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A walk through cosmological simulations and their evolution

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Cosmological simulations have become crucial for the preparation of observational surveys as well as for the calibration of analysis workflows. But if they can mimic accurately some properties of our Universe, they will also always miss some. Thus, knowing and understanding what is being done behind the scene can be key for good science.

In this talk, I will summarize the main principles and techniques behind cosmological simulations. I will especially focus on elements that can be key for post-processing analyses and that should be kept in mind in order to avoid circular dependencies. I will discuss how machine learning algorithms can sometimes learn numerical artifacts better than physics phenomena and what can be done about it.

Before concluding I will finally review some of the recent developments on the topic of cosmological simulations and give some insights from the french community that is working on the topic.

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