

## Special Issue

# The Statistical Physics of Generative Diffusion Models

### Message from the Guest Editor

Generative diffusion models and related methods have become state-of-the-art in image and video generation. While these methods were inspired by the physics of out-of-equilibrium systems, recent work revealed deep connections between generative diffusion models and equilibrium statistical mechanics. For example, it was recently shown that the generative diffusion process is punctuated by spontaneous symmetry-breaking events that correspond to splits between semantic classes or visual features. Similarly, memorization in generative diffusion is the result of ‘glassy’ phase transitions in the average free energy. Moreover, the connections between spin glasses sampling and generative diffusion have been investigated using the concept of stochastic localization of measures. These developments have the potential to drive a large inflow of physical theory and techniques to the study of generative machine learning models, which could lead to radical insights on the nature of learning and intelligence.

Given these fascinating developments, we are excited to launch a Special Issue aimed at connecting research in statistical physics and generative diffusion modeling.

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### Guest Editor

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### Deadline for manuscript submissions

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## Entropy

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### Message from the Editor-in-Chief

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### Editor-in-Chief

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