

Towards a new Astronomical Data Analysis Workflow: A Virtual and Augmented Reality approach.

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We propose the use of Virtual Reality and Augmented Reality tools to improve the usual data analysis workflow in an astronomy setting.

QUASAR Science Resources S. L.

<http://quasarsr.com/>, is a private company that provides consulting Software and System Engineering services for Research and Development projects.

Our activities cover many different areas, including scientific software development and data reduction techniques, handling and exploitation of scientific databases, archive engineering and data mining, computer systems engineering, including virtual machine infrastructure, network, data storage and backup.

Introduction: Virtual Reality and Augmented Reality offer exciting new ways to interact with multidimensional data. At Quasar SR and in collaboration with the ESAC Science Data Centre we continue to develop new techniques to analyse astronomical data in a true 3-Dimensional form.

We aim to bring Gaia's unprecedented 3D map of our milky way galaxy to a Virtual environment and allowing the use of your hands to make data analysis feel more natural (Figure 1).



Figure 1. Dataset Management and loading

Since 2016 we've been developing prototypes and tools to test the capabilities that Virtual Reality and Augmented reality can bring to data analysis and visualization (Figure 2).

These tools can provide new outreach and scientific analysis possibilities and spatial computing and motion tracking technologies give intuitiveness and helps with complex data visualization and exploration.

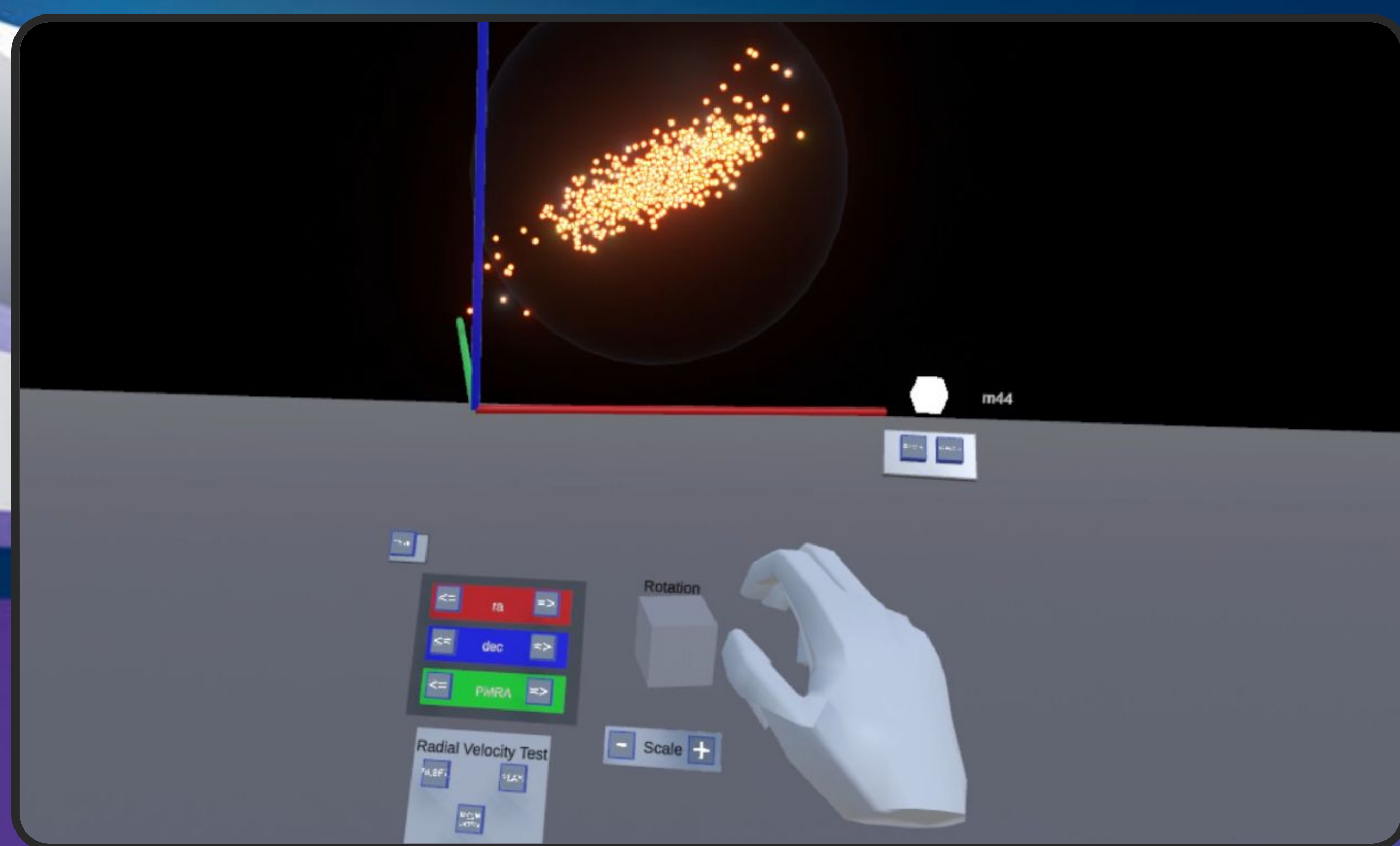


Figure 2. Virtual Reality Exploration of a Gaia Dataset

We currently have demonstrations of the VR app on Oculus Rift that allows you to load your own datasets and visualize them in your virtual workspace. As well as interact with them and select different plot parameters using hand tracking technology with Leap Motion sensors. We have a demonstration as well of Augmented Reality on Mobile devices using ARCore and ARKit, in which you can place a cluster in your room and see its characteristics (Figure 3).

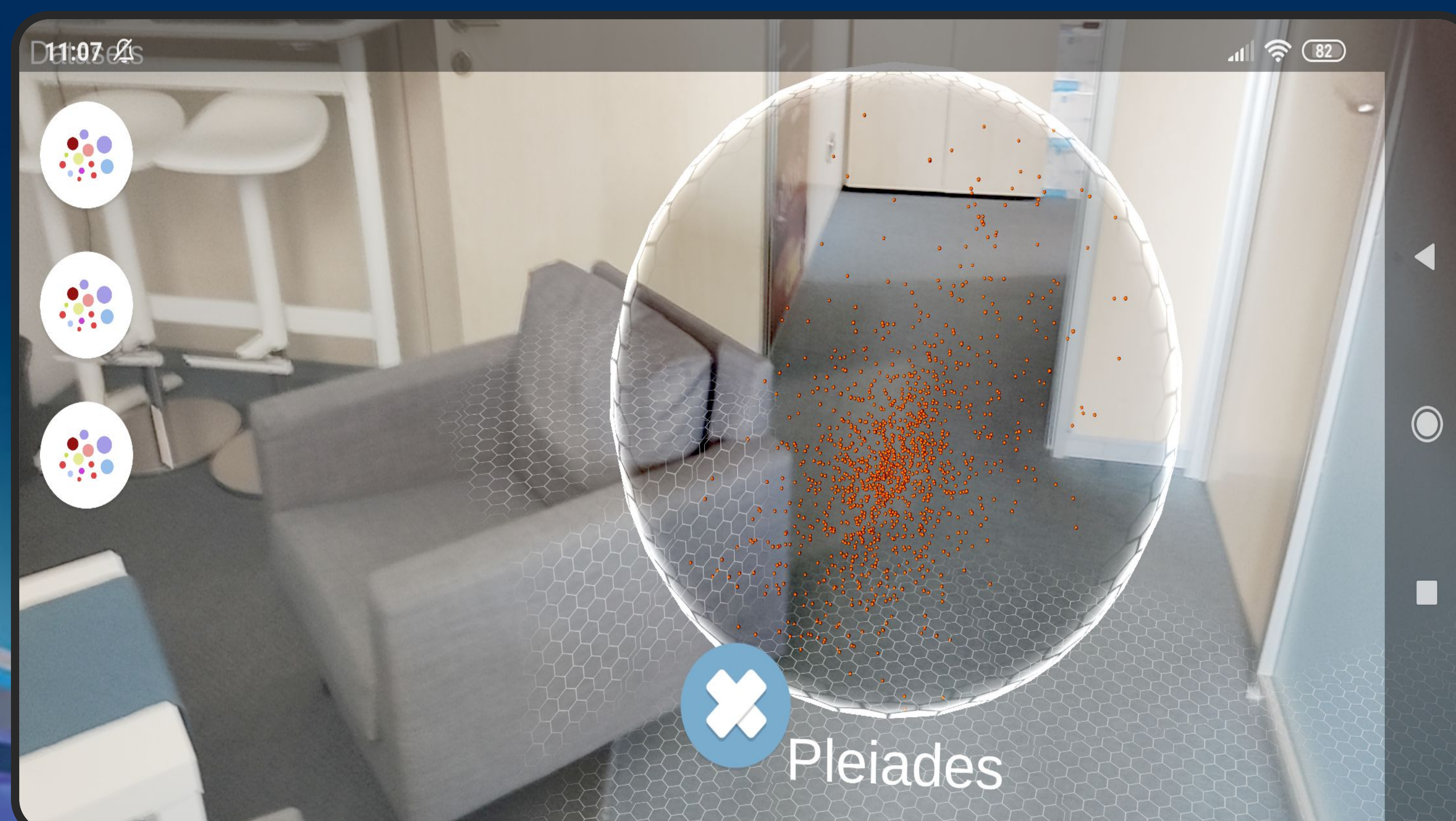


Figure 3. Mobile AR visualization of the Pleiades Cluster.

CURRENT DEVELOPMENT

The aim of this project is to create an integrated tool that combines the possibilities of VR with AR to allow us to have collaborative data analysis sessions that can be visualized by each user on their own devices.

This includes VR headsets like Oculus Rift, Mobile AR devices and AR Headsets like HoloLens. This would bring entirely new ways to collaborate and have concurrent data analysis between different users.

We believe it will be a valuable addition to a scientific workflow, with interoperability with traditional astronomical data analysis apps.

