Elie Hammou

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Research interests

I am interested in the search of new physics using robust fitting methods. I am working on its interplay with Parton Distribution Function fits in hadron colliders, to ensure we are not at risk of missing signs of it.

Education

PhD in particle physics 2022 – Today
University of Cambridge, DAMTP *Cambridge, UK*

- Supervised by Prof. Maria Ubiali.
- Thesis subject: interplay between signs of new physics and PDFs in hadron collider data.

MASt Physics (Part III) 2020 – 2021
University of Cambridge *Cambridge, UK*

Diplôme d'ingénieur (Master in Mathematics and Physics) 2017 – 2020
Ecole polytechnique *Palaiseau, France*

Licence de Philosophie (Bachelor degree in Philosophy) 2018 – 2019
University Paris-Nanterre *Nanterre, France*

Classe préparatoire (Bachelor degree in Mathematics and Physics) 2015 – 2017
Lycée Saint-Louis *Paris, France*

Publications

Published

E. Hammou, *How to fit PDFs in the presence of new physics?*, in *58th Rencontres de Moriond on QCD*, 5, 2024. arXiv:2405.09270

M. N. Costantini, E. Hammou, Z. Kassabov, M. Madigan, L. Mantani, M. Morales Alvarado, J. M. Moore, and M. Ubiali, *SIMUnet: an open-source tool for simultaneous global fits of EFT Wilson coefficients and PDFs*, *Eur. Phys. J. C* **84** (2024), no. 8 805, [arXiv:2402.03308]

E. Hammou, *Interplay between parton distribution functions and new physics signals*, in *Rencontres de Blois 2023*, 10, 2023. arXiv:2310.09332

E. Hammou, Z. Kassabov, M. Madigan, M. L. Mangano, L. Mantani, J. Moore, M. M. Alvarado, and M. Ubiali, *Hide and seek: how pdfs can conceal new physics*, *JHEP* **11** (2023) 090, [arXiv:2307.10370]

T.-H. Dang, M. Konczykowski, V. I. Safarov, E. Hammou, L. R. Vega, N. Ollier, R. Grasset, A. Alessi, H.-J. Drouhin, H. Jaffrès, et al., *Effect of high-energy electron irradiation on the electronic properties of beta-gallium oxide*, in *Oxide-based Materials and Devices XIII*, vol. 12002, pp. 46–53, SPIE, 2022

Preprint

E. Hammou and M. Ubiali, *Unravelling New Physics Signals at the HL-LHC with Low-Energy Constraints*, *Submitted to PRL* (10, 2024) [arXiv:2410.00963]

In preparation

E. Hammou, M. Ubiali, F. Merlotti, and J. Moore, *Tailored PDFs for New Physics searches*,

A. Greljo, E. Hammou, M. Ubiali, and F. Merlotti, *A global SMEFT and PDF analysis of the jet sector at the LHC*,

E. Hammou, J. Rojo, and M. Ubiali, *SMEFT constraints from the LHeC*,

B. Allanach, N. Gubernari, and E. Hammou, *Mixing quark flavours with a heavy Z'*,

Research positions

Research Assistant 2022
University of Cambridge, DAMTP *Cambridge, UK*
- Member of the research team led by Prof Maria Ubiali for an eight-month position.
- Led to my PhD project.

Research intern 2019 – 2020
Ecole polytechnique, LSI & ETSF *Palaiseau, France*
- Supervised by Prof Henri-Jean Drouhin for a one-year project.
- Investigated the impact of irradiation on semi-conductors through experiments and numerical simulation.

Awards

Smith-Knight and Rayleigh-Knight Prize for PhD Essay 2024
University of Cambridge *Cambridge, UK*

Research Centre prize for Master thesis 2021
Ecole polytechnique *Palaiseau, France*

Selected talks

Invited

EFTs and beyond Dec 2024
Global PDF-SMEFT fits *MITP, online*

Uncovering new laws of Nature at the EIC Nov 2024
PDF and SMEFT interplay *BNL, US*

Seminar at the University of Genova Nov 2024
How to disentangle PDFs and new physics signals? *Genova, Italy*

Contributed

HEFT 2024 June 2024
Can new physics be fitted away in the PDFs? *Bologna, Italy*

Rencontres de Moriond QCD 2024 Apr. 2024
How to fit PDFs in the presence of new physics *La Thuile, Italy*

Rencontres de Blois 2023 May 2023
Interplay between PDFs and new physics *Blois, France*

Teaching experience

Master thesis co-supervisor 2024
University of Cambridge, DAMTP/ UNIMI, Milano *Cambridge, UK*
- Co-supervising a Master student for a 6-month research project.

Graduate teaching, Standard Model examples class teacher 2022 – Today
University of Cambridge, DAMTP *Cambridge, UK*
- Example class teacher for groups of 15-20 in Part III (Master students).
- Wrote and distributed complete official solutions.

Undergraduate teaching, Principles of Quantum Mechanics supervisor 2021 – Today
University of Cambridge, DAMTP *Cambridge, UK*
- Lead supervisions for groups of 2 students in Part II (Third year students).

Undergraduate teaching, Particle and Nuclear Physics supervisor 2021 – 2022
University of Cambridge, Department of Physics *Cambridge, UK*
- Lead supervisions for groups of 3 students in Part II (Third year students).

Skills

Languages: French (native), English (fluent), Spanish (B1), Russian (A2)
Programming Languages: Python, Caml, LaTeX