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Singularity free Emergent Universe from Dynamical wormhole

We present flat emergent universe with a dynamical wormhole with a modified matter described by nonlinear Equation of state (nEoS) in Einstein's gravity. The Emergent universe (EU) is free from initial singularity accommodating late accelerating universe satisfactorily. The basic assumption of the original EU model is that the present universe emerged out from an initial Einstein static universe in the infinite past. We have shown that such an Einstein Static universe corresponds to the throat of a dynamical wormhole. Considering a homogeneous Ricci scalar, a class of dynamical wormholes are identified with non-linear equation of state which permits an EU model. It is interesting and new to note that nEoS considered here is equivalent to three different types of cosmic fluids. In a higher dimension the space-time dimensions (D) determines the rate of change of a particular fluid with the scale factor of evolving universe for non-interacting fluids. A realistic scenario of EU is obtained considering interaction among the three fluids at a later epoch. In a four or higher dimensions it is found that near the throat null energy condition (NEC) is violated, but away from the throat NEC is found to obey admitting the observed universe accommodating dimensions four or more than the usual four dimensions. At a later epoch the EU model satisfactorily describes the observed universe with late accelerating behaviour. Thus a universe emerged from the wormhole throat that exists in the infinite past thereafter the evolved and pass through different phases encompassed the observed universe satisfactorily.

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