

Physikalisches Kolloquium Universität Kiel Wintersemester 2016 / 2017

Dienstag, 25. Oktober 2016

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Testing Dark Energy and New Physics with Fundamental Constants

This is an exciting time where questions about the Λ CDM cosmology and the Standard Model of Physics abound. Many alternatives to these theories predict that both the dark energy equation of state and the basic physics parameters such as the Quantum Chromodynamic Scale, the Higgs Vacuum Expectation Value and the Yukawa Couplings vary with time. Significant time, energy and money have been devoted to determining the dark energy equation of state and its possible time dependence. Testing the time stability of the basic physics parameters has generally been perceived as beyond the bounds of possibility. This talk discusses tests of the temporal stability of both the dark energy equation of state and the basic physics parameters using astronomical observations of two fundamental constants, the proton to electron mass ratio μ and the fine structure constant α . Both of these constants are sensitive to all of the parameters listed above and can be measured at look back times on the order of the age of the universe. To date no definitive change in either of these constants has been observed and the limits on their time variation establish stringent constraints on the variation of any of the parameters. The explicit dependence of the fundamental constants on the parameters will be presented and corresponding constraints established. The possible time evolution of the parameters within the observational constraints for a freezing and a thawing quintessence cosmology will be presented along with their predicted current rates of change.

Der Vortrag beginnt um **12:15 Uhr** im **Max-Planck-Hörsaal (LS13-R.8)** des Physikzentrums.

Ab **12:00 Uhr** werden **Kaffee** und **Tee** angeboten.

M. Bonitz
für die Dozenten der Physik

Gastgeber: Prof. Duschl