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Inhomogeneous, massless gauge fields in Bianchi cosmologies.

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Abstract

Why is the Universe so isotropic on large scales, when "it doesn't have to be"? Can we show that the Universe must isotropise even in the presence of an inhomogeneous, massless scalar gauge field with a homogeneous gradient? Such questions motivate our study of anisotropic spaces (Bianchi types I-VII$_h$) with free p-form gauge fields as matter sourcing; all within GR. No-hair theorems are written down for the case $p = 1, 3$. Through a dynamical systems approach new self-similar cosmologies are found in (many of) the Bianchi types. Strong global results regarding the general behaviour of these cosmologies in Bianchi types I and V are obtained.