Abstract

At CERN, a European laboratory for particle physics located near Geneva, Switzerland, scientists are currently searching for the so-called Higgs particle. To facilitate this, a circular 27km long accelerator is under construction in which particles will collide at high speeds. During such collisions many new particles are created. Data of collisions or events are collected by detectors, which are part of this accelerator, and stored in a database for later analysis.

For physics analysis of this data the event-display program *Atlantis* was created. This application can show the event-data in various 2D specific data-oriented 'projections'. These projections show the detector and the events in such ways that scientists can extract valuable information.

The topic of this research is about extending this application with a 3D projection to be able to virtually navigate through the detector and get a clearer view were the data is located. 3D projections generally require lots of computations, and thus potentially slow down Atlantis. Important is thus to find an algorithm which is able to display the 3D image inside Atlantis (thus reusing the existing user interface, together with those implications) in such a way that it does not slow down the overall application performance.

Many research has already been done in the field of 3D graphics. Mostly they worked on algorithms which improve image quality and how to display it fast on a monitor. Unfortunately these techniques did not directly apply, as the projection is not allowed to directly output its images on the monitor.

The thesis of my research shows how I tackled the problems mentioned above.