Paris workshop on Bayesian Deep Learning for Cosmology and Time Domain Astrophysics 3rd ed.

20-23 May 2025

ID de Contribution: **10**   Type: **Talk**

Hybrid Analytical-Deep Solver for reconstructing maps in Cosmology

vendredi 23 mai 2025 09:45 (20 minutes)

The revolutionary methods of Machine Learning (ML) support most data science analyses today in many ways. An often neglected question remains on the interpretability of used models, and clarity on how the information inside our data is used. This work presents a physics-guided method combined with the architecture of Deep Learning, to provide both the reliability and explainability of classical statistical techniques while gaining the speed and efficiency of Neural Networks. The work also covers the treatment of uncertainty of estimated physical parameters, often impossible to propagate in conventional usage of networks. The idea will be presented in the context of reconstructing maps and inferring cosmological parameters with QUBIC - a novel experiment for measuring the polarization of the Cosmic Microwave Background by utilizing interferometry. This approach is expandable to other scientific fields, and is highly relevant in current times of rising interest for Explainable Artificial Intelligence (XAI).

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Classification de Session: Static sky cosmology

Classification de thématique: Cosmology