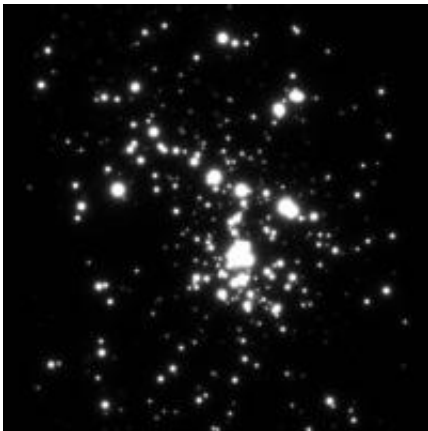


# Creating virtual universes with Swinburne's Theoretical Astrophysical Observatory

March 28 2014, by Lea Kivivali

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Swinburne University of Technology has launched a free online astronomy virtual laboratory that will allow scientists to build complex customised views of the Universe, all from the comfort of their own computer.

The Theoretical Astrophysical Observatory (TAO), funded by the Australian Government's \$48 million NeCTAR project, draws on the power of Swinburne's gSTAR GPU supercomputer to allow astronomers to simulate the Universe and see how it would look through a wide range of telescopes.

"TAO lets researchers take the data from massive cosmological

simulations and map it onto an observer's viewpoint, to test theories of how galaxies and stars form and evolve," TAO project scientist, Swinburne Associate Professor Darren Croton, said.

"TAO makes it easy and efficient for any astronomer to create these virtual universes. It's the culmination of years of effort that is now at the fingertips of scientists around the world.

"Using TAO it might take a few minutes to create a mock catalogue of galaxies, versus months or even years of development previously."

Swinburne worked with eResearch company Intersect Australia Ltd, who designed the web interface with simplicity and user-friendliness in mind.

Associate Professor Croton said that it was important to create a service that could be used by any astronomer regardless of their area of expertise, "because that accelerates the pace of science and boosts the chance of breakthroughs".

As new survey telescopes and instruments become available, they can be modelled within TAO to maintain an up-to-date set of observatories.

"TAO could be especially useful for comparing theoretical predictions against observations coming from next-generation survey telescopes, like the Australian Square Kilometre Array Pathfinder (ASKAP) in Western Australia, and the SkyMapper Telescope run by the Australian National University (ANU).

"These will cover large chunks of the sky and peer back into the early stages of the Universe and are tasked with answering some of the most fundamental questions know to humankind."

TAO is the theory node of the All Sky Virtual Observatory (ASVO) that

is being created by Astronomy Australia Limited, Swinburne University of Technology, the ANU, National Computational Infrastructure, and Intersect Australia Ltd. The ASVO will bring together both theory and observation. This includes a portal to the most detailed digital and sensitive map of the southern sky from the SkyMapper [telescope](#).

**More information:** [tao.asvo.org.au/](http://tao.asvo.org.au/)

Provided by Swinburne University of Technology

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