X56a Generative Model of Simulated Galaxies for Fitting Observed SEDs

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A galaxy's star formation history (SFH) is inferred from a galaxy's observed spectral energy distribution (SED). However, it is known that SFHs are challenging to constrain even with high-quality observations. SFHs are commonly approximated with parametric forms that impose strong priors on their shape. Consequently, it is known that these models can strongly bias galaxy property measurements such as the star formation rate. A solution to the above can be using piecewise-defined models. However, because of their flexibility, they cannot be fully constrained. Thus, physically-motivated SFH models from simulations may be favored. Instead of building an extensive library of simulated SFHs, we propose to use a generative model, which learns the intrinsic distribution of SFHs and can generate new simulation-like SFHs. In addition to SFHs, we also track a galaxy's chemical evolution history, allowing us to generate SEDs for simulation-like galaxies to be matched to observed ones. The advantages of such methods are bidirectional, to constrain galaxy property measurements from observed SEDs and to constrain galaxy formation models from observations.