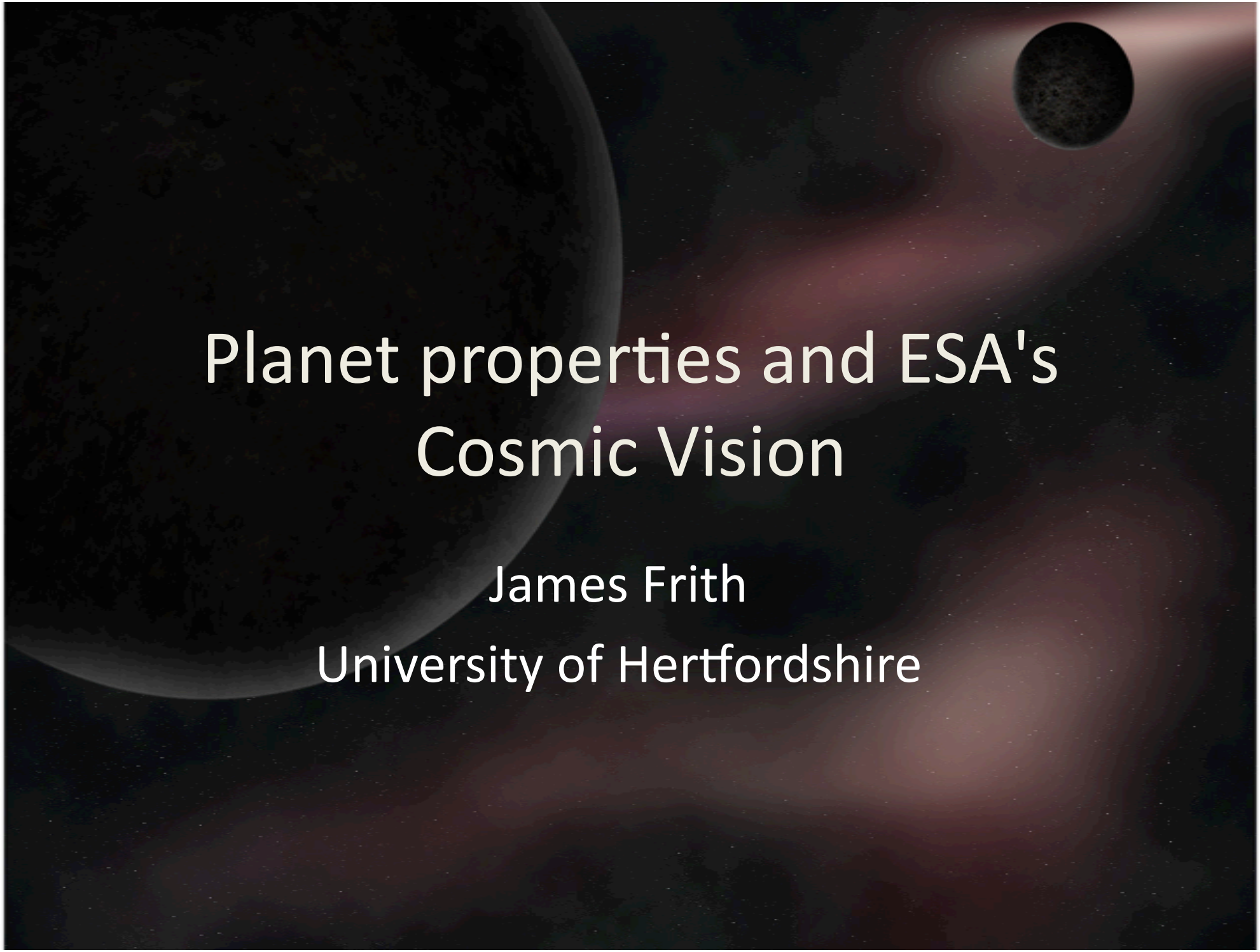


Planet properties and ESA's Cosmic Vision

James Frith

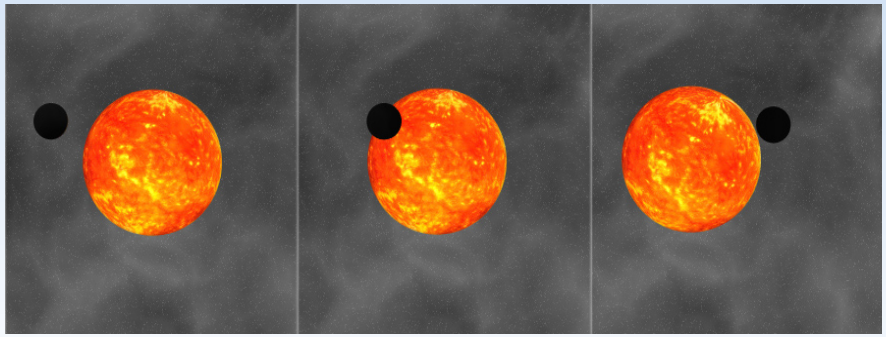
University of Hertfordshire

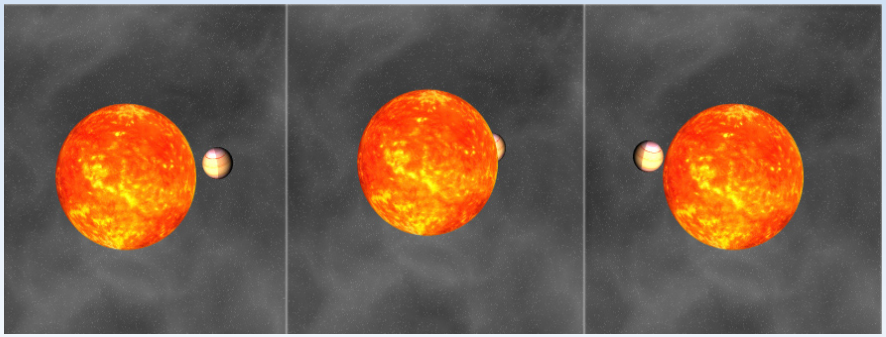
Areas of Research

- Exoplanet Satellite Design Studies at Astrium
  - The Exoplanet Characterization Observatory(EChO)
  - Preliminary Design Studies at Astrium
- Target Simulation for future ground and Space missions
- Ground Based High Resolution Spectroscopy

Exoplanet Characterization Observatory

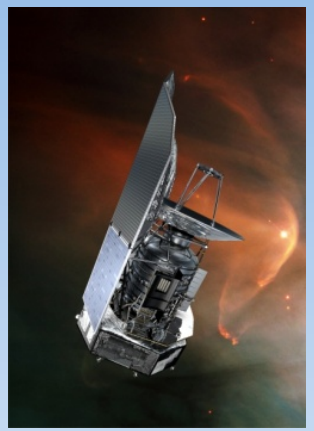
- M-Class Satellite proposal to ESA
- Proposed to do spectroscopy of transiting exoplanets from 0.4 to 16 microns
- Science is focused on characterization of exoplanet atmospheres using the combined light method
- Meetings have been held over the past year with a consortium of European and scientists on requirement design and proposal writing



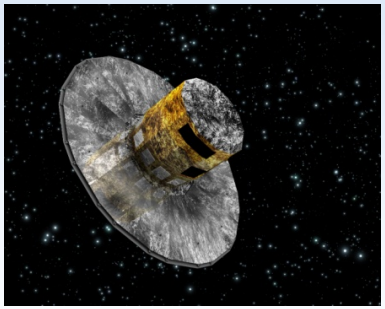


Exoplanet Characterization Mission (EChO)

- Proposal needed input on mass and sub systems design
- Worked with engineers at Astrium to perform trade studies on Echo's preliminary design
- Design points included
  - Sun Shield design
  - Attitude and Orbit Control System
  - Solar Cells
  - Antenna
  - Cryogenics for focal plane



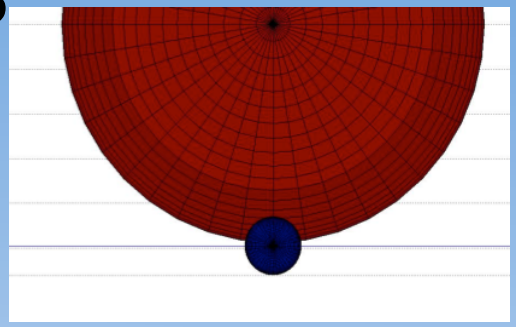
- Results of the trade studies were summarized and communicated to proposal science group and incorporated into proposal to be submitted to ESA right....now



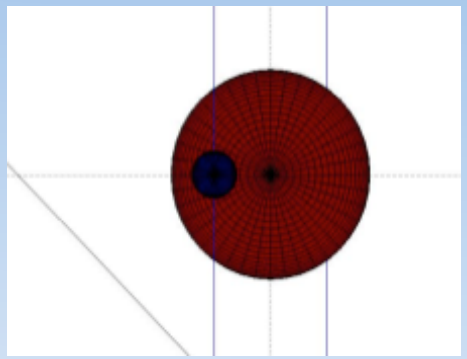
Target Simulations

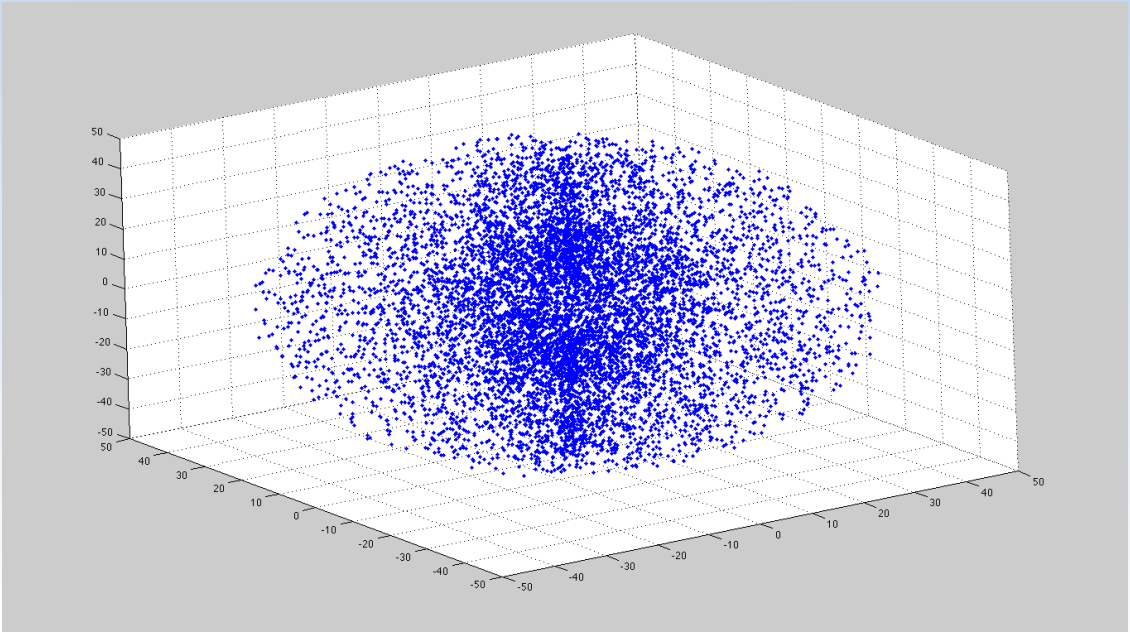
- Missions like Echo rely on ground and space based surveys to find appropriate targets
- How many targets can be expected to be found before missions like Echo are built?

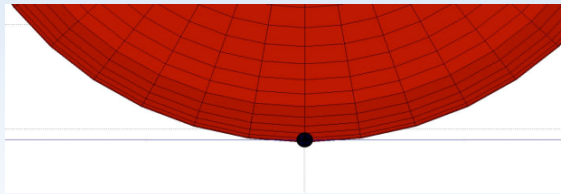
Target Simulations



- Selected local stellar population used
- Planet population added with characteristics (mass, orbital distance, radius, etc) based on current planet catalogue
- Resulting statistics give an idea of the number of potential planetary targets will become available over the next 10 years for future ground and spaced based characterization missions







Ground Based High Resolution Spectroscopy

- Infrared spectroscopy from ground based telescopes (Subaru, Keck)
- Several stellar spectra of a known planetary host star are combined to produce a model spectra
- Spectra of the planet varies as a function of its orbital phase
- Can detect and potential extract the spectra of the planet from the spectra of the star
- Currently analyzing data produced in previous observing runs and possibility of a future observing run next year.

Future Work

- If Echo proposal is successful
  - Pre-Phase A studies at Astrium
- Publish target simulation results
- Publish high resolution spectroscopy data