Bollettino Settimanale

Lunedì 5 febbraio 2024	Martedì 6 febbraio 2024	Mercoledì 7 febbraio 2024	Giovedì 8 febbraio 2024	Venerdì 9 febbraio 2024
AULA CARERI ore 14.30 **SEMINARIO INFN** **New results from the Muon g-2 experiment at Fermilab** *Marco Incagli (Istituto Nazionale di Fisica Nucleare)* The muon magnetic moment anomaly a_mu = (g − 2)/2 is one of the most precisely measured and predicted quantities in the Standard Model of Particle Physics. A long history of improved measurements and improved theoretical understanding led the way from the first prediction by Schwinger in 1948 to the previously best measured value of the magnetic anomaly with a precision of 500 parts per billion. The Muon g-2 experiment at Fermilab aims to measure a_mu with a final accuracy close to 100 ppb. The experiment's first result from the 2018 dataset was published in 2021 confirming, with a similar sensitivity, the discrepancy of almost 4 sigma observed by the previous experiment at Brookhaven National Laboratory from the theory prediction dated Summer 2020. On-going progress on the theory side has not yet been summarized into an official consensual update of the prediction. I will present the result based on the 2019 and 2020 datasets, which contain a factor of four more data thus entering a new sensitivity regime of g-2. I will discuss the improvement in the accuracy of a_mu and the future prospects for the experiment. I will then discuss the implications of the comparison of the new measurement with the last Standard Model predictions for muon g-2.	**AULA CONVERSI ore 12.30** **SEMINARIO** **Generative AI and Diffusion Models: Statistical Physics Analysis and Diffusion Models.** *Giulio Biroli* Generative diffusion is the state-of-the-art method for generating images and sound. Diffusion Models learn how to time-reversed the stochastic process that transforms data, e.g. images, in white noise. Generative diffusion then consists in integrating a Langevin equation, with suitable (learned) forces, that transforms white noise in new data. We show that the optimally trained diffusion process involves three dynamical regimes: a first one of almost pure Brownian motion; a second one where the system identifies the main classes of the data; finally, a last regime where the diffusion 'collapses' onto one of the examples of the database. To avoid this collapse one needs either non-optimal diffusion or exponentially large database. We provide expressions for the two typical times separating these regimes, applicable to any database, and confirm their validity using simulations and mathematically solvable models. Interestingly, the cross-over between these regimes become bona-fide dynamical phase transitions in the limit of large dimension of the data and large number of samples. The 'collapse' transition, which is attracting a lot of attention for applications, turns out to be a glass transition towards an exponential number of states.			**SALA LAUREE ore 14.30** **SEMINARIO DI FISICA STATISTICA** **Reparametrization Invariance, from glasses to toy black holes.** *Jorge Kurchan (ENS Paris)* Glassy dynamics have time-reparametrization `softness': glasses fluctuate, and respond to external perturbations, primarily by changing the pace of their evolution. Remarkably, the same situation also appears in toy models of quantum field theory such as the Sachdev-Ye-Kitaev (SYK) model, where the excitations associated to reparametrizations play the role of an emerging `gravity'. I will describe how these two seemingly unrelated systems share common features, arising from a technically very similar origin. Apart from the curiosity that this correspondence naturally arouses, there is also the hope that developments in each field may be useful for the other.