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Spacetime Singularities in Inflationary Universe

Despite the fact that the exact de Sitter space is free of spacetime singularity, the absence of singularity in inflationary universe is still non-trivial. I will focus on singularity problem of two kinds of inflationary universe: past asymptotic de Sitter space and torus compactified de Sitter space. In the former case, I find that the presence of the singularity depends on how fast the scale factor approaches to that of exact de Sitter space toward the asymptotic past. In the latter case, I find that the end point of an incomplete geodesic in compactified de Sitter space is locally extendible but there is no globally consistent extension of spacetime. In other words, compactified de Sitter space has so called quasi regular singularity.

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