

Title: Emergent Dark Universe and the Swampland Criteria

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Abstract: We study a model of the emergent dark universe, which lives on the time-like hypersurface in a five-dimensional bulk spacetime. The holographic fluid on the hypersurface is assumed to play the role of the dark sector, mainly including the dark energy and apparent dark matter. Based on the modified Friedmann equations, we present a Markov-Chain-Monte-Carlo analysis with the observational data, including type Ia Supernova and the direct measurement of the Hubble constant. We obtain a good fitting result and the matter component turns out to be small enough, which matches well with our theoretical assumption that only the normal matter is required. After considering the fitting parameters, an effective potential of the model with a dynamical scalar field is reconstructed. The parameters in the swampland criteria are extracted, and they satisfy the criteria at the present epoch but are in tension with the criteria if the potential is extended to the future direction. The method to reconstruct the potential is helpful to study the swampland criteria of other models without an explicit scalar field.