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Chimera: A hybrid numerical approach for isotropic loop quantum cosmology PETER DIENER, BRAJESH GUPT, PARAMPREET SINGH, Louisiana State University — Loop quantum cosmology (LQC) is one approach to the resolution of the problem of singularities in classical cosmologies. The evolution of a cosmological model in LQC is governed by a set difference equations. In the isotropic cosmology (1+1 dimensions) the discretization is uniform in the spatial dimension. The stable simulation of a widely spread semi-classical state requires a very large computational domain and would therefore be computationally very expensive. In this talk we present an efficient hybrid numerical scheme based on the fact that the difference equations can be approximated by a set of partial differential equations (PDE's) in the limit of large spatial volume. We therefore introduce a hybrid scheme where we solve the LQC difference equations in the small volume and the PDE's in the large volume regime. By a simple change of coordinates in the large volume regime, we can significantly reduce the computational cost and explore regions of parameter space previously unachievable. We will describe the numerical implementation, present selected results and discuss the extension of the scheme to other models.

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