics, black holes, stability.

Publications (articles, preprints & proceedings)

From most recent to oldest.

4. **High-frequency solutions to the constraint equations** (*June 2022, arXiv:2206.13062*) accepted in *Communications in Mathematical Physics*.
3. **High-frequency solutions to the Einstein vacuum equations: local existence in generalised wave gauge** (*June 2022, arXiv:2206.12318*) submitted.
2. **Global existence of high-frequency solutions to a semi-linear wave equation with a null structure** (*September 2021, arXiv:2109.15204*) *Asymptotic Analysis*, 131(3-4):541–582, 2023.
1. **Einstein vacuum equations with $U(1)$ symmetry in an elliptic gauge: local well-posedness and blow-up criterium** (*January 2021, arXiv:2101.09093*) *Journal of Hyperbolic Differential Equations*, 19(04):635–715, December 2022.

Articles 2, 3 and 4 above compose my PhD thesis.

Seminar & talks

- *2023*
 - **Journée des Jeunes EDPistes**, Tours,
 - **Gravity Initiative Seminar**, Princeton University,
 - **Séminaire du laboratoire**, LMR Reims,
 - **London PDE Seminar**, Imperial-UCL-Queen Mary London,
 - **Séminaire de physique mathématique**, Institut Fourier Grenoble,
 - **Groupe de lecture en relativité générale**, LJLL Sorbonne Université.
- *2022*
 - **Séminaire Laurent Schwartz**, CMLS-IHES,
 - **Séminaire EDP**, IRMAR Université Rennes 1,
 - **Mathematical GR and Hyperbolic PDE Seminar**, Columbia University,
 - **Topics in general relativity**, WWU Münster,
 - **HADES Seminar**, Berkeley University,
 - **Analysis & PDE Seminar**, Stanford University,
 - **Séminaire EDP et Physique mathématique**, LAGA Université Sorbonne Paris Nord.
- *2021*
 - **Vienna Relativity Seminar**, University of Vienna,
 - **Seminar on Mathematical General Relativity**, LJLL Sorbonne Université,

- **Séminaire des doctorants du CMAP et du CMLS**, Ecole Polytechnique, "How to solve Einstein's equations?",
- **Groupe de travail en analyse**, CMLS Ecole Polytechnique.
- **2020 Groupe de lecture en relativité générale**, LJLL Sorbonne Université, on the article *Nonlinear interaction of impulsive gravitational waves* of Luk and Rodnianski,
- **2019 Séminaire des doctorants ANH et ANEDP**, LMO Orsay, "Le problème de Cauchy en relativité générale et les équations d'Einstein dans une jauge elliptique".

Organization

- **2022-?** **Groupe de lecture en relativité générale**, LJLL Sorbonne Université.

Teaching

- **2022-2023** Lecturer of MAA310 "Measure and Integration (Condensed)" for the third year of the **Bachelor of Science** of Ecole Polytechnique,
- **2019-2022** Tutorials (in English) for the **Bachelor of Science** of Ecole Polytechnique, lecture MAA202 "Topology and multivariable calculus",
- **2015-2019** Oral interrogations in mathematics in **Classes Préparatoires aux Grandes Ecoles** in Lycées Louis-le-Grand and Henri IV.

Supervision

- **2022-2023** PSC (Projet Scientifique Collectif), four second year Polytechnique students working on the Gregory-Laflamme instability,
- **2022 (Mai to June)** Antoine Peyronnet, L3 internship from ENS Rennes, on approximate solutions of the Einstein-Maxwell system.

Other activities

- **2022-?** Member of the press review writing team for the website **Images des mathématiques**,
- **2022** "Trous noirs : sont-ils stables ?", short popular piece on **Polytechnique Insights website**,
- **2021** "Ecrire un livre de vulgarisation scientifique pendant sa thèse", interview on **IP-Paris website**,
- **2021** Guest of **La Conversation Scientifique** on France Culture hosted by Etienne Klein (June 26th 2021),
- **2021** Writing and publication (First Editions) of **Voyage au coeur de l'espace-temps**, a popularization book on relativity,
- **2018-2020 Animath**, organization of week-ends for high-school girls around mathematics and coaching of several teams for french tournaments,
- **2017 Savoir Pour Tous** (presentation for high-school student available on Youtube), "Vers l'infini et au-delà..."