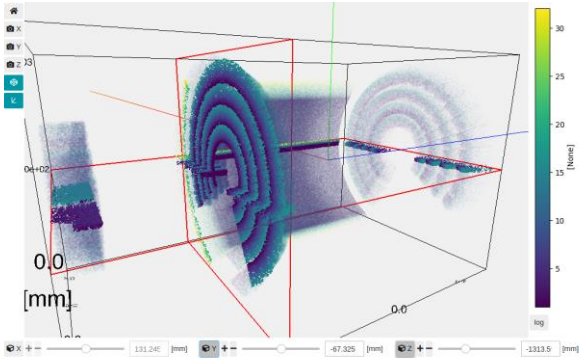
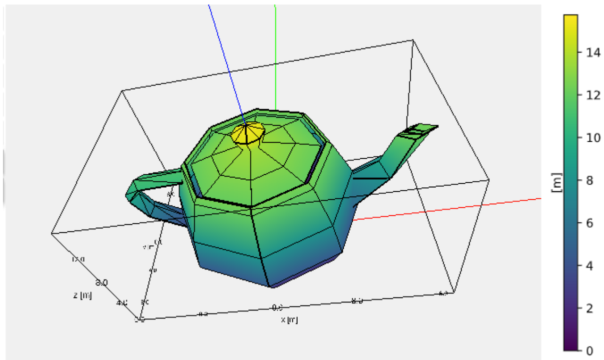
Student project at European Spallation Source Data Management and Software Centre

Converting instrument OFF geometries to a mesh of triangles for 3D visualization



Curent visualization of the DREAM instrument



A 3D mesh of triangles visualized with Plopp

Supervisor	?	Code difficulty	★★★☆☆
Co supervisor	neil.vaytet@ess.eu	Maths/Physics difficulty	★★★★☆

DESCRIPTION

Neutron scattering is an investigative technique that examines matter at the atomic scale, particularly the distances between atoms in crystals. This process involves placing a sample in a neutron beam and analyzing the scattering patterns of these neutrons. Instruments used in these experiments are highly specialized for various types of samples and scattering methods. The European Spallation Source (ESS), nearing completion in Lund (SE), houses 15 such instruments. These instruments have typically 100,000+ detector pixels that have different shapes and sizes. The current visualization tool for data reduction at ESS (Plopp) is only able to visualize the pixels as single points in space, ignoring the pixel shapes.

This project aims to convert the full detector pixel geometry that is written in the data files to a format that can be visualized in Plopp. The geometry is stored in OFF format in the files, which consists of a list of vertices and polygons describing the faces of each volumetric detector pixel. Plopp however only accepts triangles to build a 3D mesh, and the project will thus focus on writing a utility that can convert the OFF geometry by triangulating the polygons. This useful tool would be used by all 15 ESS instruments.

REQUIREMENTS

Experience with the programming language Python (including Numpy), and an interest in spatial geometry.

Matchmaking Day 2024 Engineering physics and companies meet