## Berliner Colloquium für wissenschaftliche Visualisierung

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## Topology and Perception for the Visualization of Complex Scalar Data

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Despite many great advances in visualization research, we are still far from being able to intuitively convey the behavior of complex scalar data through images. Part of the solution resides in developing theoretical and computing tools to extract and display meaningful features. It is equally crucial to take into account the strengths and the limitations of the human visual perception to derive efficient visualizations.

This talk will describe several works we have been conducted in these two complementary directions. First we will give an overview of our on-going work on topology-based visualization of scalar data. In this area we propose the use of piecewise polynomials interpolants to reconstruct data based on their simplified Morse-Smale complexes. We show how it is possible to define monotonic polynomial interpolants that can be used as patches to represent the data inside each Morse-Smale cells.

In the second part of the talk we give an overview of our works on perception related research for visualization. Regarding the perception of depth in Direct Volumetric Rendering (DVR), we have shown the limitation of standard DVR algorithms, and we have studied under which conditions the addition of depth-offield effects can improve the perception of depth. We have also studied the perception of noise stimuli, and applied this study for the visualization of uncertain scalar datasets using noise textures.











