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## Experiments with the Oculus Rift

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Collaboration with the IMCCE (Jérôme Berthier, Jonathan Normand), the Jardin des Sciences (Benjamin Rota, Christelle Spettel, Milène Wendling) and Laurent Michel (SSC XMM Newton Strasbourg)

New Technologies session
21 May 2014

CDS Centre de Données astronomiques de Strasbourg
Université de Strasbourg
cnrs dépasser les frontières
IVOA

# Motivation

- Most recent R&D experiments with new technologies
  - 2011, SkySurveys : HEALPix (native) android viewer using OpenGL
  - 2012, SkyObjects : android app able to point an object found by the CDS name resolver
  - 2013, SkyTouch : interaction between a tablet (as a smart remote control) and a desktop application (Aladin) through SAMP
    - This proof of concept is followed by a development in the frame of the European Arches project (see Friday's presentation in Education).

# And now

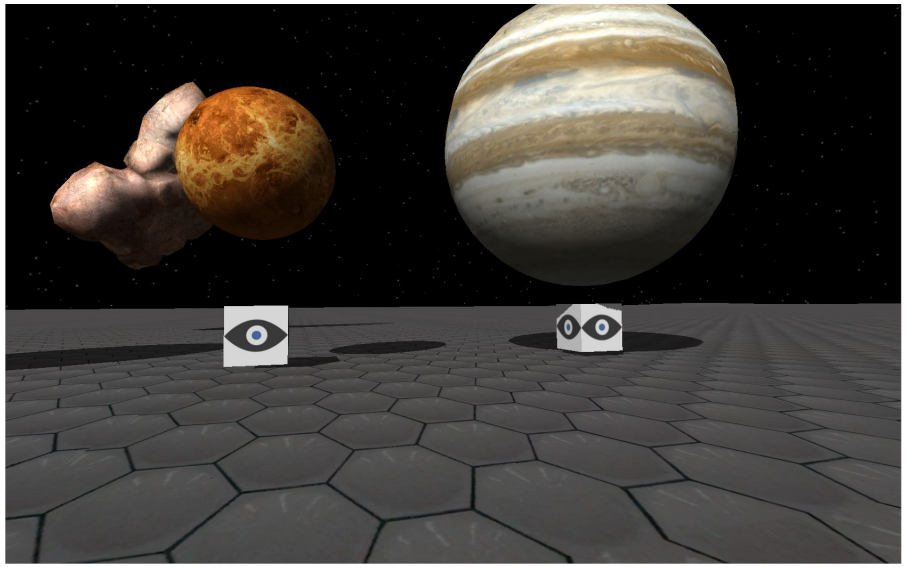
- 2014: Augmented Reality (AR) / Virtual Reality (VR)
  - Experiments in VR around the Oculus Rift
  - The aim is not to make a wonderful demo today but to explain what we have started in mid-April (for 6 Month)
    - A reflexion about use cases
    - We spent time also to learn how it works (development kit, languages, platforms, etc.)
    - First developments
  - The aim of this presentation is to get back comments, critics, ideas, etc.

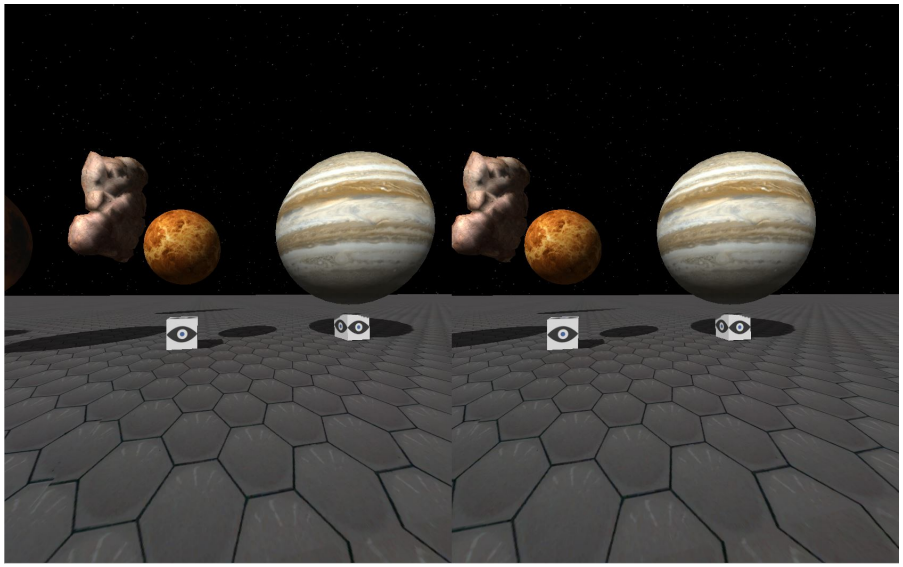
# Oculus Rift : what is it ?

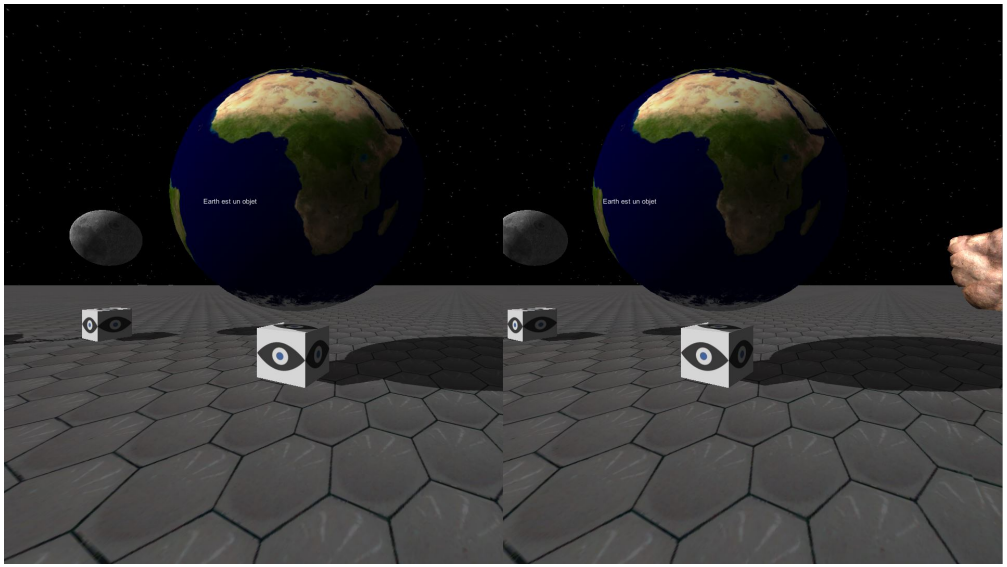
- A development kit (hardware + software + access to oculus community)
  - Version 1: our version
  - Version 2: available from July/August (HD + a camera to improve the experience (less latency between the movement and the display))
- Different ways to build an « application »
  - 3D engines like Unity, directly with the oculus libraries, …
- http://www.oculusvr.com/

# How we use it ?

- In a first time, directly in C++ with the oculus librairies but it was not easy to develop quickly our prototypes and we decided to use Unity/C#
- It is not a « final choice », it will probably evolved



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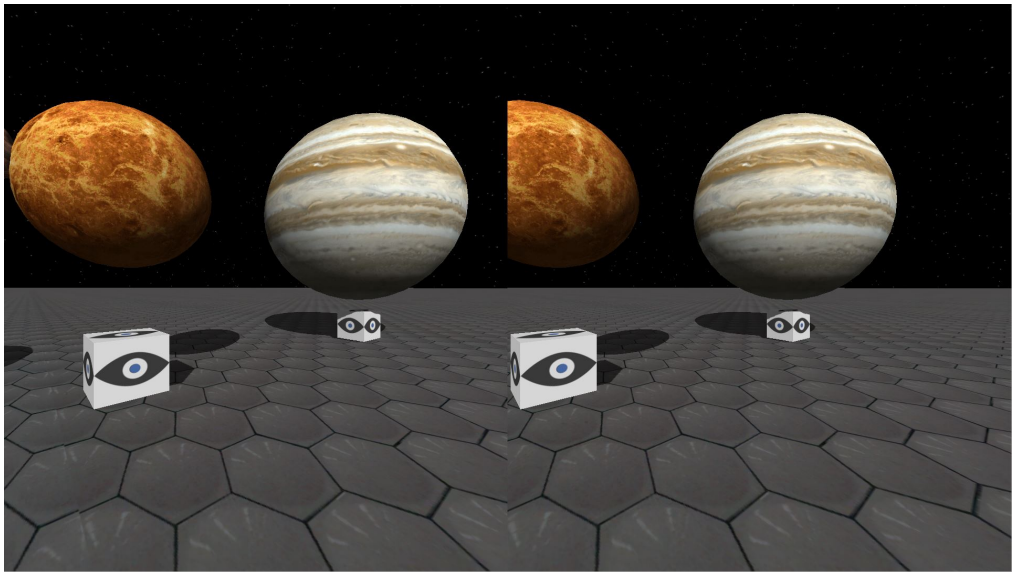
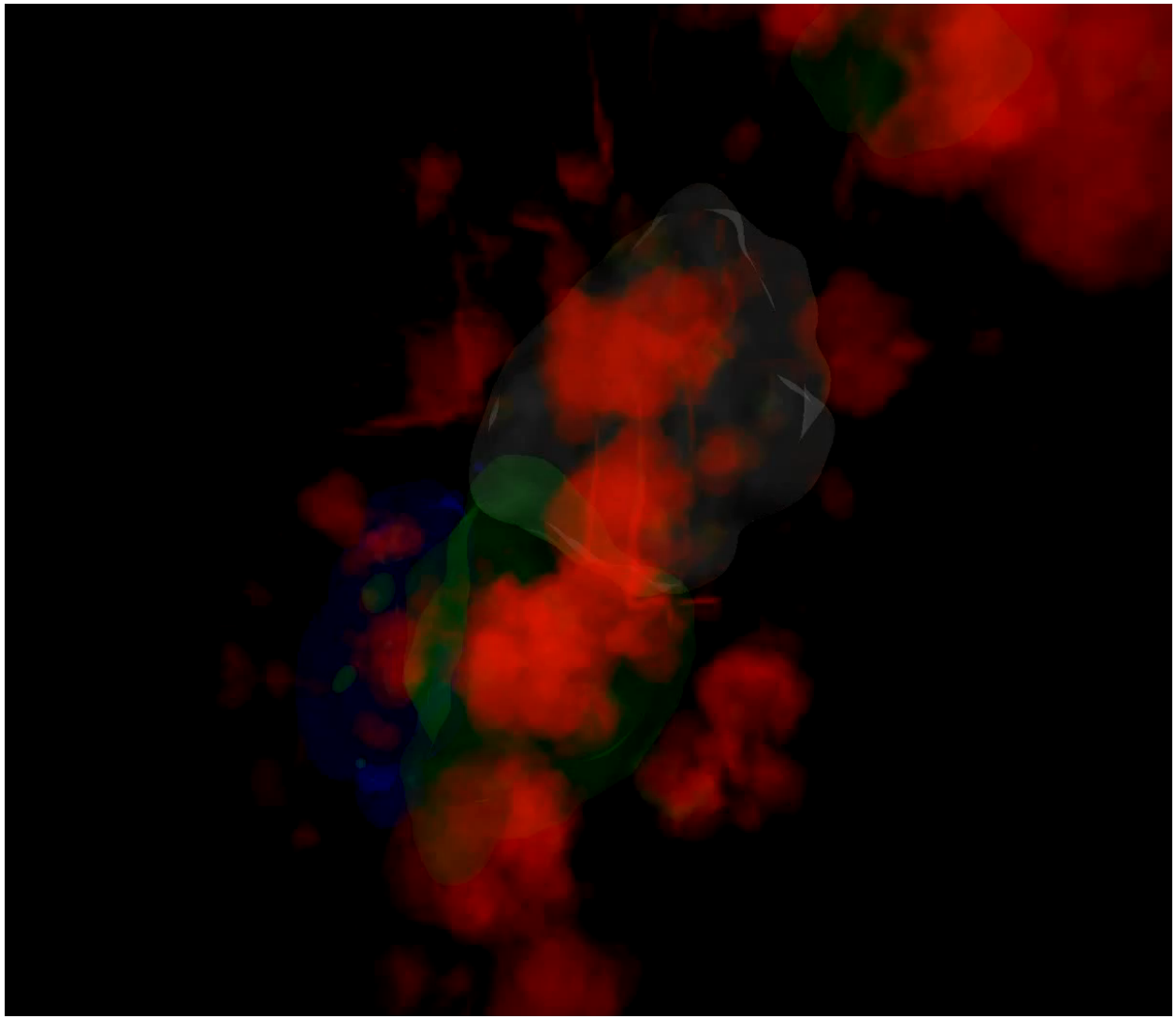


# Remarks

- The examples available to play with the Oculus Rift are mainly based on a scene with objects (with a movement, you can turn around, etc. ) for which you define the forms, the textures, etc.
- It is nice if you want for example to show the solar system and it is not too hard to due with an engine like Unity
- But it is no the same
  - if you want to visualise a simulation
  - if you want to adapt an existing application
  - if you want to navigate into a HEALPix survey
  - Etc…

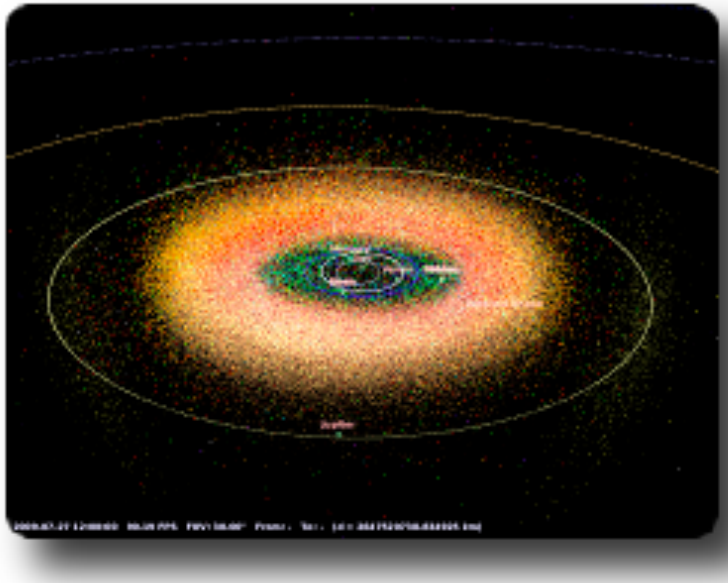
# Use case : how to visualise simulation ?



Credits: High-resolution Simulations of the Reionization of an Isolated Milky Way-M31 Galaxy Pair, Ocvirk P. et al

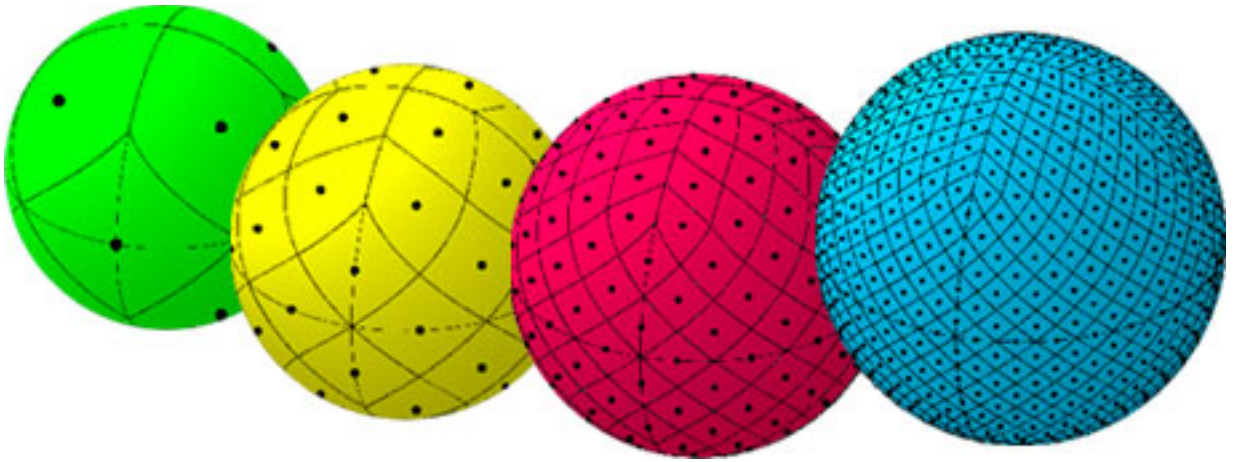
# Use case : how to adapt an existing software ?

SkyBot3D (IMCCE)



# Uses case: How to navigate into a HEALPix survey ?

- Add a output to an existing tool (Aladin, etc.)
- Develop it with a 3D engine ?
- Etc.
- In our case we had developed the SkySurveys viewer with OpenGL

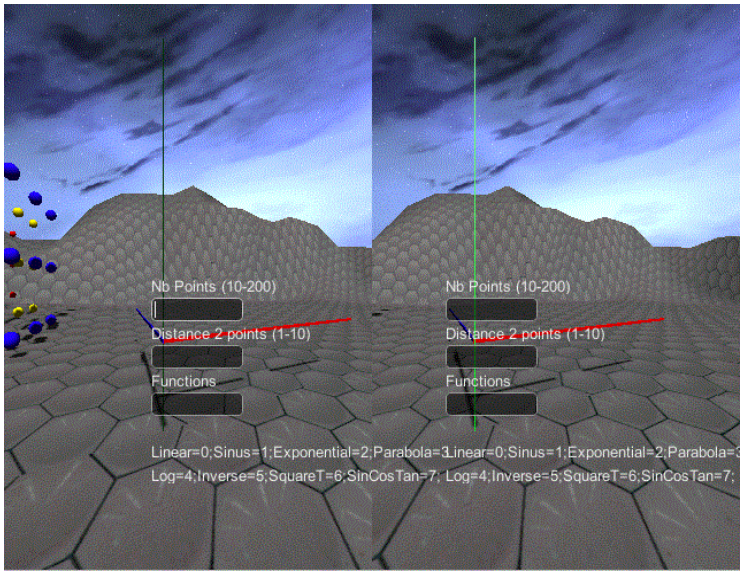


# Use case : more generally how to navigate into datasets ?

- Which kind of datasets ?
  - 3D visualisation in TOPCAT
    - does it provide an added-value to navigate into it with an oculus ?
  - plot tools in general
  - display of grid or cubes of values, etc.
  - mathematical curves, etc.
  - Etc.

# Following that

- We are working
  - on the development of prototypes for these different use cases
  - on the building of a toolkit
    - to display axis, mathematical curves, data cubes, creation of objects on the fly with a specific movement, etc…
- A few examples and animations…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Log=4;Inverse=5;SquareT=6;SinCosTan=7;
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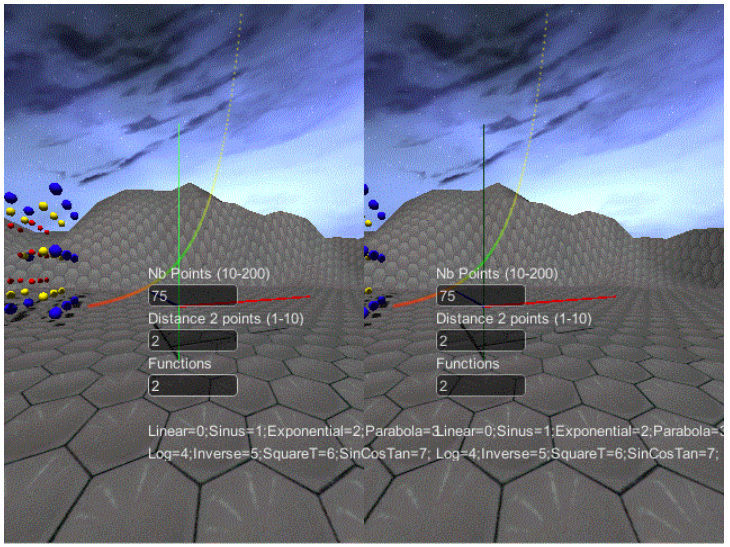
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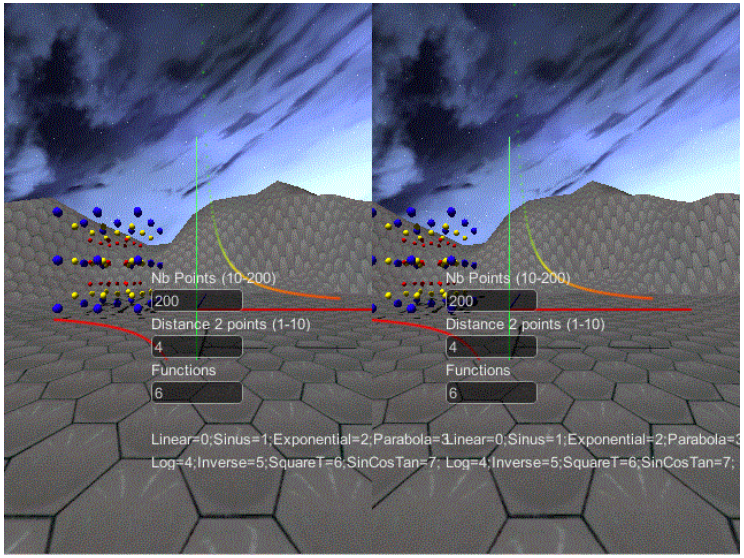
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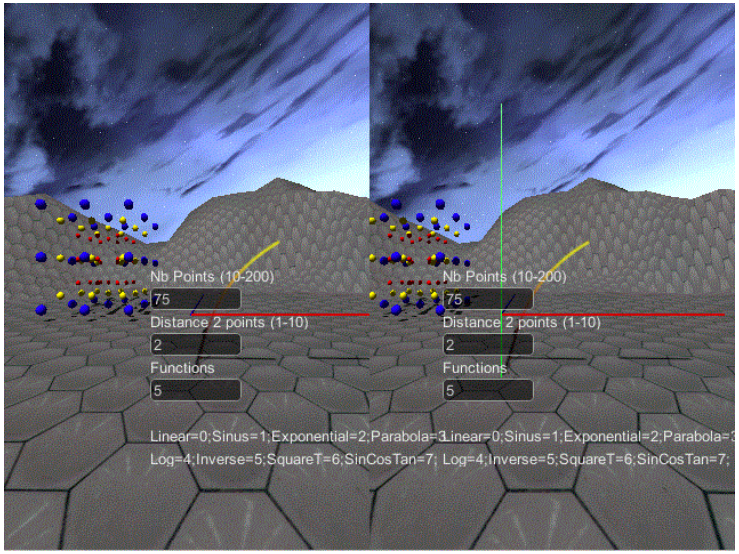
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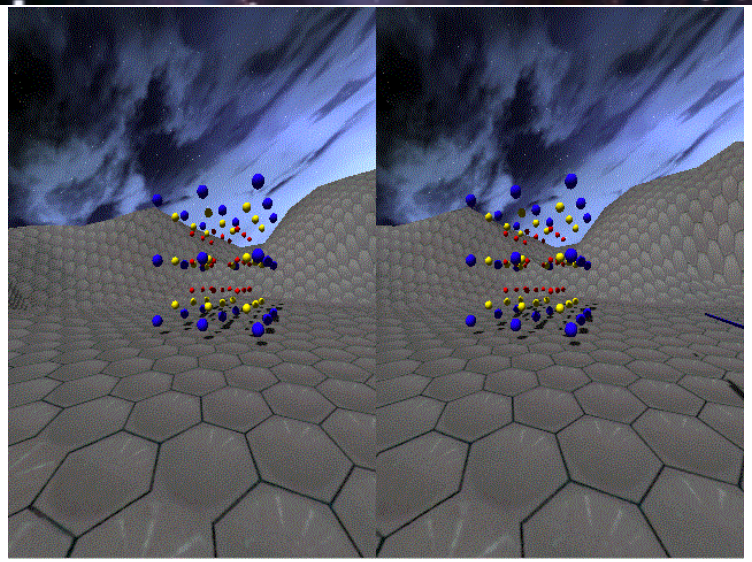

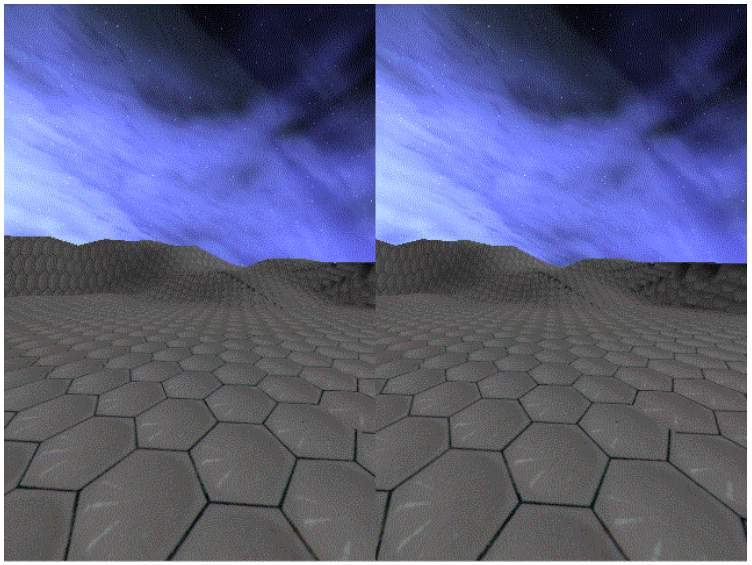

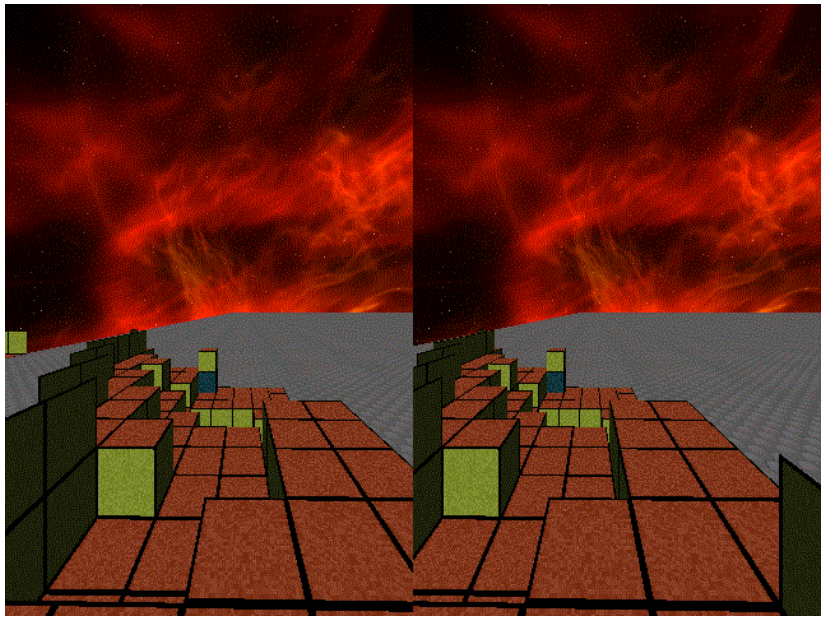

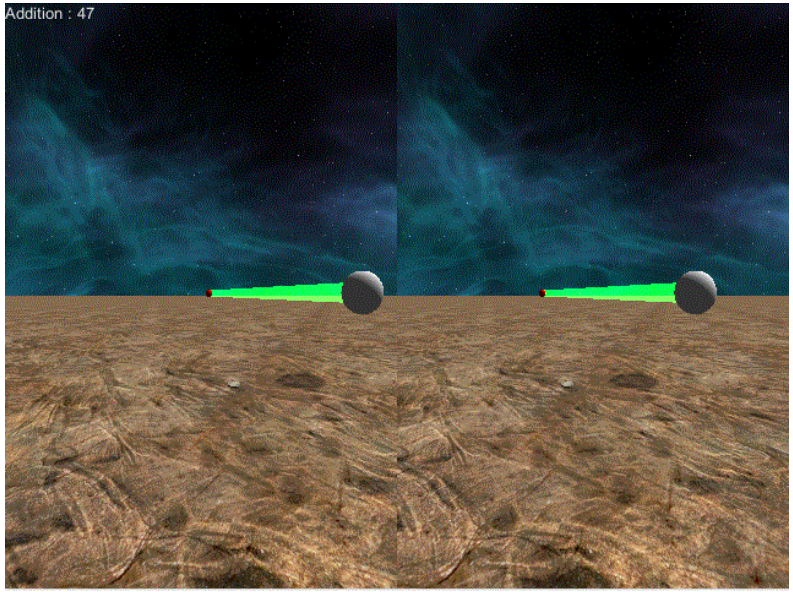
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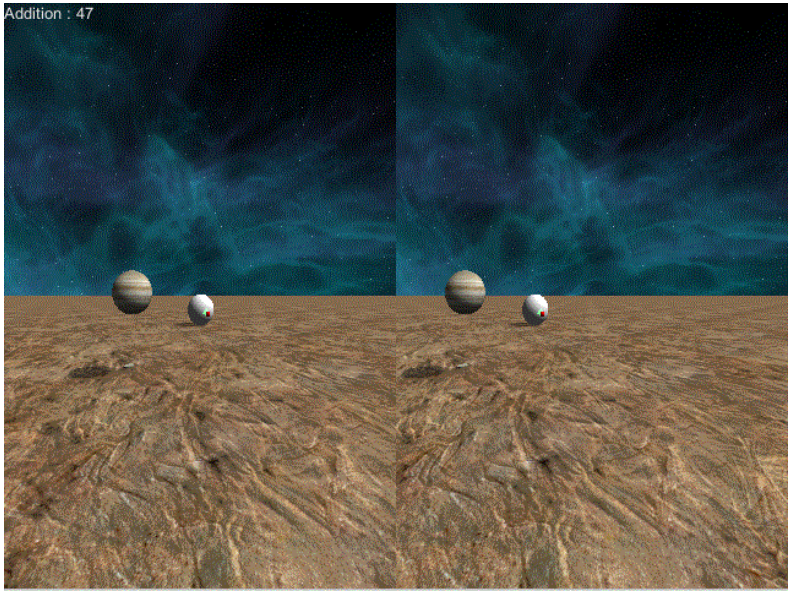
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# Conslusion

- Preliminary phase
  - Ready to collaborate during this R&D action
- Hopely nice demos in Banff