

FREIE UNIVERSITÄT BERLIN

Fachbereich Mathematik und Informatik

Promotionsbüro, Arnimallee 14, 14195 Berlin

## DISPUTATION

**Freitag, 2. Juni 2017, 10.00 Uhr**

**Ort: Seminarraum (Raum 2006)  
Konrad-Zuse-Zentrum für Informationstechnik Berlin (ZIB)  
Takustrasse 7, 14195 Berlin**

**Disputation über die Doktorarbeit von**

**Herrn Norbert Lindow**

**Thema der Dissertation:  
Visual Analysis of Atomic Structures  
Based on the Hard-Sphere Model**

**Thema der Disputation:  
Efficient Visualization of Large Voxel Scenes**

Die Arbeit wurde unter der Betreuung von **Prof. Dr. Chr. Schütte** durchgeführt.

Abstract: Voxel-based representations are widely used today to encode 3-dimensional data. For example, most tomographic imaging techniques produce voxel data. Furthermore, due to the simplicity of voxels and the resulting advantages in modeling and rendering, voxel representations have also become interesting for purely virtual scenes in computer games and for movie production. In contrast to triangulated scenes, ray tracing of voxel-based representations can be done more efficient. This offers the possibility for advanced and more realistic illumination techniques at interactive rendering performance. In addition, since in voxel representations geometry and attributes are usually not separated, the whole modeling process of such scenes is simplified.

One problem of voxel scenes, however, is their size, which grows cubically with increasing resolution. Even when exploiting the fact that voxel scenes are often sparse and can be stored in an octree, still too much memory is required to store detailed scenes completely on the graphics card. In my disputation I will present a new data structure that avoids the storage of geometric duplicates in sparse voxel octrees by utilizing acyclic graphs (Kämpe et al., 2013). I will also show how this new data structure can be combined with voxel attributes and how these attributes can be efficiently compressed to store them completely on the graphics card (Dado et al., 2016). In the second part, I will present my PhD work on visual analysis of atomic structures based on the hard sphere model.

Die Disputation besteht aus dem o. g. Vortrag, danach der Vorstellung der Dissertation einschließlich jeweils anschließenden Aussprachen.

**Interessierte werden hiermit herzlich eingeladen**

Der Vorsitzende der Promotionskommission  
Prof. Dr. Chr. Schütte