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| Uni-LOGO | Fakultät für Physik**Isotopenforschung** und **Kernphysik** |

E I N L A D U N G  
zum

V E R A - S E M I N A R

von

#### **Hans Otto Uldall Fynbo**

Department of Physics and Astronomy, Aarhus University, Denmark

**Experimental Nuclear astrophysics**

**with clustered nuclei**

One of the challenges with atomic nuclei is that different types of motion are relevant at the same time - as an example there can be both collective and single particle states in the same region of nuclear spectra. For some nuclei cluster correlations of nucleons into e.g. alpha-particles is another type of collective motion in addition to deformations and vibrations of the mean field.

In this talk I will discuss recent experiments on mainly 8Be and 12C, which have pronounced alpha-structure, and also have in common that they play important roles for nuclear astrophysics. The experimental challenge is to precisely determine properties of resonances with very short lifetimes, or correspondingly very large widths, due to their strong coupling to the two-alpha or three-alpha decay channels. We use the weak interaction as a method to selectively populate the resonances of interest at the ISOLDE facility at CERN, and facilities in Finland, the Netherlands and the US. I will discuss the relevance of our results for understanding the triple-alpha reaction, and the neutrino spectrum from the decay of 8B.

Recently we have developed a new method to study short-lived nuclear resonances with electromagnetic transitions. The advantage of this method is that the selectivity of the transition can be tuned by proper choice of the initial state. In a new ERC project called *LOBENA*, LOng BEam time experiments for Nuclear Astrophysics, we will use this method to further elucidate resonances in 8Be, 12C and 16O of relevance for understanding the cluster structure of these nuclei and their role in the cosmos. These experiments will be carried out at the local Van der Graaf accelerators.

### Donnerstag, 24.01.2013 16:30 Uhr

**1090 Wien, Währinger Str. 17, "Kavalierstrakt",  
1. Stock, Victor-Franz-Hess Hörsaal**

R. Golser W. Kutschera E.M. Wild