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Model-independent constraints on Ω_m and $H(z)$ from the link between geometry and growth

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In the light of the S8 and Hubble tensions, Gaussian processes have gained a great degree of popularity among cosmologists as tools to perform model-independent analyses. However, there's not a well-established consensus on how or when to deploy these methods yet. In this talk I will discuss the methodology and results of our recent work <https://arxiv.org/abs/2201.07025>. In this paper we constrain the expansion history of the Universe and the cosmological matter density fraction in a model-independent way by exclusively making use of the relationship between background and perturbations under a minimal set of assumptions. We do so by employing a Gaussian process to model the expansion history of the Universe from present time to the recombination era. I will focus on the difficulties posed by the Hubble rate and other similar functions to Gaussian processes and how we tackled them in this work while remaining as independent from the Λ CDM model as possible. I will also present the results of our work in the context of the different cosmic tensions and the promising future of model-independent analyses as the quality of data increases over time.

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