

Curriculum Vitae

Arthur Touati

Personal information

- *Nationality* French
- *Birth* August 4th 1995 at Bordeaux, France
- *Adress* Centre de mathématiques Laurent Schwartz, Office 06.1015
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- *Languages* French (mothertongue), English (professional), German (B1 level)

Education

- *2019-2022* **PhD in mathematics** at Ecole Polytechnique
 - Advisor: Cécile Huneau
 - Title: Construction of high-frequency spacetimes
- *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**. In particular, I study high-frequency solutions to the Einstein vacuum equations. This includes

- construction of appropriate initial data solving the **constraint equations**,
- local issues: the **Cauchy problem** for high-frequency spacetimes,
- global issues: study the **stability** of high-frequency perturbations of fixed background.

Keywords : mathematical general relativity, hyperbolic PDEs, Cauchy problem, geometric optics.

Articles

From most recent to oldest. Articles 2,3 and 4 below compose my PhD thesis.

4. **High-frequency solutions to the Einstein vacuum equations: local existence in generalised wave gauge**, *2022, work in progress*
3. **High-frequency solutions to the constraint equations**, *2022, work in progress*
2. **Global existence of high-frequency solutions to a semi-linear wave equation with a null structure**, *September 2021, arXiv:2109.15204, accepted in Asymptotic Analysis*
1. **Einstein vacuum equations with $U(1)$ symmetry in an elliptic gauge: local well-posedness and blow-up criterium**, *January 2021, arXiv:2101.09093*

Teaching

- *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

Talks

- *2022* **Topics in general relativity**, WWU Münster
- *2022* **HADES Seminar**, Berkeley University

- *2022* **Analysis & PDE Seminar**, Stanford University
- *2022* **Séminaire EDP et Physique mathématique**, LAGA Université Sorbonne Paris Nord
- *2021* **Vienna Relativity Seminar**, University of Vienna
- *2021* **Seminar on Mathematical General Relativity**, LJLL Sorbonne Université
- *2021* **Séminaire des doctorants du CMAP et du CMLS**, Ecole Polytechnique, "How to solve Einstein's equations?"
- *2020* **Groupe de travail 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"

Other activities

- *2021* Writing and publication (at 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..."