

TAIPAN

Andrew Hopkins
Australian Astronomical Observatory

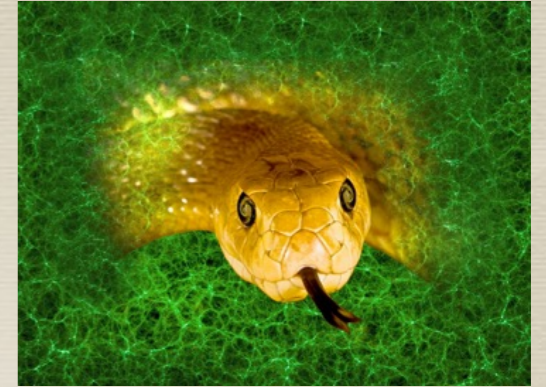


Australian Government
Department of Industry and Science





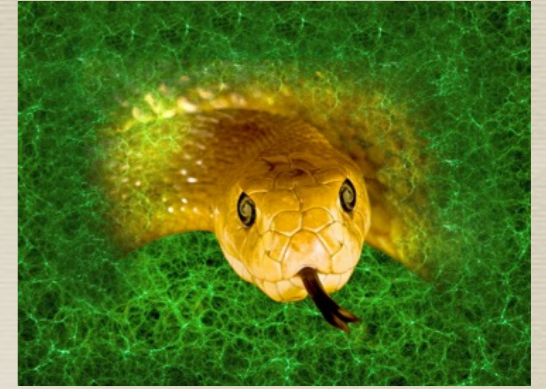
Taipan goals



- 🐍 Three themes: **Cosmology, Galaxies, Stars**
- 🐍 The “**Stars**” theme is addressed by the **Funnelweb** survey, 2000000 stars to $V < 12$.
- 🐍 The “**Cosmology and Galaxies**” themes are addressed by the **Taipan galaxy** survey of around 500000 galaxies to $i < 18$.
- 🐍 The primary key science goal for the Taipan survey is a 1% precision measurement of H_0 .
- 🐍 Additional key science goals for the Taipan survey include:
 - 🐍 Precision peculiar velocity survey
 - 🐍 Galaxy evolution, transition, environment, fuelling

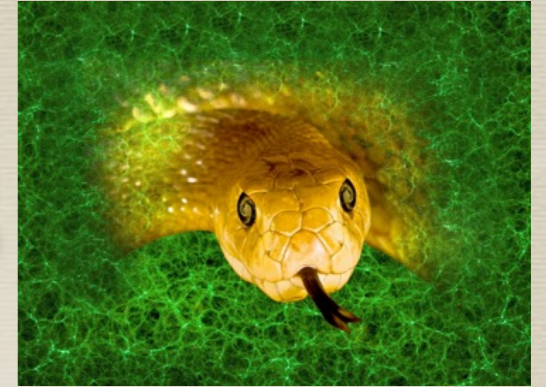


TAIPAN





Hardware status



All now funded! Work underway on each of the positioner, spectrograph and telescope refurbishment.



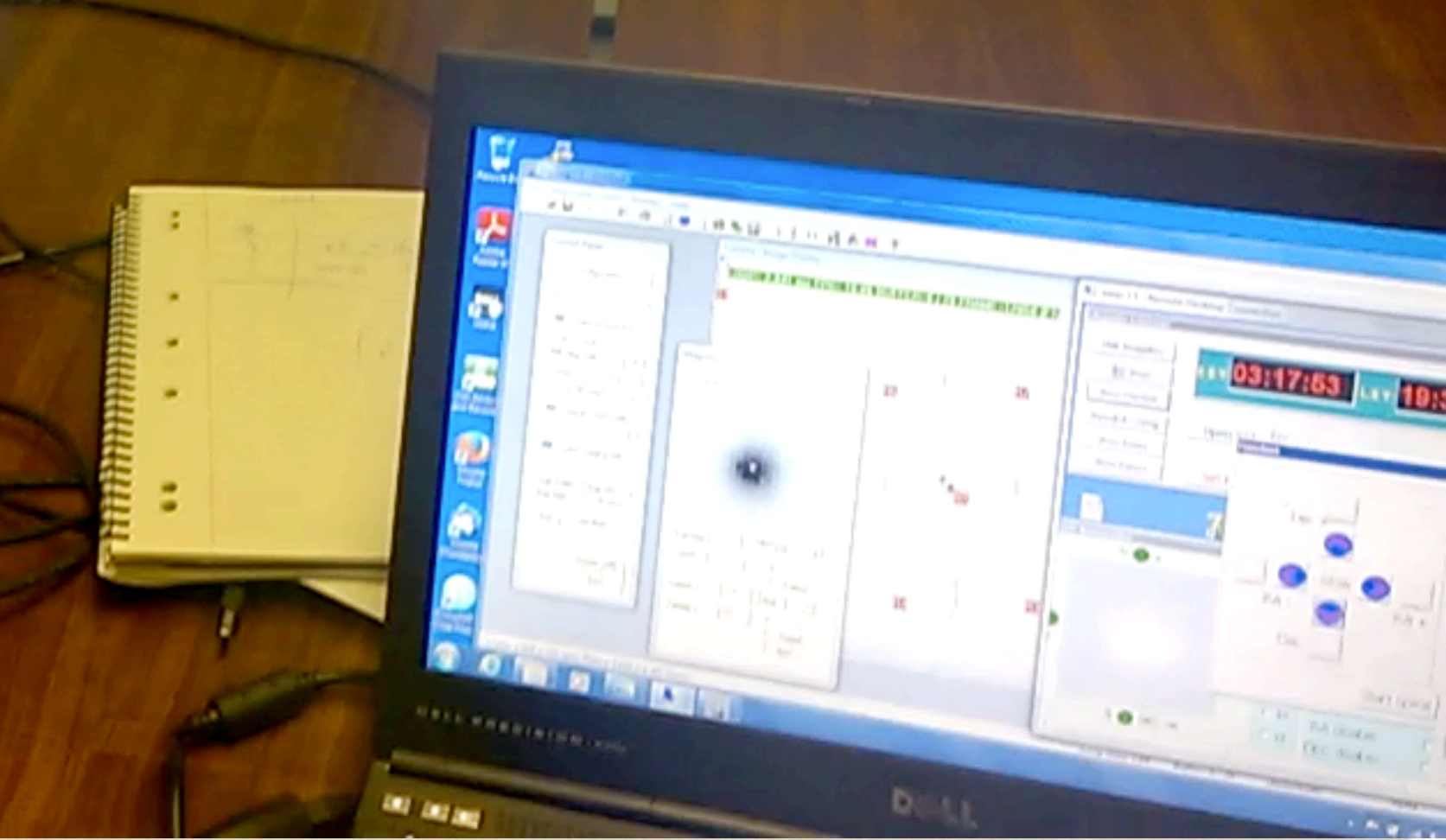
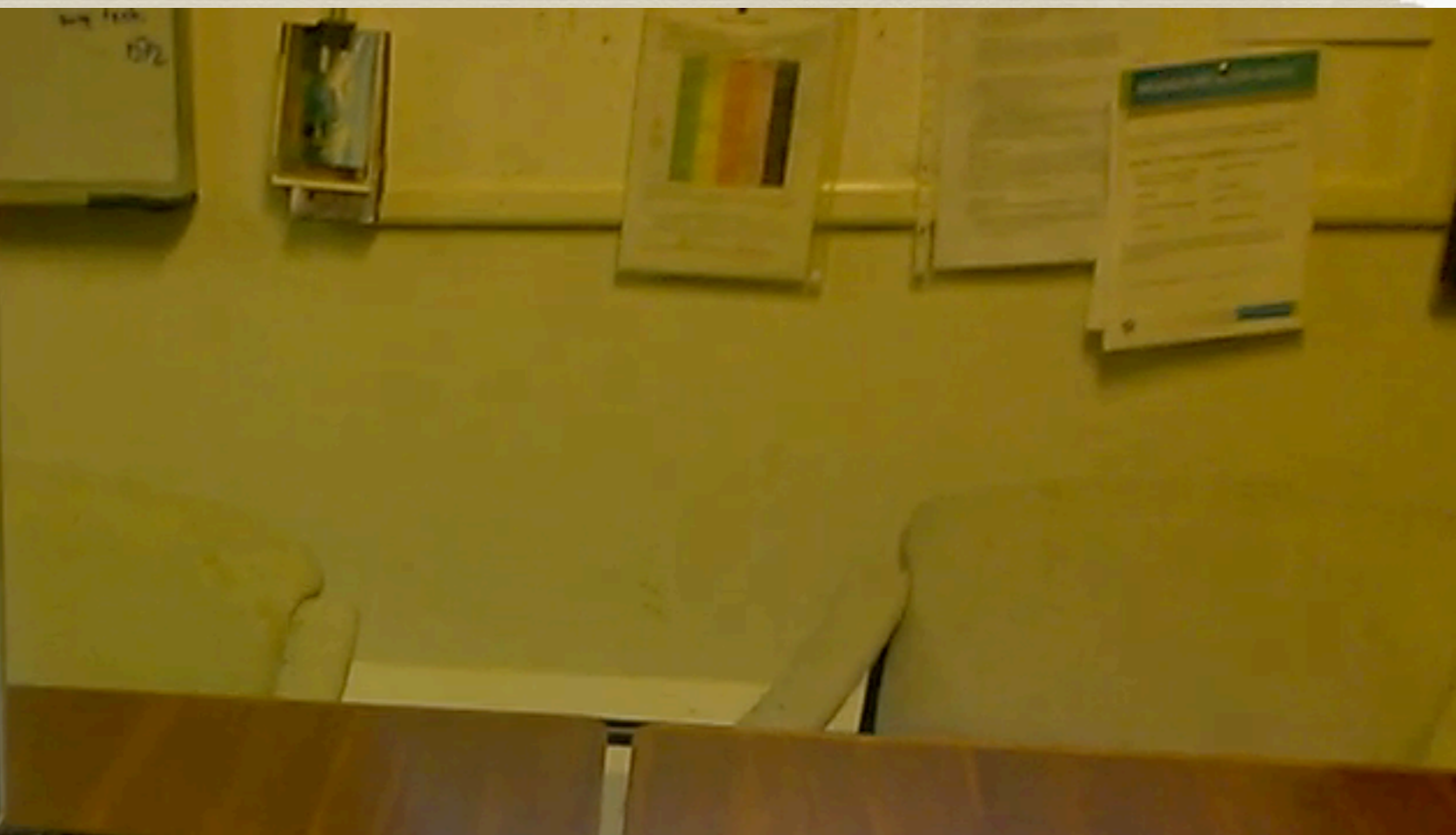
Starbugs positioner well underway. Preliminary demonstrations of prototype bugs and coherent polymer fibre bundles for auto-guiding and focal-plane characterisation on the UKST carried out in February. 150 starbugs for initial operations, with the intent to increase to 300.

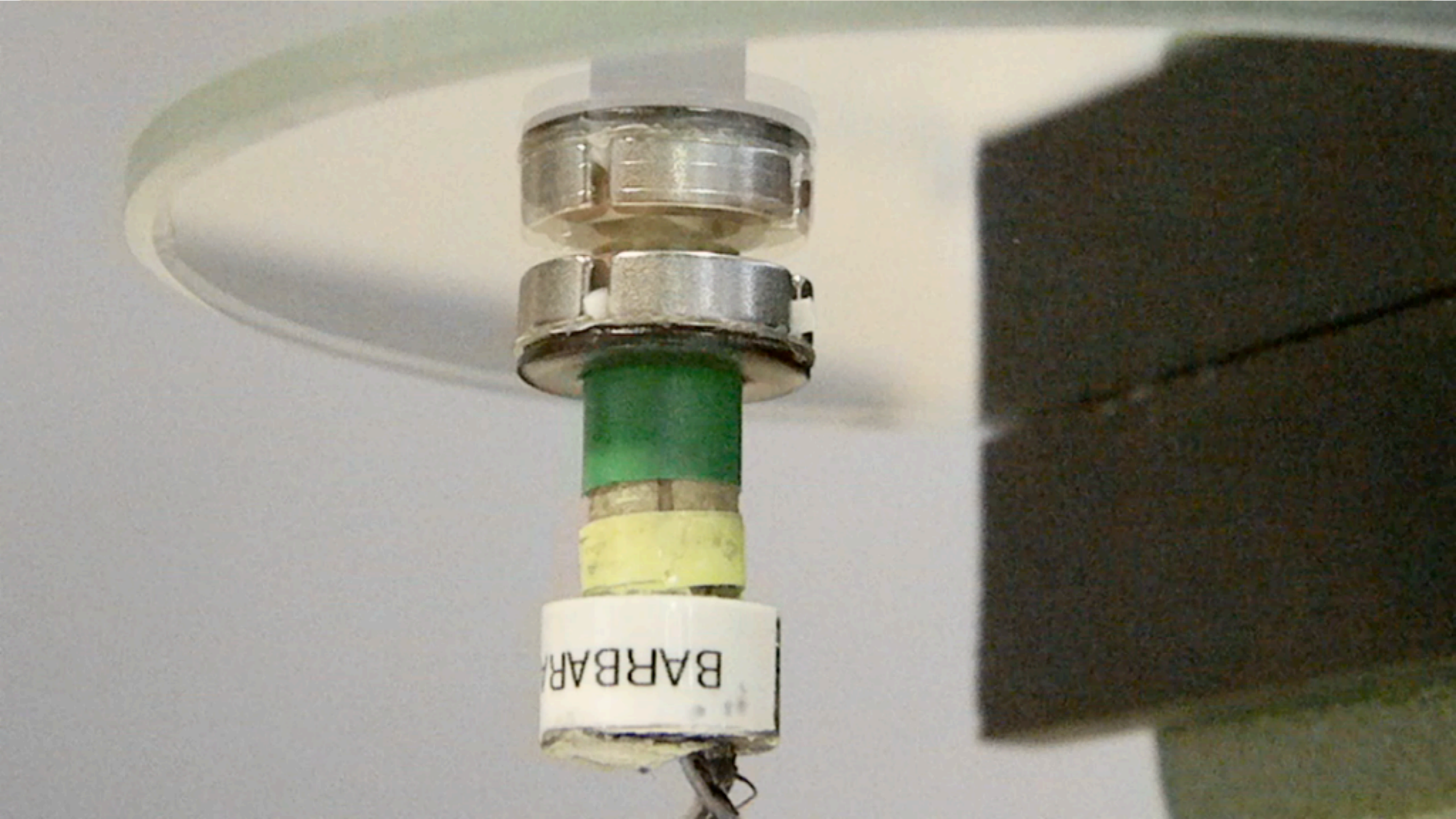


TAIPAN spectrograph: successfully funded through an ARC LIEF proposal, and strongly supported by 12 institutions (out of 16 nationally with active astronomy research groups).



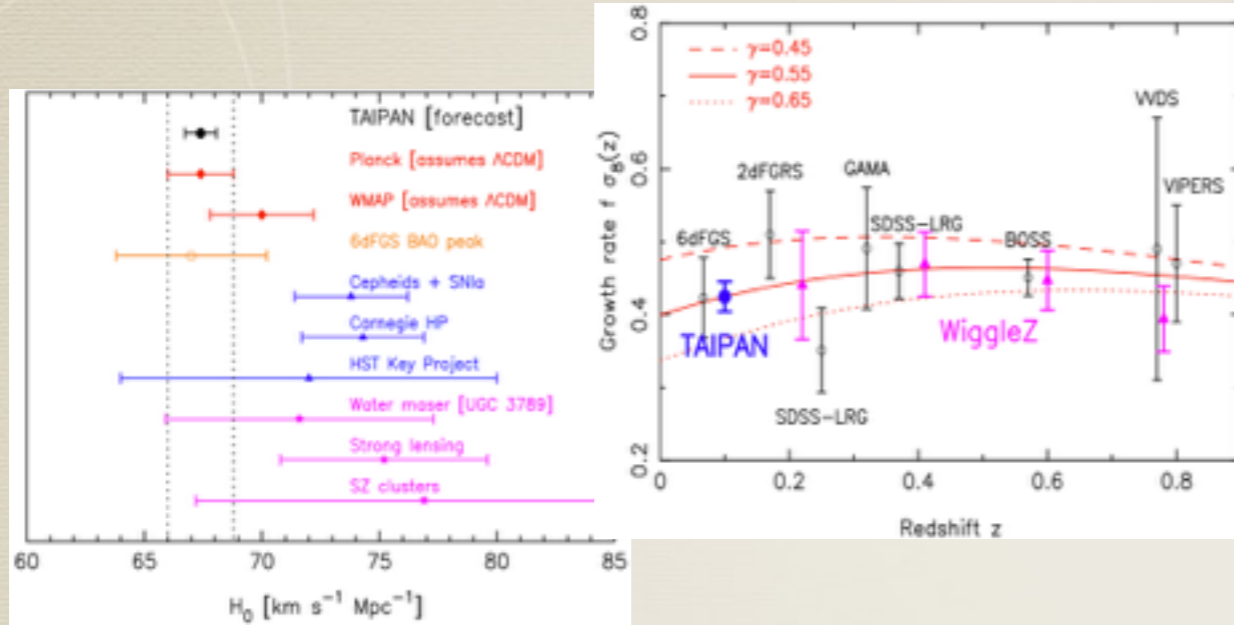
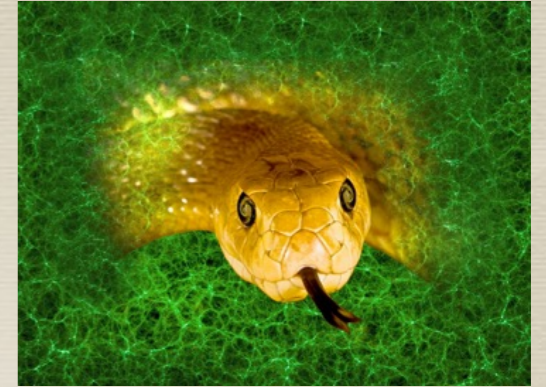
The UKST refurbishment: supported through AAO capital funding bid to Department of Industry, approved following success of LIEF proposal.



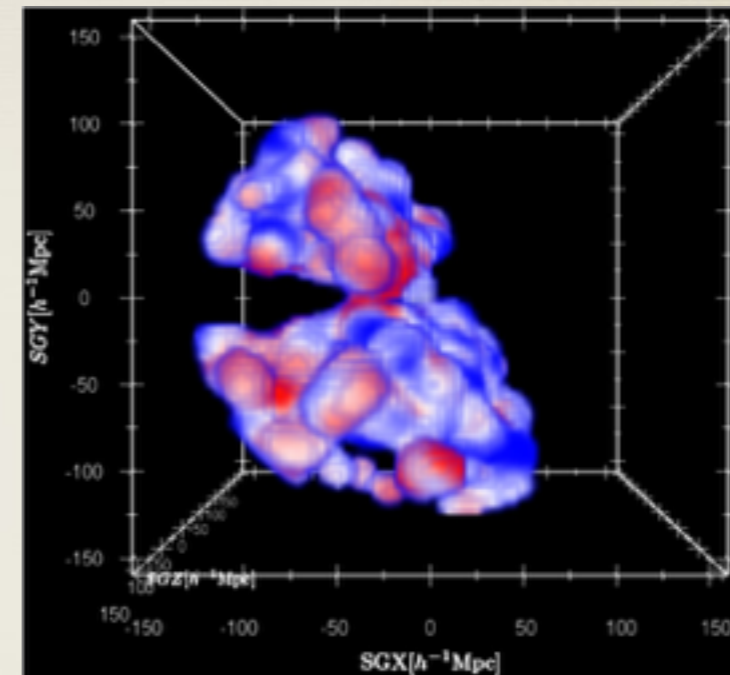




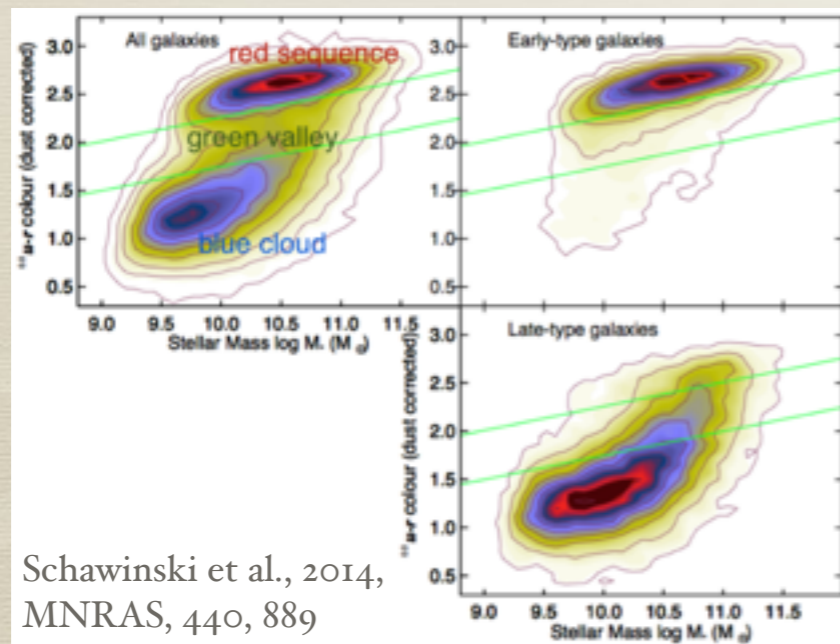
Taipan science



1% measurement of Hubble's constant and **5%** measurement of the growth rate of structure.



The most extensive and detailed map of the mass distribution and motions in the local Universe.

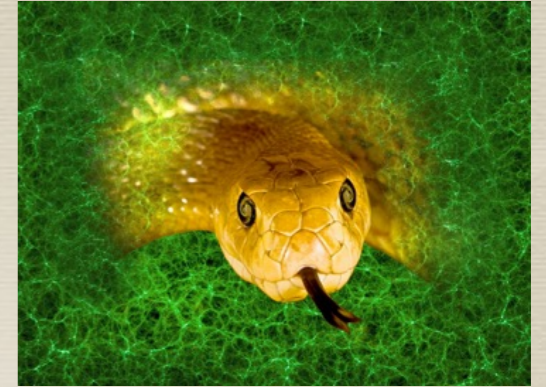


Schawinski et al., 2014, MNRAS, 440, 889

Identifying the mechanism that causes the cessation of star formation in galaxies, and moderates the transition from blue, active disk galaxies to red, passive spheroids.



Target selection



Taipan galaxy survey input catalogues:



SuperCOSMOS (optical) or potentially SkyMapper (optical)



VISTA Hemisphere Survey (near-IR)



WISE (mid-IR)



Photometric pre-selection required:



optimise for mass and volume limits in the galaxy survey,



necessary preselection to provide relevant mass and luminosity ranges for the cosmology and peculiar velocity surveys.



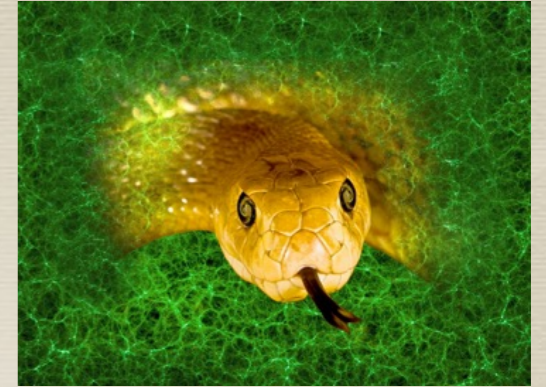
Reliable photometry needed to quantify aperture effects



For galaxy photometry, want elliptical apertures



Summary



Instrument + telescope funded, construction and refurbishment underway.



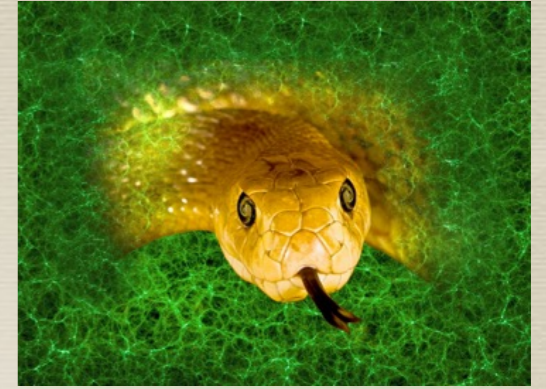
Taipan and Funnelweb survey teams in place, key science defined, survey strategy being refined.



Taipan and Funnelweb surveys to begin in 2016, with approximately 5 year duration.

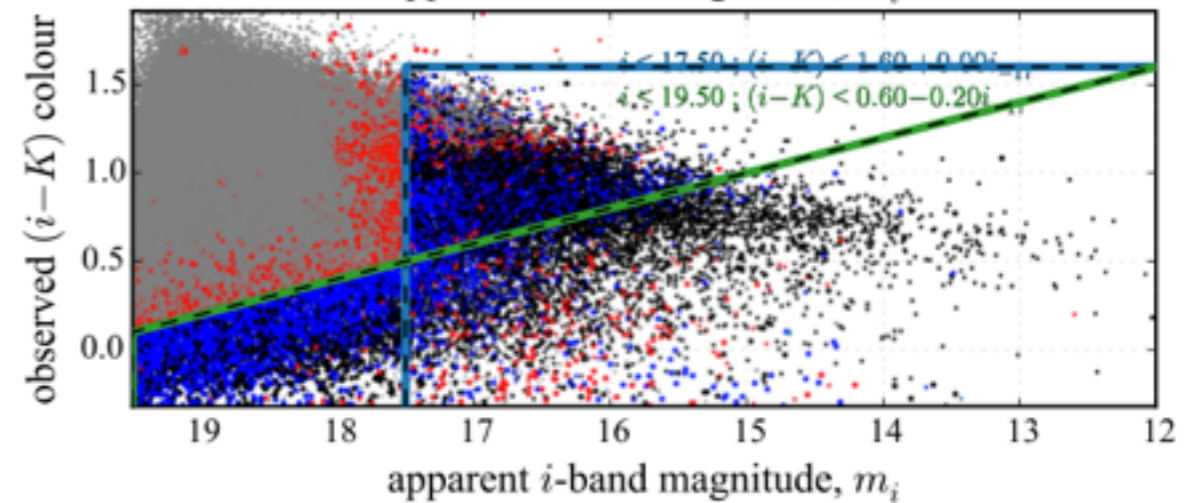
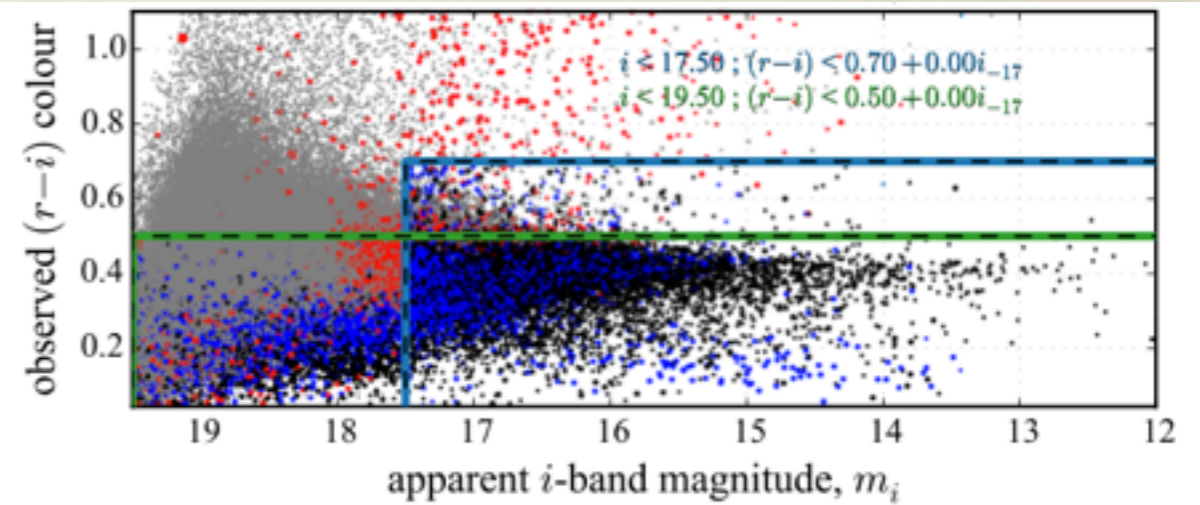
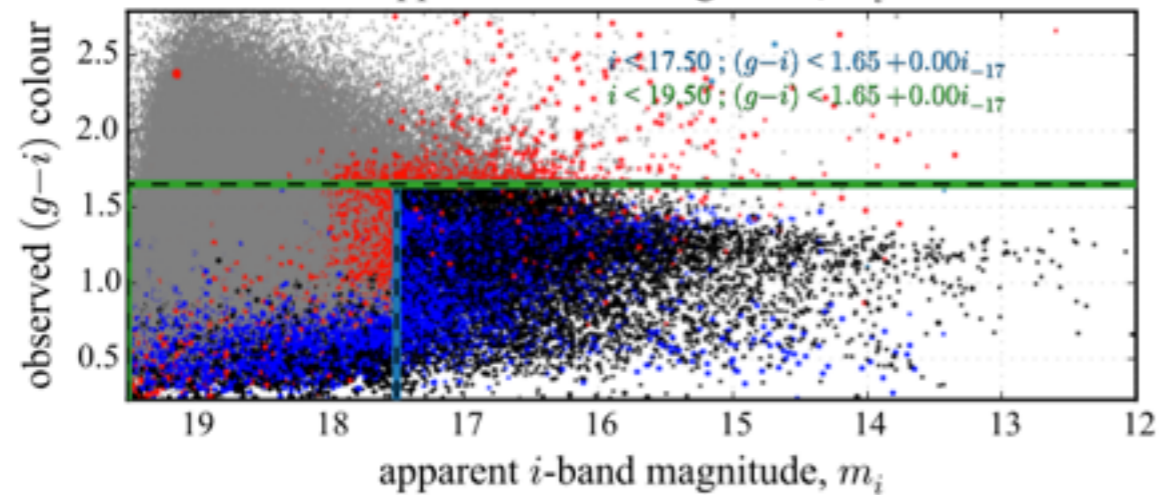
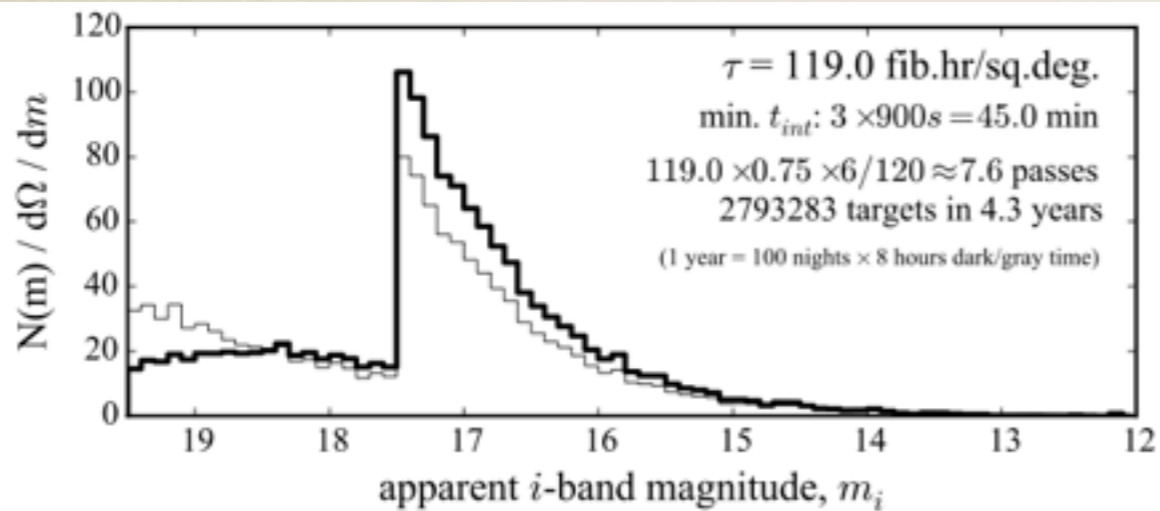
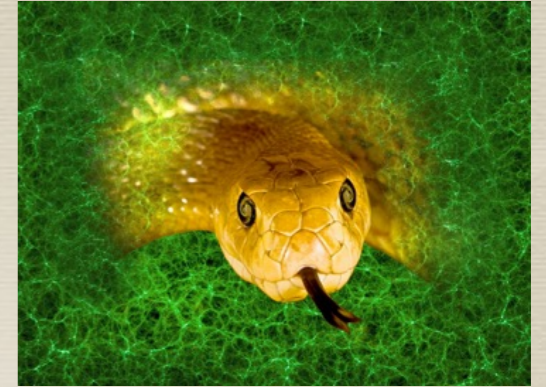


<http://www.taipan-survey.org/>



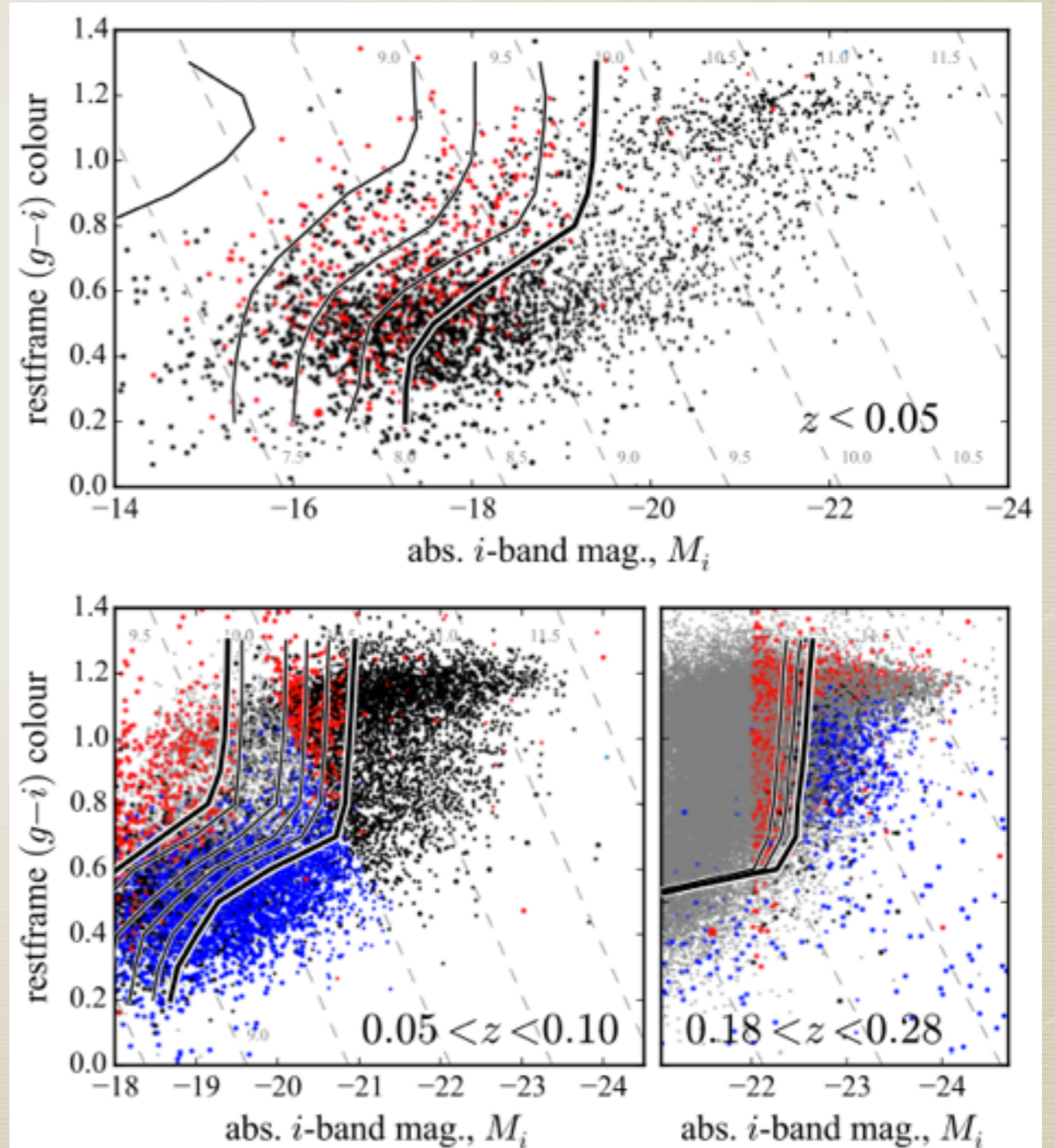
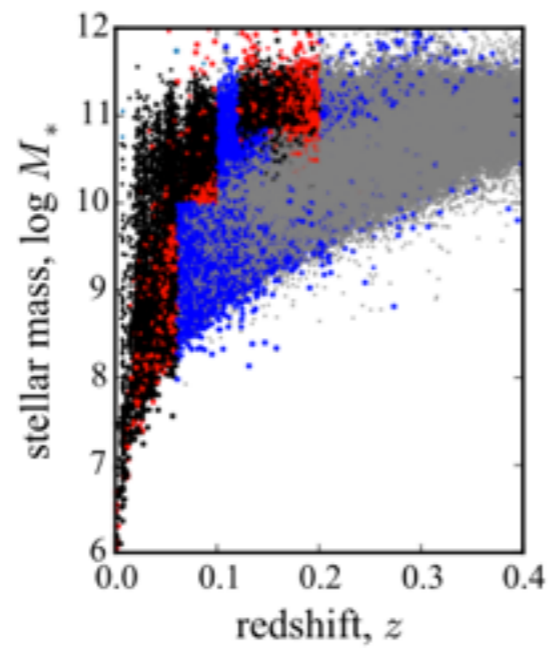
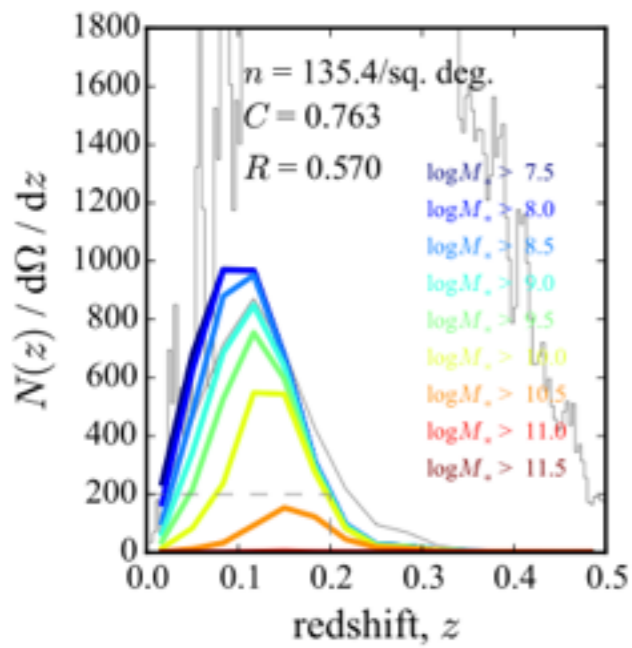
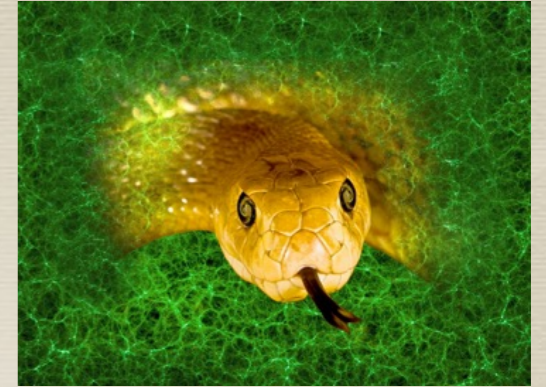


Target selection



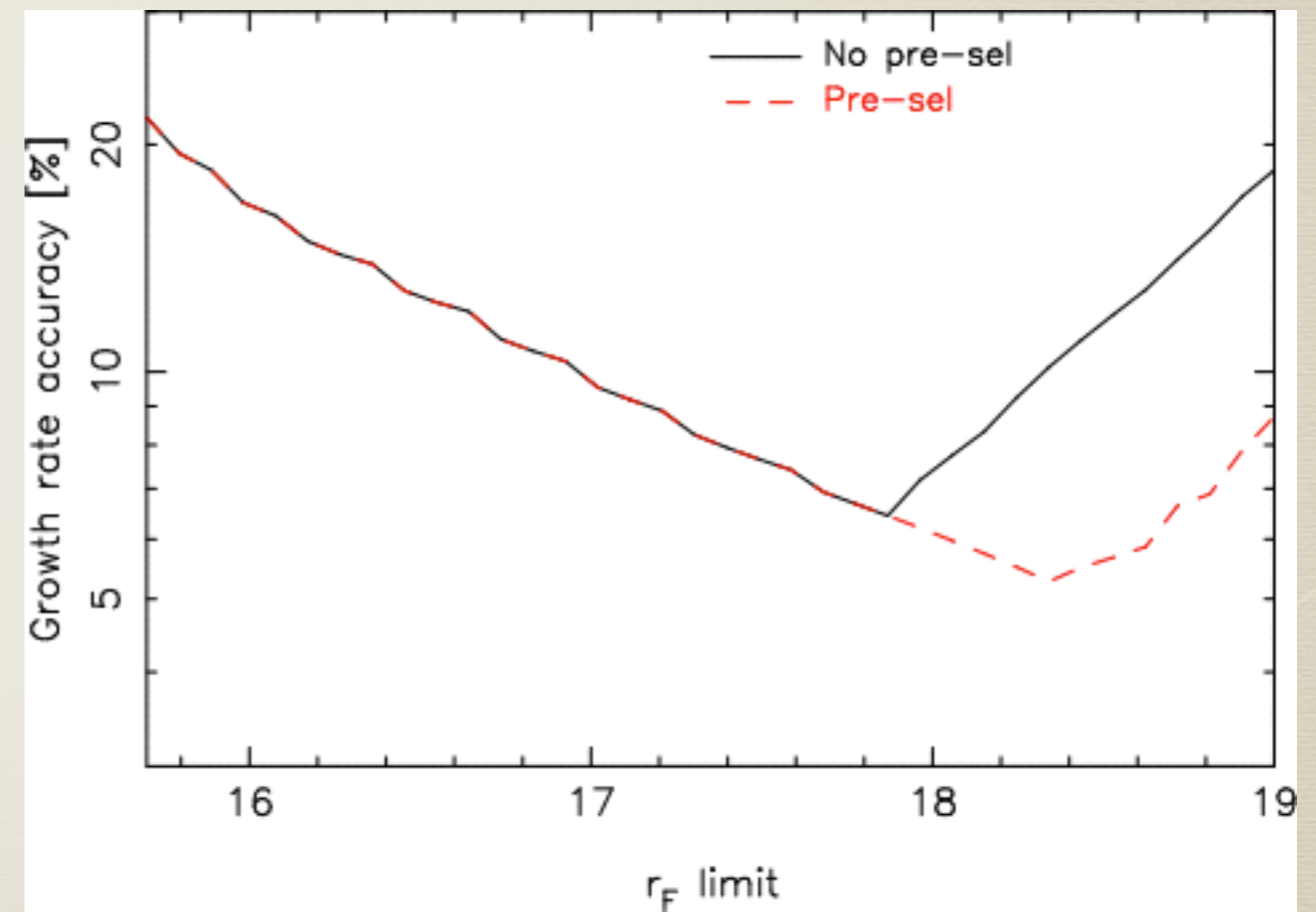
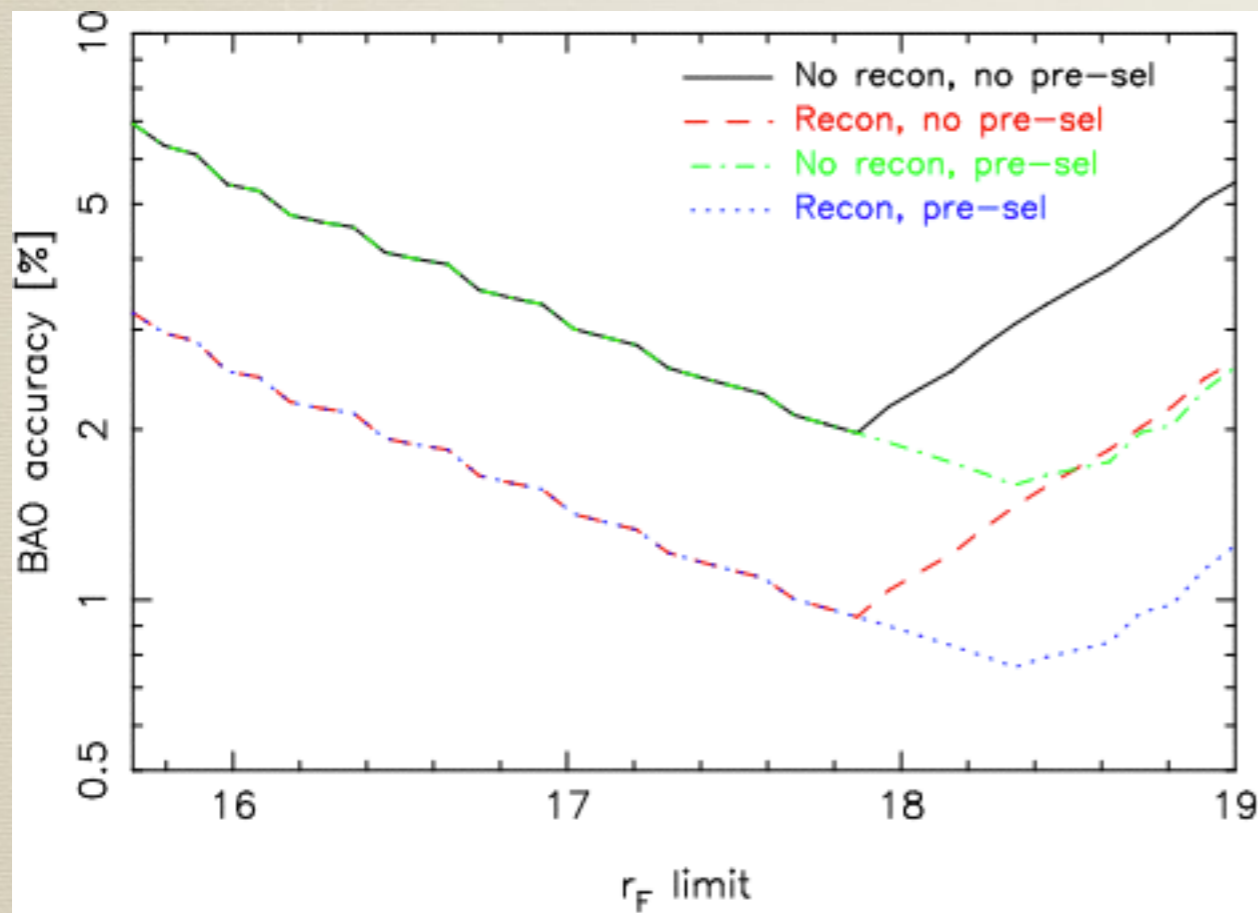
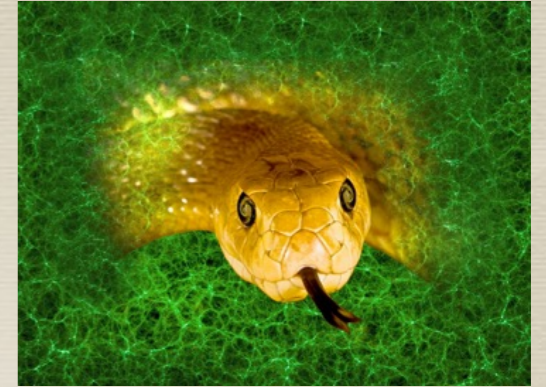


Target selection





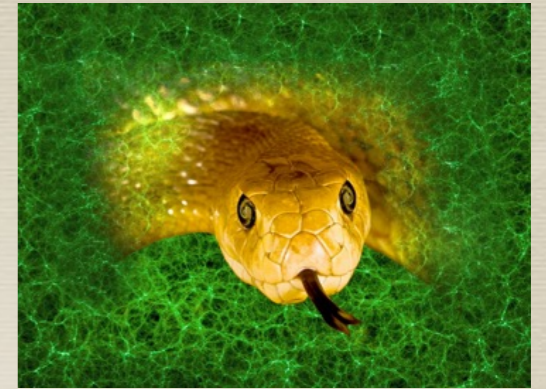
Cosmology



Credit: Chris Blake



Galaxies



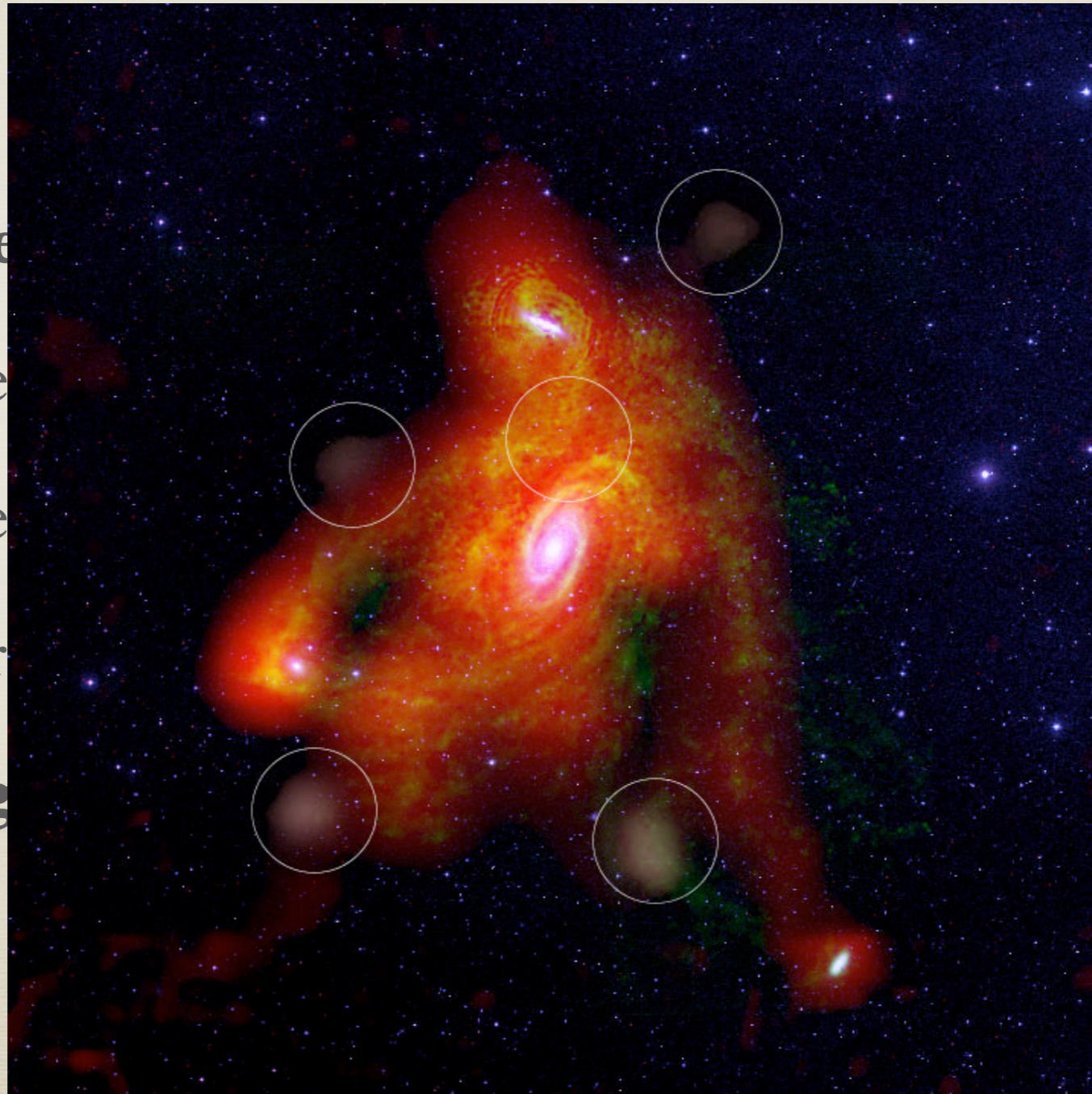
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 Star

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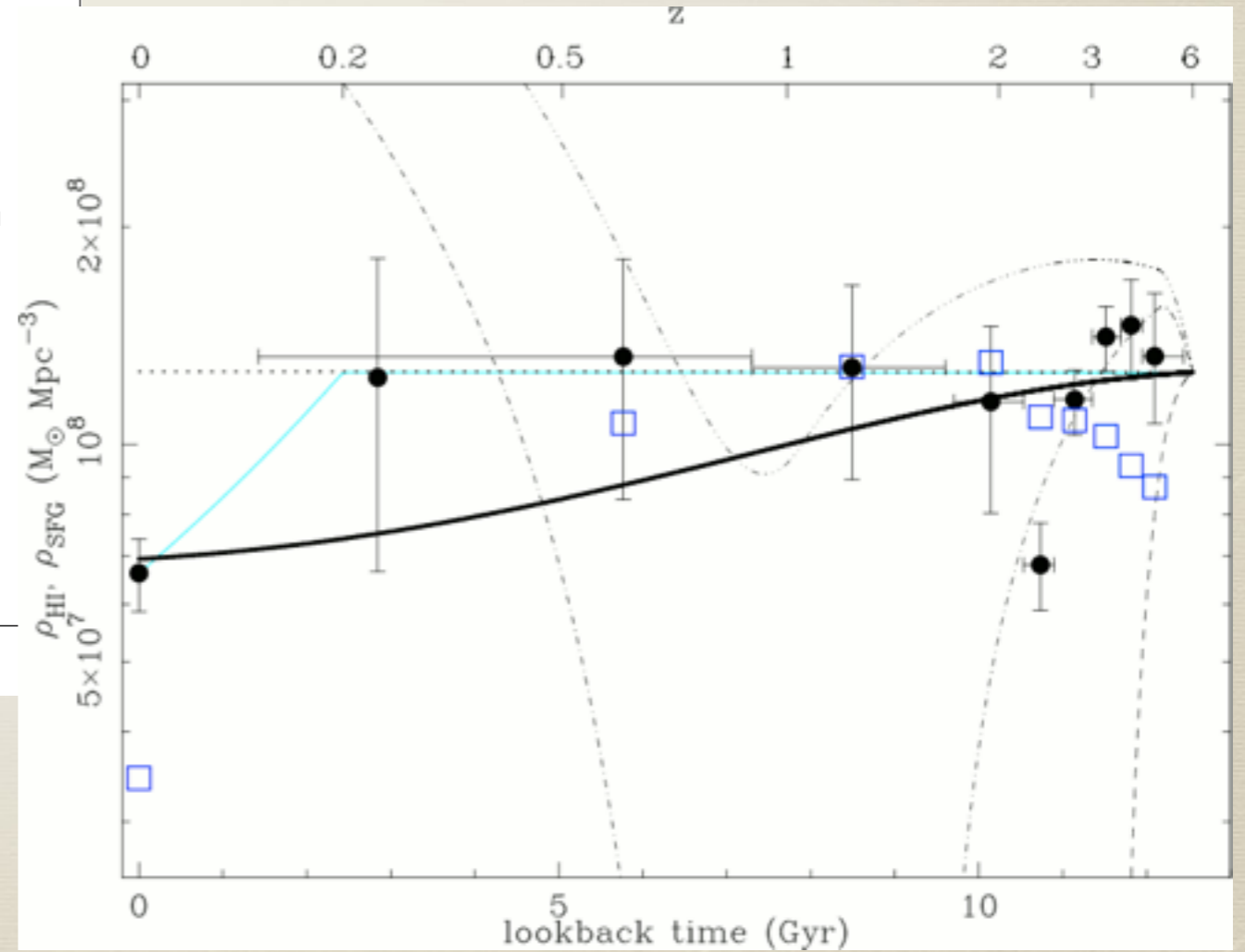
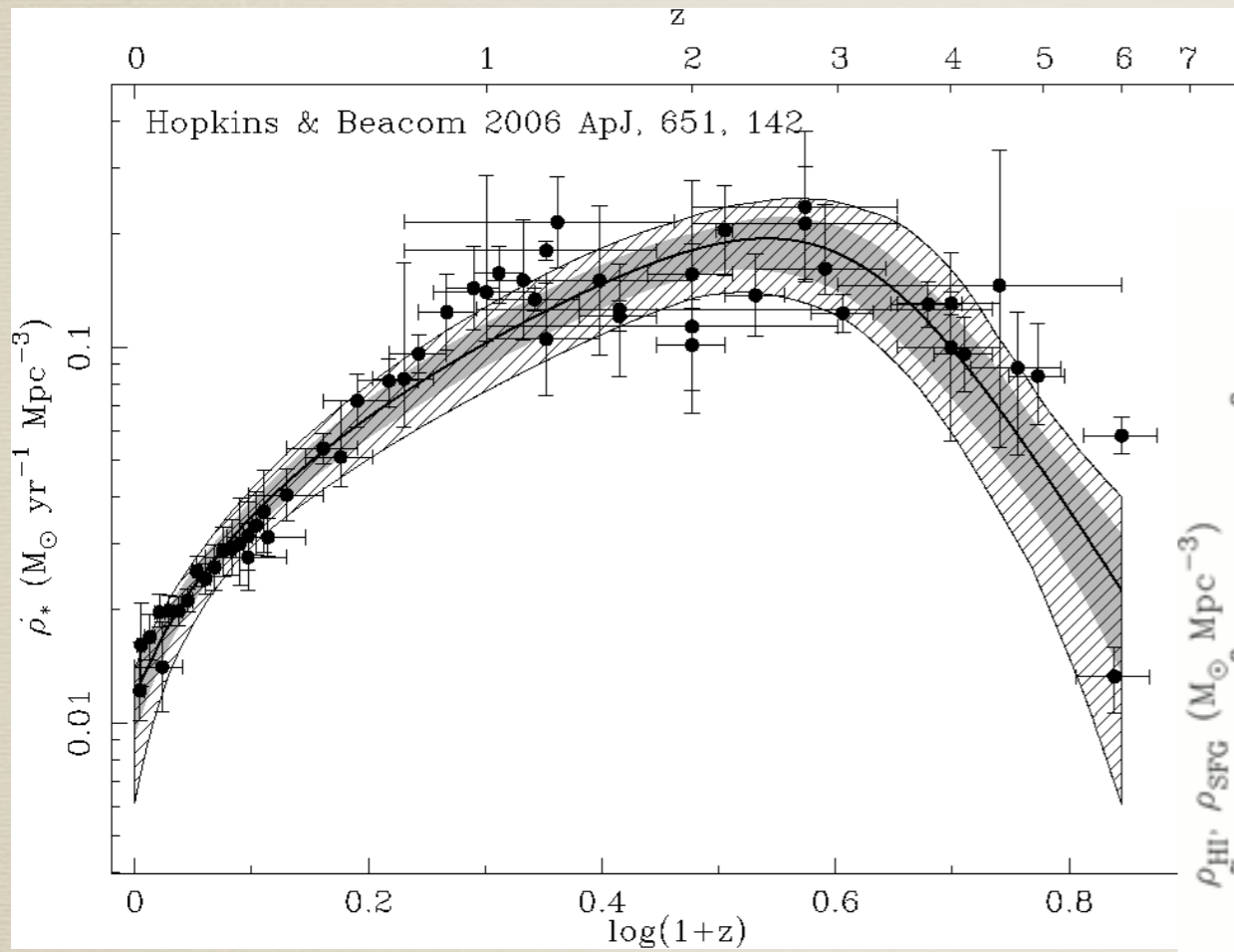
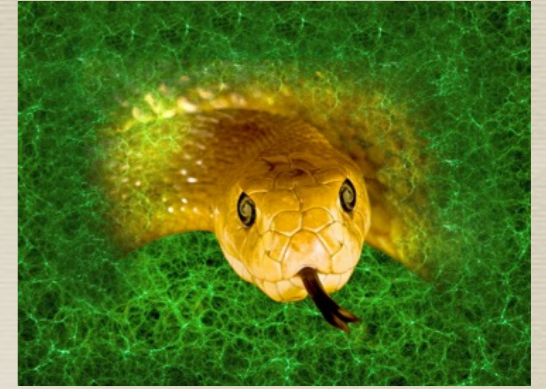
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Katie Chynoweth & NRAO



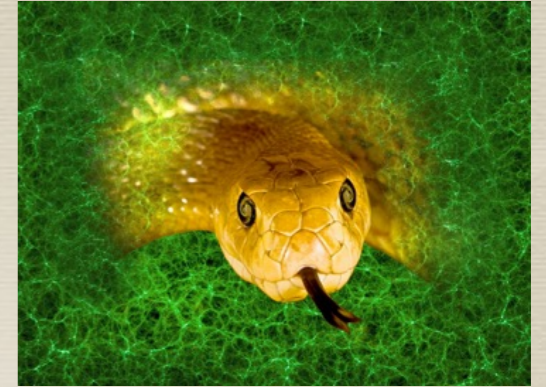
Stars and Gas







Hopkins, McClure-Griffiths & Gaensler, 2008, ApJ, 682, L13



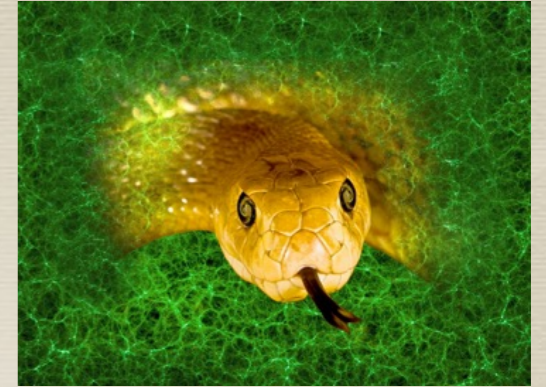
Galaxies







-  Starting to converge on optimum survey selection, currently the focus of a working group being led by Elisabete da Cunha at Swinburne.
-  Survey to $r < 18$ (c.f. SDSS at $r < 17.7$) with colour selection to identify appropriate mass and redshift ranges for the H_0 and growth of structure surveys.
-  Extended to roughly $r < 19$ for low- z galaxies to probe low mass regime.
-  Still being finalised, but seems possible to minimise overall survey time requirement, aiming for a 5 year survey plan, encompassing both cosmology and galaxy science



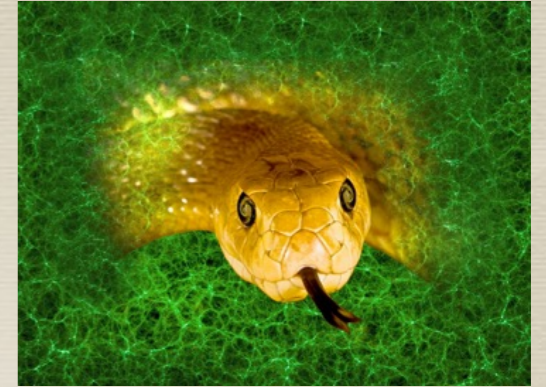
TAIPAN







-  Transforming Astronomical Imaging-surveys through Polychromatic Analysis of Nebulae
-  Survey with the UK Schmidt Telescope at Siding Spring, following in the footsteps of the 6dF Galaxy Survey (Jones et al., 2004, 2009)
-  All southern sky multi-object spectroscopic survey, ~5000000 galaxies
-  30 authors on the original expression of interest to the AAO. The Taipan galaxy survey team now numbers more than 50, and there is an entirely new team, the Funnelweb team as well.



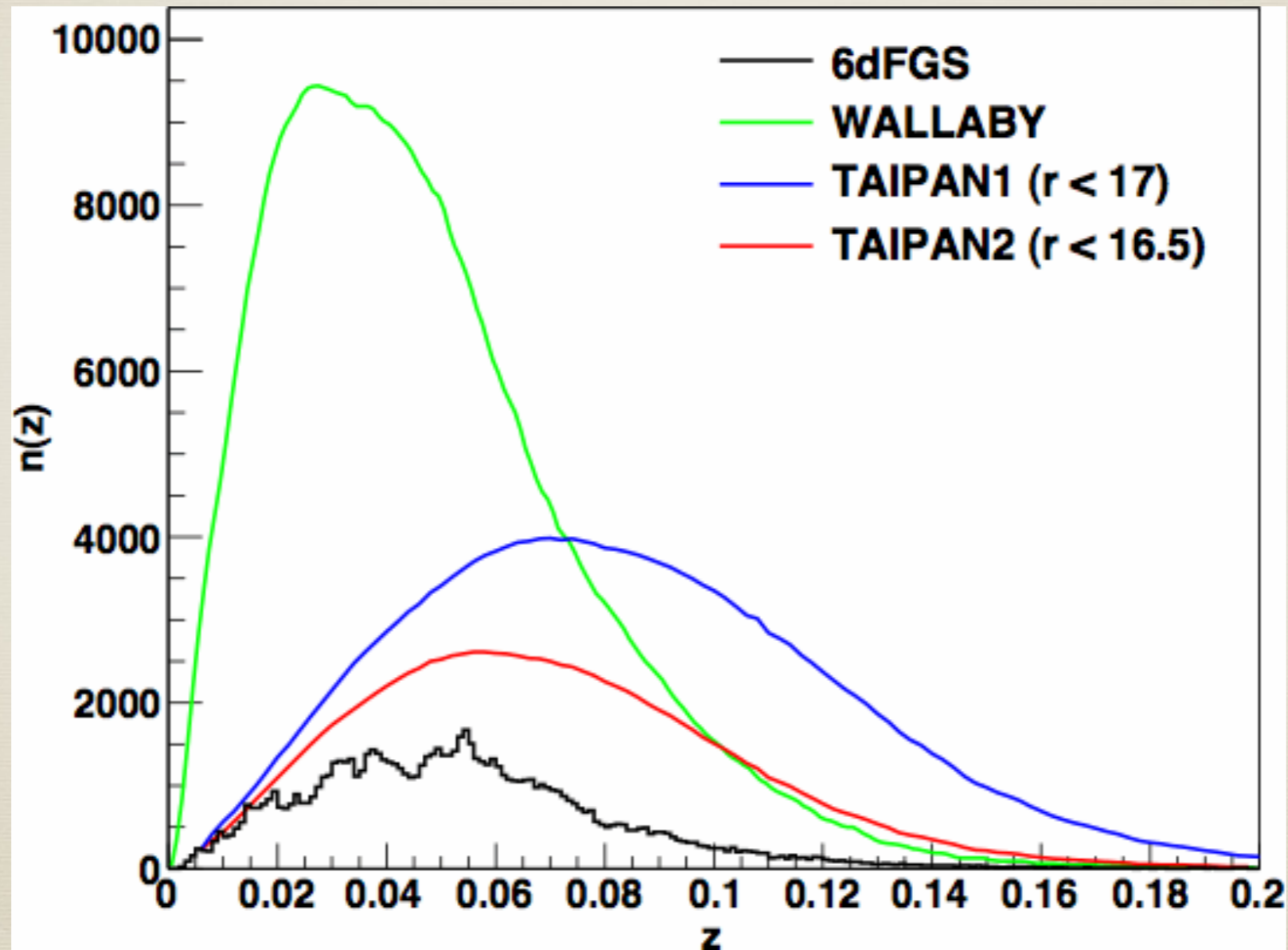
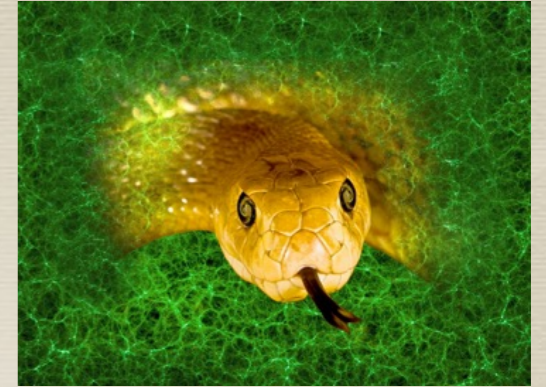
TAIPAN



-  TAIPAN: The galaxy survey, the spectrograph, the whole instrument, the project, plus potential confusion with Funnelweb.
-  The galaxy survey: “**The Taipan survey**” or “**The Taipan galaxy survey**”.
-  The stellar survey: “**The Funnelweb survey**”.
-  The instrument: “The UKST starbugs positioner” or “MANIFEST prototype”, plus “the TAIPAN spectrograph”. Refer to collectively as “**The TAIPAN facility**”.



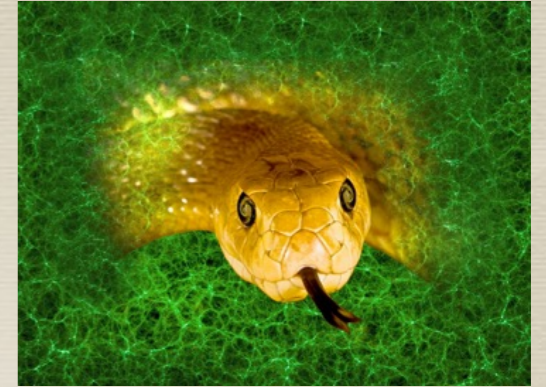
Galaxies






Beutler et al., 2011, MNRAS, 416, 3017



Funnelweb science



The Funnelweb project will carry out a spectroscopic survey of ~3 million of the brightest stars in the whole southern sky and deliver:

-  Identification from an unbiased survey of all the southern stars younger than 100 Myr and suitable for direct planet imaging from 2017 onwards;
-  Identification and characterisation of the input catalogue stars for the southern hemisphere half of the Transiting Exoplanet Survey Satellite (TESS) NASA's next-generation planet search mission; and
-  Identification of stars belonging to the thick disk, including all core-helium-burning “red clump” stars out to a distance of 4 kpc from the Sun, and measurements of their distances, space motions and chemical abundances revealing the processes that built the “thick disk” component of our Galaxy early in its history.