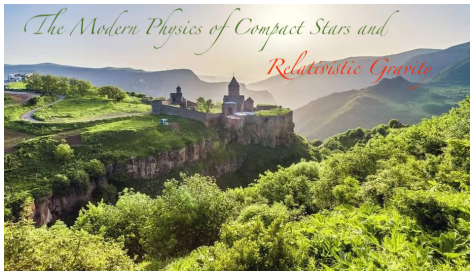

Contribution ID: **2** Type: **not specified**

Cosmology ensuing from Machine Learning

Thursday, 30 September 2021 10:55 (35 minutes)

Machine Learning opens a new era in Physics, Cosmology, and Astrophysics. In the last couple of years, indeed, the effort of applying Machine Learning to tackle various problems seems to be very promising. The growing number of research papers and the nature of solved problems is a bright example of this.

One of the widely used Machine Learning techniques is Gaussian Processes. This approach provides a way to study problems in a model-independent way. Because, instead of using a parameterized function, we learn the function from the data. There are many studies based on this particular approach. Among them is the study of the swampland criteria for dark energy-dominated Universe [1]. Here for the first time, the analysis has been done without involving any explicit form of the potential for the scalar field dark energy. Moreover, for the first time, it has been applied and the model-independent form of f(T) gravity has been reconstructed [2].

On the other hand, recently, in a series of papers [3,4,5], it has been demonstrated that Bayesian Machine Learning can be used in Cosmology, too. It is an approach based on a generative process allowing to use of the model to analyze the model. It should be mentioned that real observational data can be used to validate learned results and at the end only. The last one obviously makes this approach different from more traditional approaches and allows to learn different features of the model that due to bias in data can be either hidden or wrongly interpreted.

During this talk, we will discuss one of our results where the Bayesian Machine Learning has been used and for the first time viscous fluid cosmological models where the well-known H_0 tension can be solved have been crafted. The talk is mainly based on [6]. However, we will discuss particular results of [5] demonstrating how deviation from cold dark matter can solve the H_0 tension problem, too.

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