

Learning from a simulated universe: the limits of realistic modeling in astrophysics and cosmology.

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Abstract

As noticed recently by Winsberg (2003), how computer models and simulations get their epistemic credentials remains in need of epistemological scrutiny. My aim in this paper is to contribute to fill this gap by discussing underappreciated features of simulations (such as “path-dependency” and plasticity) which, I’ll argue, affect their validation. The focus will be on composite modeling of complex real-world systems in astrophysics and cosmology. The analysis leads to a reassessment of the epistemic goals actually achieved by this kind of modeling: I’ll show in particular that its realistic ambition and the possibility of empirical confirmation pull in opposite directions.

Keywords: Computers models and simulations. Realism. Cosmology.

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