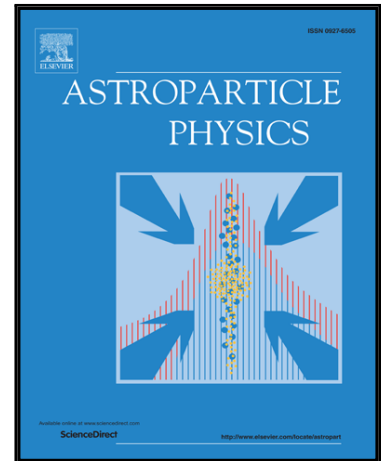


Accepted Manuscript

On the concordance of cosmological data in the case of the generalized Chaplygin gas

R. Aurich, S. Lustig

PII: S0927-6505(17)30261-X
DOI: [10.1016/j.astropartphys.2017.11.002](https://doi.org/10.1016/j.astropartphys.2017.11.002)
Reference: ASTPHY 2256



To appear in: *Astroparticle Physics*

Received date: 11 September 2017
Revised date: 17 October 2017
Accepted date: 2 November 2017

Please cite this article as: R. Aurich, S. Lustig, On the concordance of cosmological data in the case of the generalized Chaplygin gas, *Astroparticle Physics* (2017), doi: [10.1016/j.astropartphys.2017.11.002](https://doi.org/10.1016/j.astropartphys.2017.11.002)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

On the concordance of cosmological data in the case of the generalized Chaplygin gas

R. Aurich and S. Lustig

*Institut für Theoretische Physik, Universität Ulm,
Albert-Einstein-Allee 11, D-89069 Ulm, Germany*

Abstract

The generalized Chaplygin gas cosmology provides a prime example for the class of unified dark matter models, which substitute the two dark components of the standard cosmological Λ CDM concordance model by a single dark component. The equation of state of the generalized Chaplygin gas is characterised by a parameter α such that the standard Λ CDM model is recovered in the case $\alpha = 0$ with respect to the background dynamics and the cosmic microwave background (CMB) statistics. This allows to investigate the concordance of different cosmological data sets with respect to α . We compare the supernova data of the Supernova Cosmology Project, the data of the baryon oscillation spectroscopic survey (BOSS) of the third Sloan digital sky survey (SDSS-III) and the CMB data of the Planck 2015 data release. The importance of the BOSS Lyman α forest BAO measurements is investigated. It is found that these data sets possess a common overlap of the confidence domains only for Chaplygin gas cosmologies very close to the Λ CDM model.

Keywords: dark energy theory, cosmic microwave background, large-scale structure

PACS: 98.80.-k, 98.70.Vc, 98.80.Es

1. Introduction

For almost two decades, cosmology possesses a standard cosmological model which allows a remarkable successful description of a large variety of observational data, the Λ CDM concordance model. For a recent review on the various data sets, see e. g. [1]. Although there is currently no competing cosmological model, there remain tensions [2] which justify the investigation of alternatives. The Λ CDM concordance model is based on two dark ingredients, the dark energy in the form of the cosmological constant Λ and the cold dark matter (CDM). There have ever been attempts to establish alternative cosmological models which are based only on a single dark component, the so-called unified dark matter (UDM) models.

The prototypical model for a UDM cosmology is provided by a dark matter fluid having the equation of state $p = -A/\varepsilon$ of the Chaplygin gas, where ε

Download English Version:

<https://daneshyari.com/en/article/8132758>

Download Persian Version:

<https://daneshyari.com/article/8132758>

[Daneshyari.com](https://daneshyari.com)