

# DIESE WOCH

## PHYSIKALISCHES KOLLOQUIUM

des Fachbereichs Physik  
der Johann Wolfgang Goethe-Universität Frankfurt

Mittwoch, den 26.06.2013, 16 Uhr c.t.  
Großer Hörsaal, Raum \_0.111,  
Max-von-Laue-Str. 1

**Prof. Dr. Johan Messchendorp**  
Kernfysisch Versneller Instituut (KVI)  
Universität Groningen

*„Charmonium: from discovery to precision,  
and beyond!“*

The physics of the strong interaction is undoubtedly one of the most challenging areas of modern science. Quantum ChromoDynamics (QCD) is reproducing successfully the physics phenomena at distances much shorter than the size of the nucleon, where perturbation theory can be used yielding results of high precision and predictive power. At larger distance scales, however, perturbative methods cannot be applied anymore, although spectacular phenomena – such as the generation of hadron masses and quark confinement – occur. Quantum systems composed of a charm quark and an anti-charm quark (charmonium) are ideal laboratories to shed light on the dynamics of the strong interaction from the perturbative to the non-perturbative energy region with a large potential to discover new forms of hadronic matter.

Charmonium states, first discovered in November 1974 by Ting and Richter, are now-a-days copiously produced via the annihilation of matter with antimatter. Hadronic and electromagnetic transitions between charmonium states and their decays have been measured with a world-record in precision with the BESIII spectrometer at the electron-positron collider at IHEP Beijing, China. Moreover, unconventional narrow charmonium-rich states have been discovered recently in an energy regime above the open-charm threshold, thereby, possibly initiating a new era in charmonium spectroscopy. The near future experiment, PANDA, at the research facility FAIR in Germany, Darmstadt, will exploit the annihilation of cooled anti-protons with protons to perform charmonium spectroscopy with an incredible precision.

A review will be given of the highlights in the field of charmonium spectroscopy: from the discovery of the charm quark in 1974 till today's precision studies at electron-positron collider experiments and tomorrow's discovery potentials at future facilities such as FAIR.

Die Dozenten der Physik

# Kolloquium

<http://www.uni-frankfurt.de/fb/fb13/Termine/index.html>