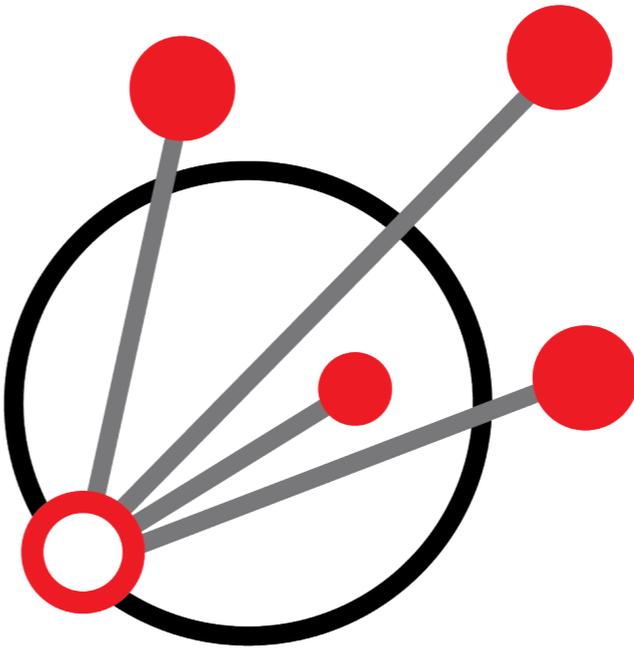


data central



The Australian Astronomical Theory Hub:
building a simulation and model archive

The current Australian theory data archives

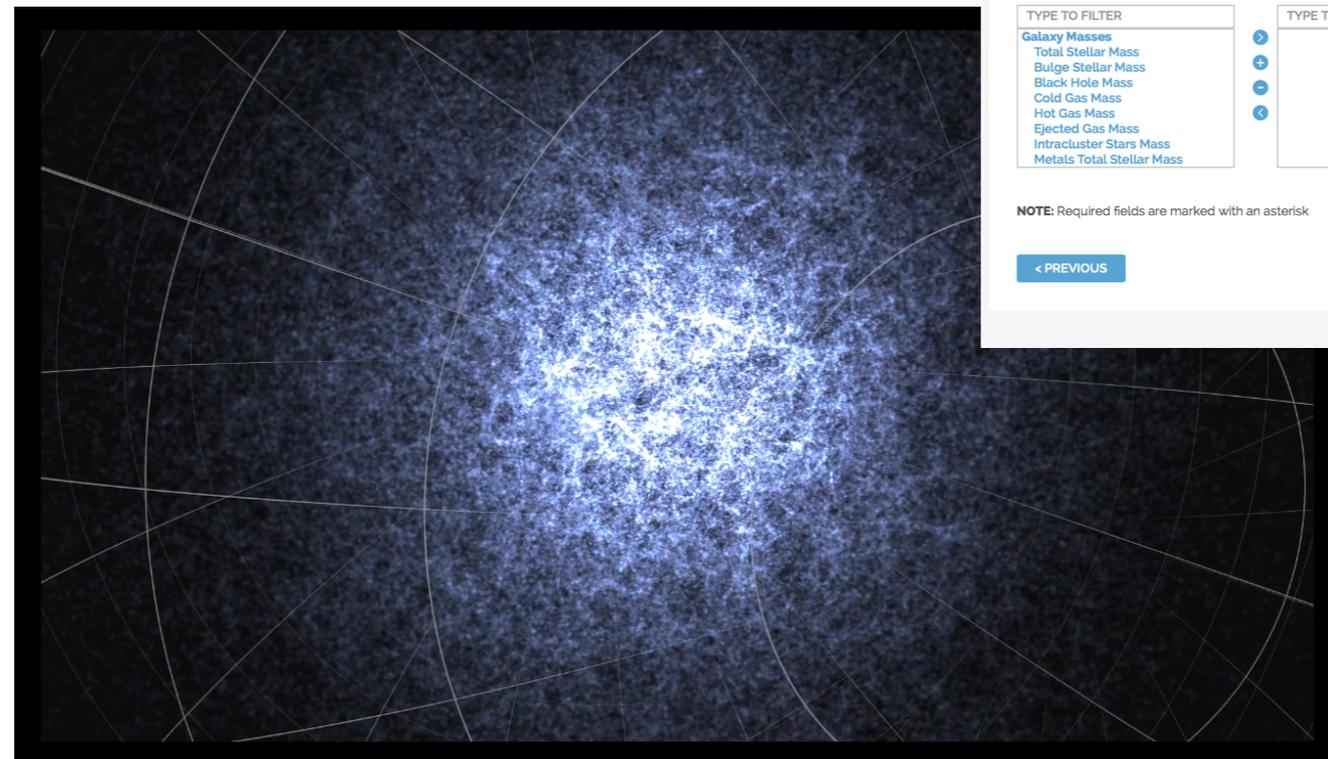
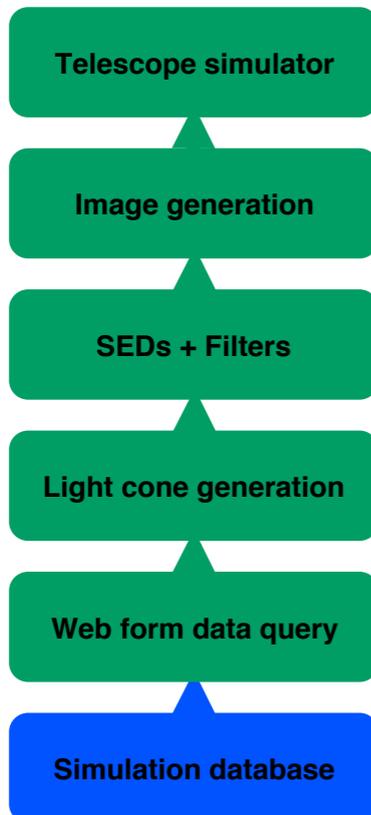
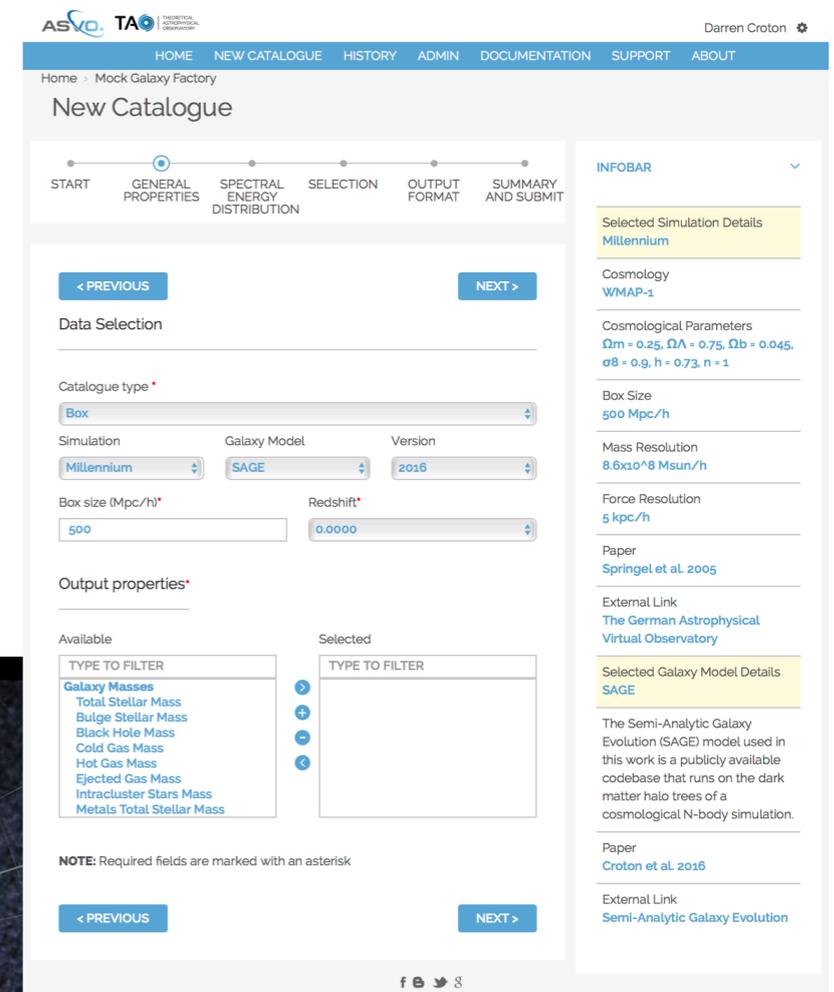
- Theoretical Astrophysical Observatory (next slide)
- Australian National Institute for Theoretical Astrophysics
 - data store: one dataset (!) not VO-compliant or FAIR
- Desktops, hard drives, etc “email the author for access”

Theoretical Astrophysical Observatory



THEORETICAL
ASTROPHYSICAL
OBSERVATORY

- Summary:
 - Led by Swinburne University
 - Cosmological and galaxy formation simulations for astronomers
 - Launched March 2014
 - Over 1000 virtual universes built



What about other simulations and model data?

- Rapid population synthesis models for the evolution of binary stars
- 3D models of supernova explosions and supernova progenitors
- Smoothed particle hydrodynamics models of protoplanetary disks
- Common envelope evolution models
- Multidimensional asteroseismological model grid from GYRE
- Massive star evolution models
- Multidimensional stellar evolution model grid from MESA
- Spectral Energy Distribution models from ProSpect
- Stellar evolution models incorporating elemental nucleosynthesis
- Desert Fireball Network Asteroid Orbital evolution simulations
- Stellar interior and nucleosynthesis models
- 3D model stellar atmospheres and synthetic spectra
- Photoionisation and shockwave emission line spectral models

Australian Astronomical Theory Hub

- ARDC Data Partnerships proposal (decision in 2-3 weeks)
- Plan to implement SimDM for a large range of simulations and models
 - Will need to accept multiple data formats, including FITS, HDF5
- To be part of Data Central (datacentral.org.au)
- Implement a simulations database (SimDB?)
 - SQL or noSQL?
- How to query?
 - Currently considering TAP over SimDAL

ASTRO3D at Macquarie

- ASTRO3D is an Australian Research Council Centre of Excellence, with \$30 million over 7 years
- Macquarie University has just joined, and will have two data focussed roles
- Possible connection to the AATH (under discussion)
 - A role each for stellar and extragalactic/cosmological simulations
 - Help to develop user-friendly connections between simulations and observations

What next for FAIR simulations?

- Separate registry for simulations/models to make them discoverable?
- Any system that helps simulations become findable and accessible must be **usable**.
- Simulations can be highly complex, so the user experience is critical, as well as the technical implementation