

Embark on an epic adventure that will take you beyond the limits of the classroom to unlock the mysteries of the Universe like never before!

Unlocking the Universe in 3 Dimensions



ASTRO 3D



CADET

Virtual Reality
Training and
Simulation
Research Lab

Introducing **Unlocking the Universe in 3D**

Unlocking the Universe in 3D is a ground-breaking Virtual Reality education package that brings complex astronomical concepts and theories on the origin of the Universe to life. This cutting-edge experience merges science, mathematics, and digital technologies, to create an immersive, interactive journey that will inspire and engage students.

Unlocking the Universe in 3D is not just an educational tool, it's an adventure! You'll become a member of the Universe 3D Space Telescope (U3D) Taskforce, a team of astronomers on a mission to uncover the secrets of the cosmos. Equipped with a space suit, complete with a space watch to help navigate your research tasks, you'll travel through time and space to explore different parts of the Universe.

You'll start by entering the U3D Transporter Room, selecting your destination from a 12m x 2.5m Universe timeline. Once you've made your selection, you'll be teleported to that specific time in the Universe, where you'll use advanced technology to complete a variety of tasks. And don't worry, you won't be alone on this journey – Australian Indigenous astronomer Kirsten Banks will be your guide and mentor, providing extra information and instruction as you explore the wonders of the Universe.

Unlocking the Universe in 3D is more than just a learning tool – it's a chance to experience science in a whole new way. Users collaborate, problem-solve, and engage in deep learning through an immersive, self-led experience. This package promotes independent and embodied learning through the visualisation and manipulation of objects at both atomic and astronomical levels. With *Unlocking the Universe in 3D*, students can access data intensive science in ways not otherwise possible, and increase engagement and understanding of complex astronomical science on the origin of the Universe.

Try *Unlocking the Universe in 3D* today and embark on an unforgettable journey of discovery!



Overview

Activity name	Content	Level of user involvement	Collaboration in VR	Atomic/ astronomical level
<i>Universe 3D Transporter Room</i> 'Waiting room' – familiar space where users can adapt to being in VR, investigate tools, user interfaces and learn about what they need to do to complete activities.				
The Oldest Light	<ul style="list-style-type: none"> 10 secs – 380,000 years after the Big Bang Sub-atomic particles Linking the cooling and expansion of the Universe to the formation of nuclei and atoms Standard Big Bang nucleosynthesis Origin of Cosmic Microwave Background 	Inquiry	Single	Atomic
Exploring the first atoms in the Cosmic Dark Ages	<ul style="list-style-type: none"> Standard Big Bang nucleosynthesis predicts the abundances of hydrogen and helium in the early Universe Atomic structure of the first stable, neutral atoms Origin of the first elements 	Inquiry	Single	Atomic
21 cm H1 line	<ul style="list-style-type: none"> The effect of cosmological redshift on light Radio astronomy (Australia's contribution) 	Inquiry	Pair	Atomic and astronomical
Epoch of Reionisation	<ul style="list-style-type: none"> EoR simulation to observe new stars form and the bubbles of ionised gas getting larger and larger until the Universe becomes transparent Modelling the evolution of the Universe First stars 	Experiential Inquiry	Single or pair	Atomic and astronomical
Ionising neutral hydrogen in the EoR	Creating ionised hydrogen atoms by 'blasting off' the electrons with UV blasters	Game	Multi-player (3)	Atomic

Education

- Aim: to increase student engagement in, and understanding of, the complex astronomical science on the origin of the Universe via an interactive, self-led learning paradigm.
- Targeting secondary school students in Year 10, but can be useful for students in Years 9-12.
- Addresses the Australian Curriculum: Science focusing on how the Big Bang theory models the origin and evolution of the Universe and the evidence for the theory.
- Future access:
 - ASTRO 3D has a lending library of class sets of the Oculus 2 headset. These will be lent to schools for a few weeks, thereby allowing teachers to conduct a unit of work.
 - For those schools that have Oculus 2 headsets, the program will be available on the Oculus store.

Technology

- Unity – industry standard game engine
- Meta Quest 2 – off-the-shelf hardware
- Custom designed carry case – holds 20 headsets

Unlocking the Universe in 3D is a Virtual Reality education package conceptualised by the Education and Outreach team in the Centre of Excellence in All Sky Astrophysics in 3D (ASTRO 3D) and designed and built by the Deakin University Centre for Advanced Design in Engineering Training (CADET) Virtual Reality (VR) Laboratory at Deakin University, Melbourne.

ASTRO 3D is a seven-year \$40 million Centre of Excellence project funded by the Australian Government through the Australian Research Council. It is producing a comprehensive picture of the evolution of matter, the chemical elements, and energy in the Universe from shortly after the Big Bang to the present day. It hosts over 250 investigators and professional staff, mostly based at nine Australian Universities. <https://astro3d.org.au/>

The CADET Virtual Reality Laboratory is a unique, world class VR facility, designed specifically around the ability for Research and Development (R&D) of VR and Augmented Reality (AR) solutions for industry. The facility is a first-of-its-kind and has a team of experts able to provide both the niche capability and capacity to deliver industry appropriate VR and AR solutions. The VR lab being positioned within a university environment, unlike vendors in the VR space, is able to remain at the forefront of the range of available VR and AR technologies and approaches while still being sensitive to the technical intricacies involved in deployment to industry for value add to commercial operations. <https://www.deakin.edu.au/engineering/facilities/virtual-reality-lab>



For further information

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