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**Editor-in-Chief**

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**Dear Editor-in-Chief,**

I am pleased to submit our manuscript, entitled "*Galaxy Imaging with Generative Models: Insights from a Two-Models Framework*", for consideration in *Monthly Notices of the Royal Astronomical Society*.

This study examines the statistical learning and generalization capabilities of three generative models—GAN-based, flow-based, and diffusion-based—applied to galaxy image generation. Using non-overlapping subsets of the SDSS DR7 dataset, we evaluate the models' ability to learn the underlying data distribution. Building upon the "two-models" framework introduced by Kadkhodaie et al. (2024), which demonstrated the memorization-to-generalization transition for diffusion models, we propose two novel consistency tests: the "inversion test" for flow-based models and the "discriminator test" for GAN-based models. These tests provide deeper insights into the models' learning processes, complementing traditional evaluations based on morphological variable distributions. Our findings confirm the role of dataset size and the importance of consistency checks for robust generative modeling.

We believe this work will be of interest to the readership of *MNRAS*, particularly those focused on computational astrophysics, data-driven modeling, and machine learning applications in astronomy.

This manuscript is original, has not been published elsewhere, and is not under consideration by another journal. We have approved the submission and adhere to the ethical publishing guidelines of *MNRAS*.

Thank you for considering this submission. We look forward to the opportunity to contribute to your highly respected journal.

**Sincerely,**

Jean-Eric Campagne  
Senior Research Director  
Laboratoire de Physique des 2 Infinis Irène Joliot-Curie (IJCLab)