



Dr Alberto Acuto, PhD

Data scientist – Research associate

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Biographical Summary

Alberto has a background in astrophysics and physics topics with experience in computational research, statistical data analysis, software development and machine learning.

Alberto joined University of Liverpool as a data scientist in February 2022 and worked and cooperated on several different projects on various topics and scopes, some as principal investigator, others collectively with other university members, external partners and stakeholders. Providing software components, applied research output, detailed reports for deliverables and meeting with stakeholders and partners.

Previously, he was part of the LiV.DAT CDT, a joint PhD program between Liverpool John Moores University and the University of Liverpool focused on projects involving big data science at the interface between industry and scientific research. His research history and interests are in computational cosmology, in particular the focus on analytical methods and the role of gas physics in cosmological predictions. Alberto developed a benchmark accuracy test for a widely used analytical method in large-scale structure cosmology. His research led to a first author paper [1] in an international journal in 2021 and a series of talks and presentations between 2018 and 2021.

During the PhD, Alberto joined for six months placement at a B2B growth marketing company (IQBlade, part of TD Sinnex since 2020) acting as a junior data scientist developing a classification pipeline for un-labelled entries in a database.

Career History

University of Liverpool

Data Scientist – Research Associate 2022-present

Alberto is currently working as a data scientist at the University of Liverpool in the signal processing group, distributed algorithm CDT and he is involved in several projects covering different realms and topics. Alberto is involved in a collaboration project with other staff members to improve and extend the capabilities of a DSTL flagship target tracking software, Stone Soup. He is involved in developing examples and tutorials of applications of various tracking and data fusion methodologies present in the software.

Alberto led two projects regarding the implementation and evaluation of autonomous agents responding on networks and in real-world threats using Bayesian optimisation, gaussian process and reinforcement learning algorithms. Both projects were in collaboration with external partners (Aleph insights, NCSC) and consist in the creation of ad-hoc software, investigation of state-of-the-art algorithms and integration with existing components.

Alberto led a project on text and topic classification for research papers evaluating the future impact of a novel

scientific facility in the UK panorama. The project focused on the creation of an ad-hoc database of papers using public journal API, creation of NLP toolkits and analysis pipeline and summarising in detailed reports. Some tools and software developed are currently exported in a stand-alone package developed jointly with a staff member of the group aiming to submit it as a paper and python module.

IQBlade

Data scientist placement March 2020-September 2020

Alberto acted as a junior data scientist in a six-month placement as part of the CDT requirements. Alberto developed a series of classification tools and models using natural language processing and text mining applications for automatic labelling and classification of companies in a large datasets (millions of entries).

Liverpool John Moores University

PhD Researcher

2017-2022

Alberto undertook research on the impact and accuracy of analytical methods in non-linear structure formation in cosmology (namely the “halo-model”) using numerical hydrodynamical simulations (the “BAHAMAS simulations”). The project was expected to develop and use such analytical methods to make meaningful predictions for an in-house cosmological emulator, however, the research led to an in-depth characterising of the in-accuracies and assumptions of the model and the neglected influence of baryonic physics. Alberto published a first author paper on the subject in 2021 [1], and presented the work done at several conferences across the UK and abroad. During the PhD, he was the co-chair of some inter-departmental activities such as the weekly paper discussion and PhD talks.

CDT Student (Liv.DAT)

2017-2022

Alberto was part of the first cohort of students from LJMU and the University of Liverpool in the CDT in big-data science. The CDT provided courses and workshops on machine learning, parallel computing, project management and outreach activities.

Professional Qualifications

PhD Cosmology (Liverpool John Moores University) 2022

Master's degree (Bologna University, Italy) 2017

Bachelor's degree (Bologna University, Italy) 2014

Publications

- [1] **A Acuto**, I G McCarthy, J Kwan, J Salcido, S G Stafford and A Font: *The BAHAMAS project: evaluating the accuracy of the halo model in predicting the non-linear matter power spectrum*. Monthly Notices of Royal Astronomical Society, 2021. {5 citations, via MNRAS website}