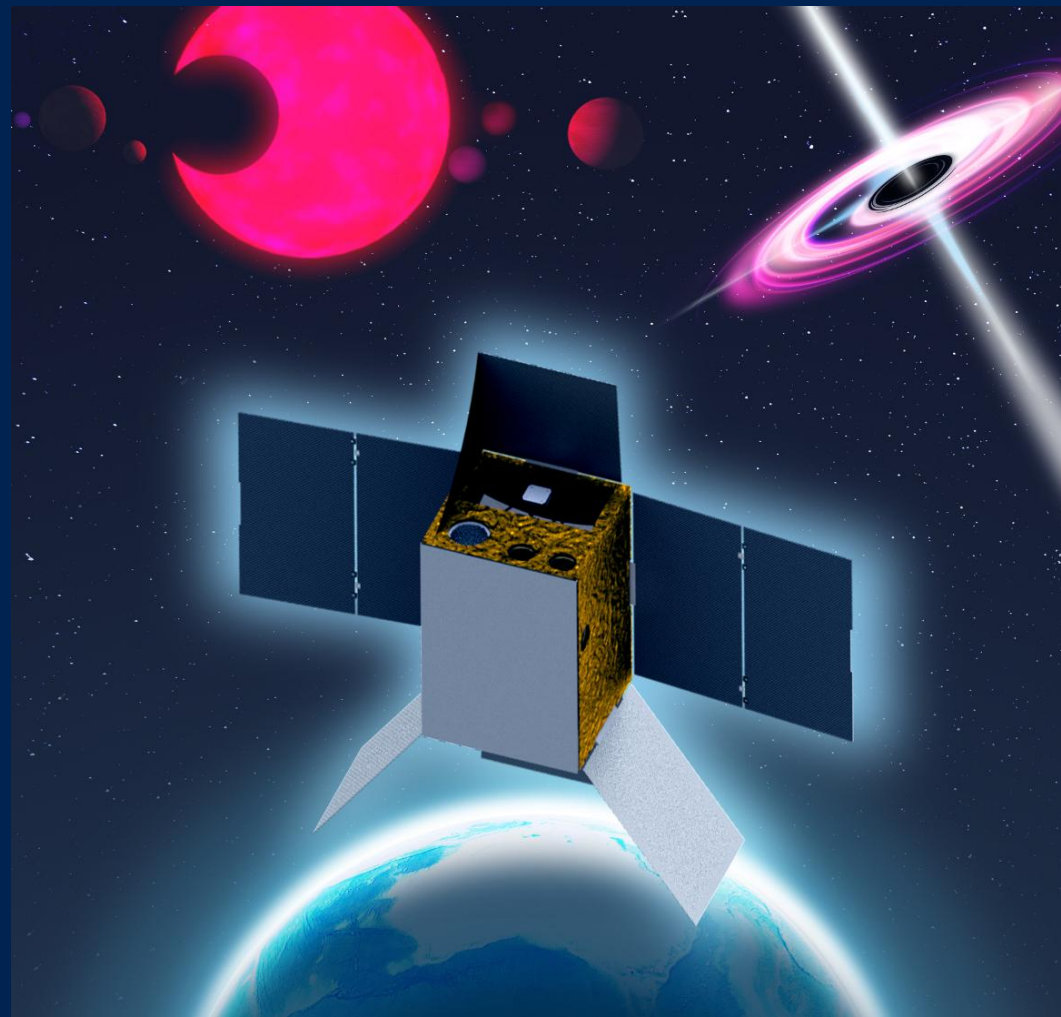


The SkyHopper CubeSat



Michele Trenti

The University of Melbourne



Budapest - 13/09/2018

SkyHopper: A telescope in a shoebox

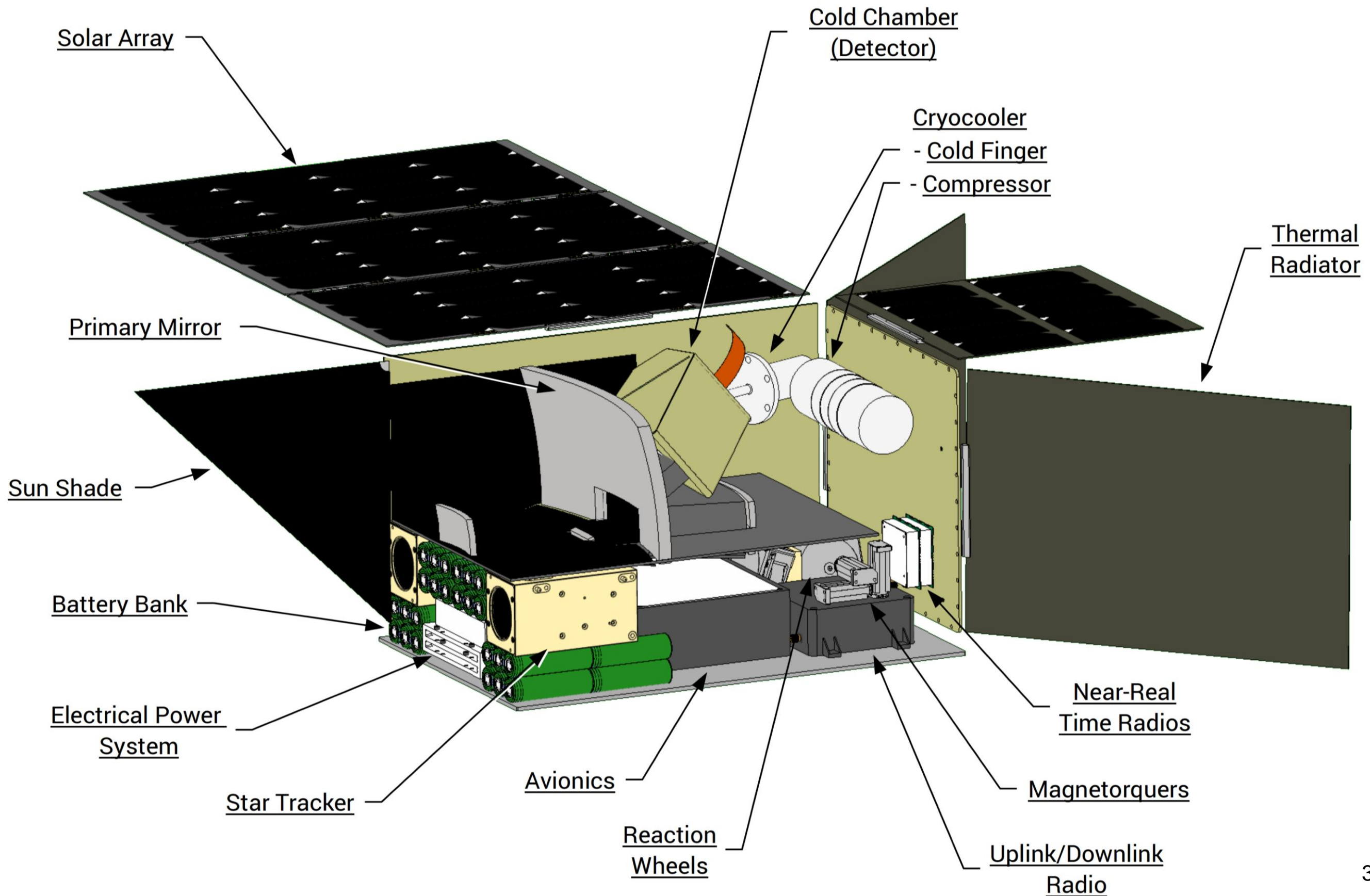
- **Near-infrared “15cm” space telescope [12U CubeSat]**

- 4 channel IR imager [0.8-1.7 μm],
cooled detector [145K]
- Sensitivity: $m_{\text{AB}}=19.5$ [S/N=5, 600s]
- Agile spacecraft [3deg/s slew]
- High pointing stability [$\sim 4''$]
- 24/7 comms [GlobalStar/Audacy]
- Polar Sun-Synchronous 550 km orbit



- **Mission concept under active development**

SkyHopper: A telescope in a shoebox



Science case: Frontier problems

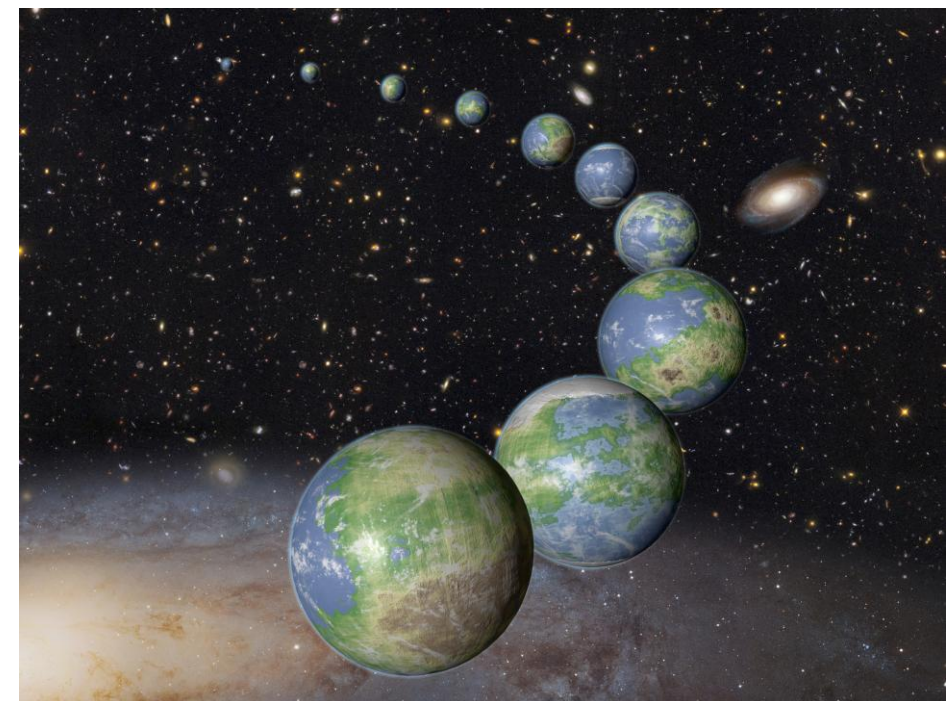
- **Where are we coming from?**

- First stars and galaxies
[**Gamma Ray Bursts**
+Cosmic Infrared Background]



- **Are we alone?**

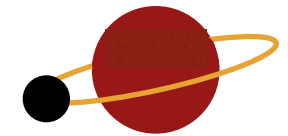
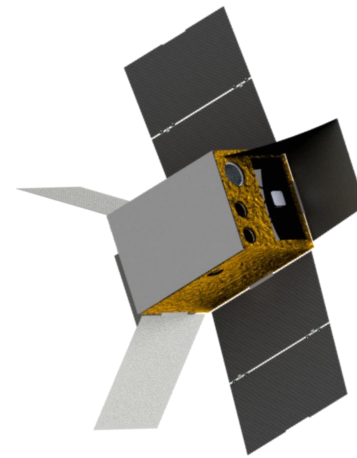
- Search for other Earths
[exoplanet transits]



Artist's concepts, NASA

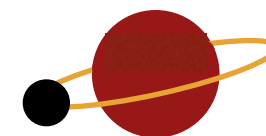
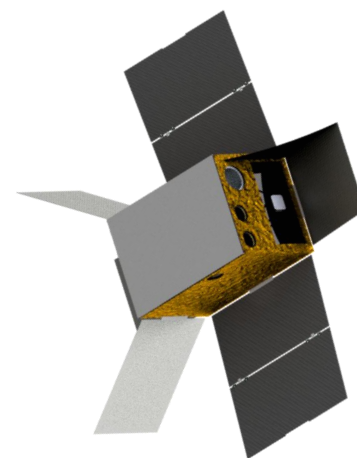
Real-time transient follow-up

- Hop to observe Gamma Ray Bursts in the near infrared
 - Identify stellar explosions 13 billion light years away (within the first galaxies)



Real-time transient follow-up

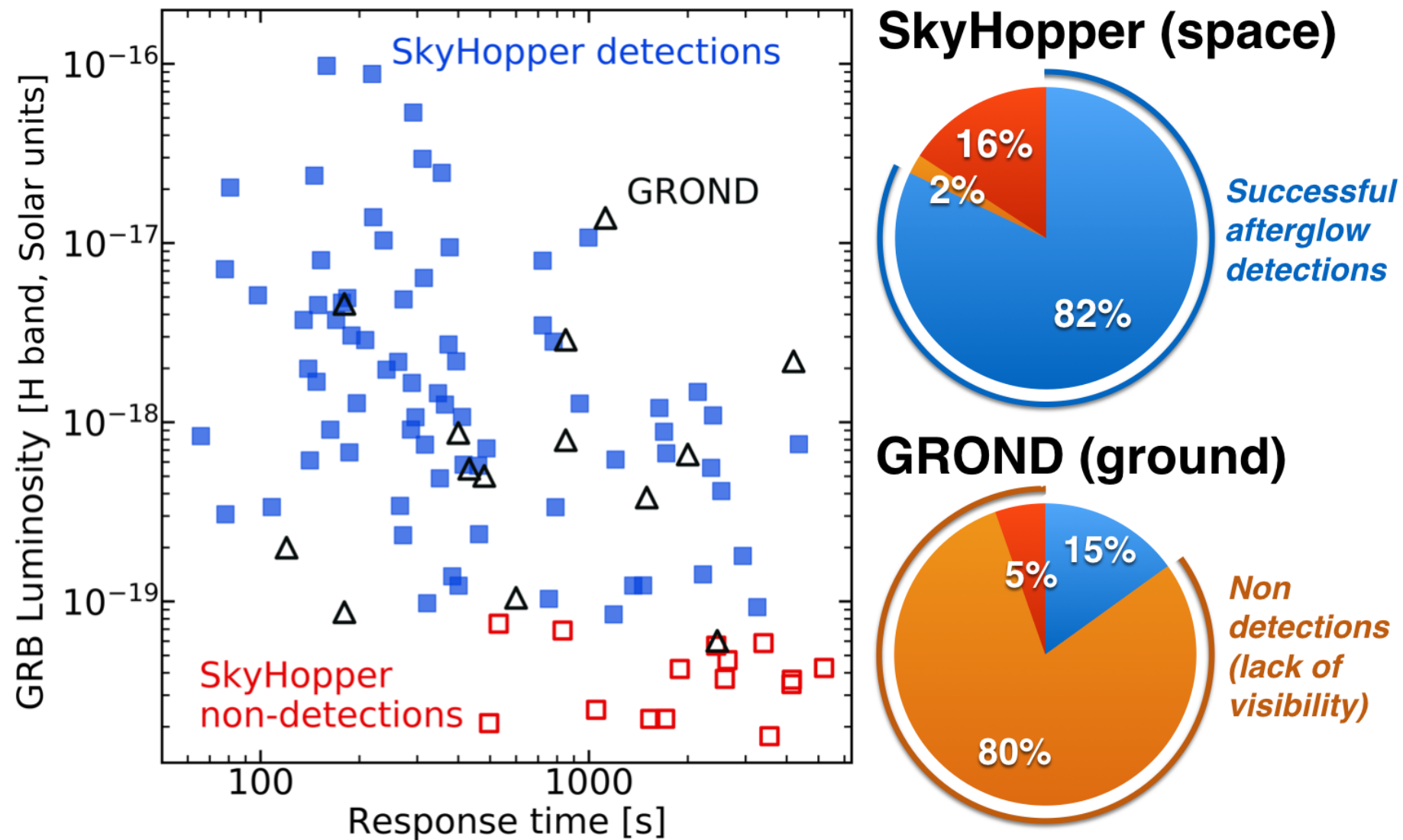
- Hop to observe Gamma Ray Bursts in the near infrared
 - Identify stellar explosions 13 billion light years away (within the first galaxies)



Hopping 1000 times faster than Hubble to double GRBs at $z > 5$ (first Gyr)!

High-z Gamma Ray Burst afterglows

Simulated 1yr follow-up of Swift GRB triggers



Expected yield: 4-5 $z > 5$ GRBs/yr + dusty low-z ones

- Network of 3 SkyHoppers aspirational goal

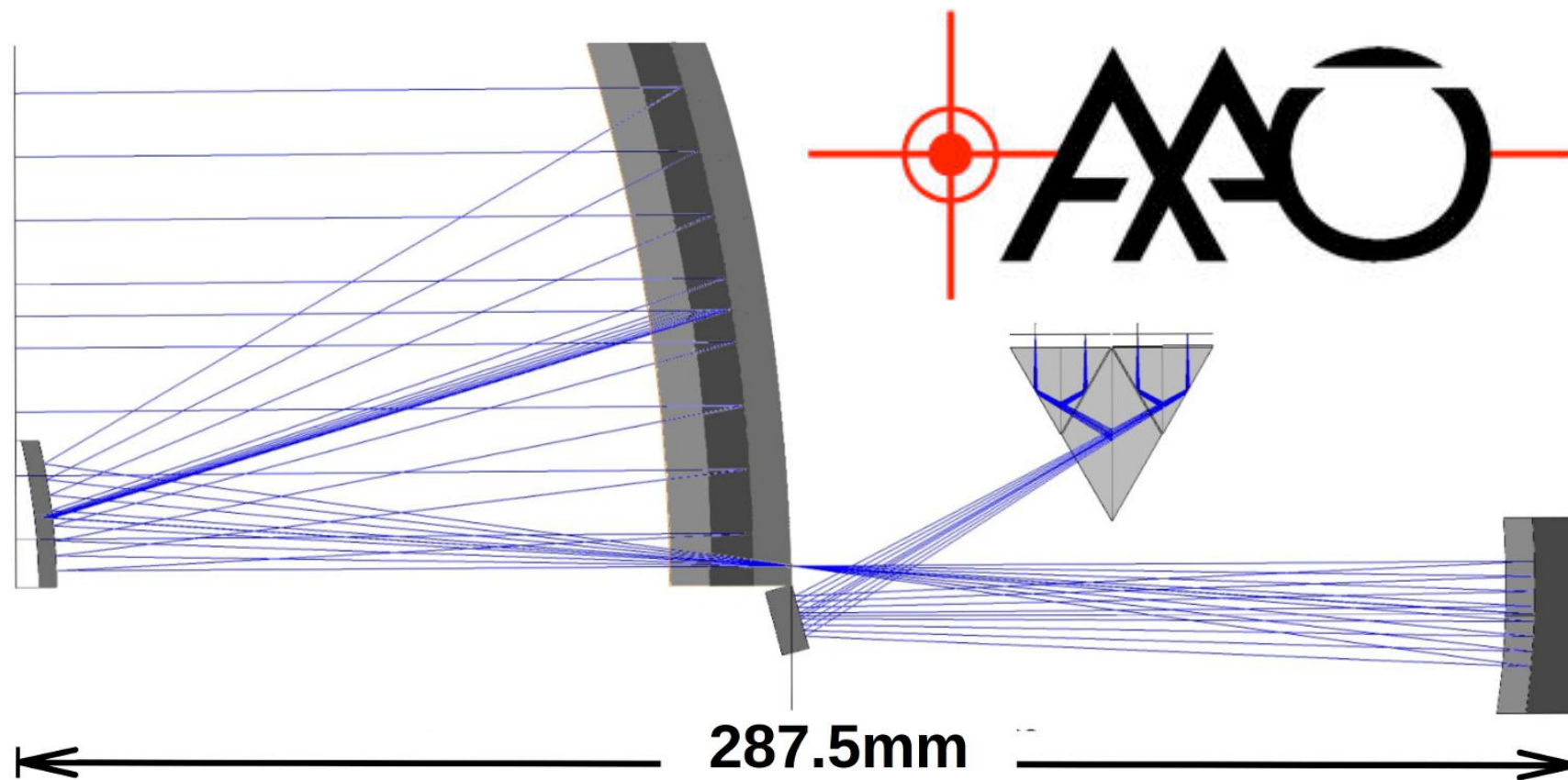
Hardware highlights

- **Spacecraft: Commercial flight-proven (TRL9)**



Hardware highlights

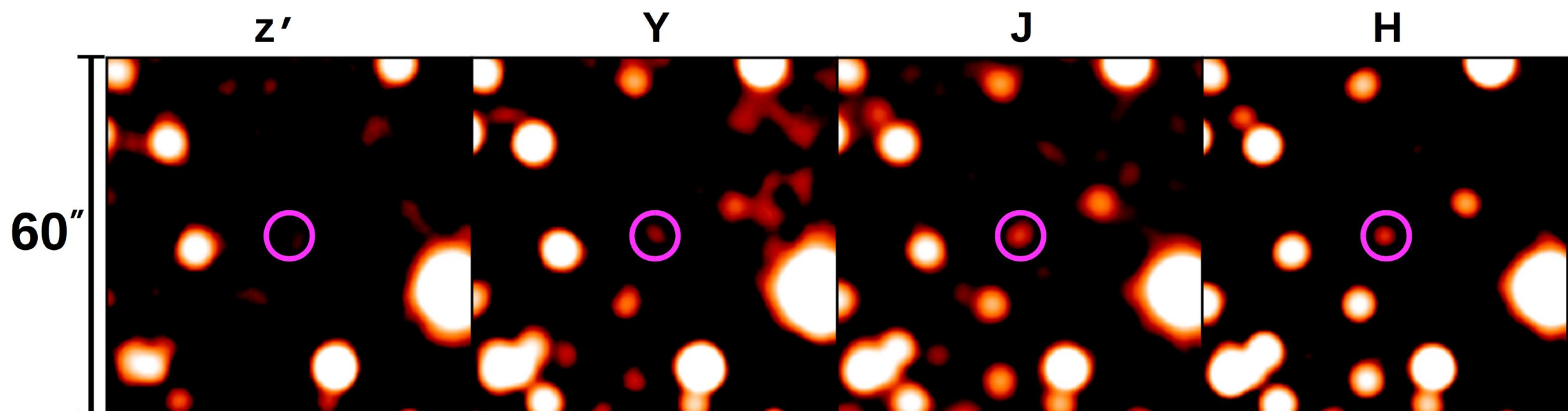
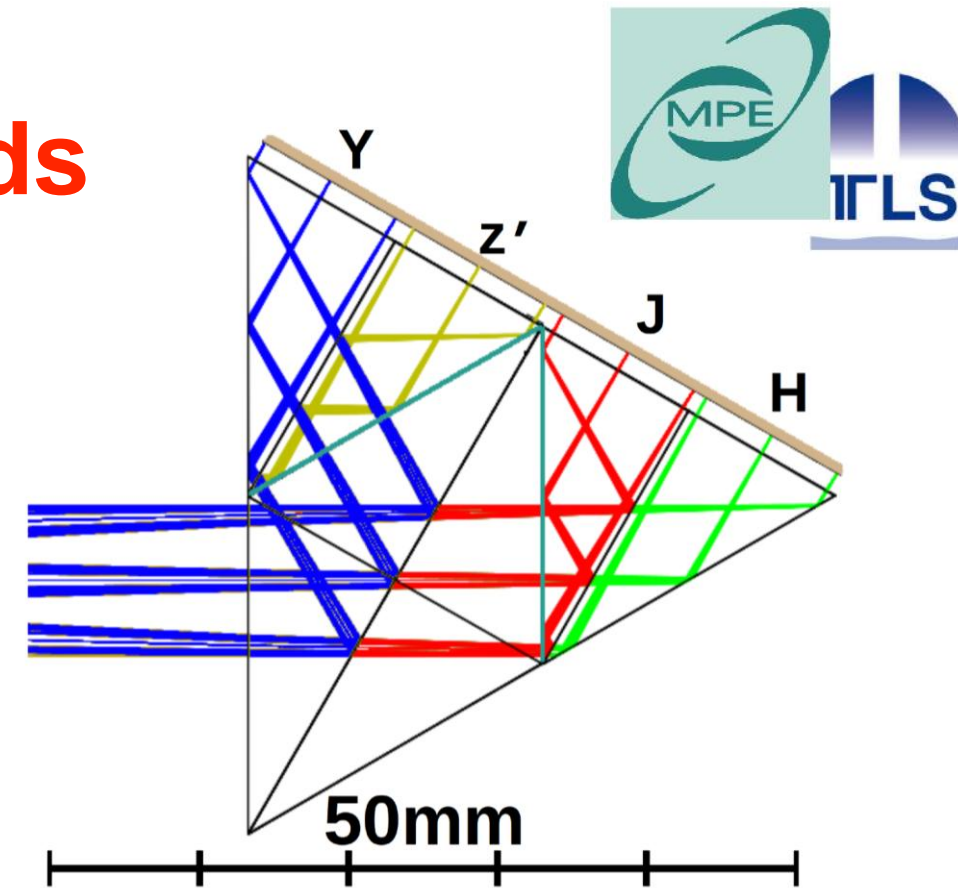
- **Spacecraft: Commercial flight-proven (TRL9)**
- **Telescope: Custom designed & built**
 - 200cm² primary feeding 4-channel dichroic
 - 4M pixel cryogenic IR camera, 0.6x2.4 deg² FoV



The telescope concept

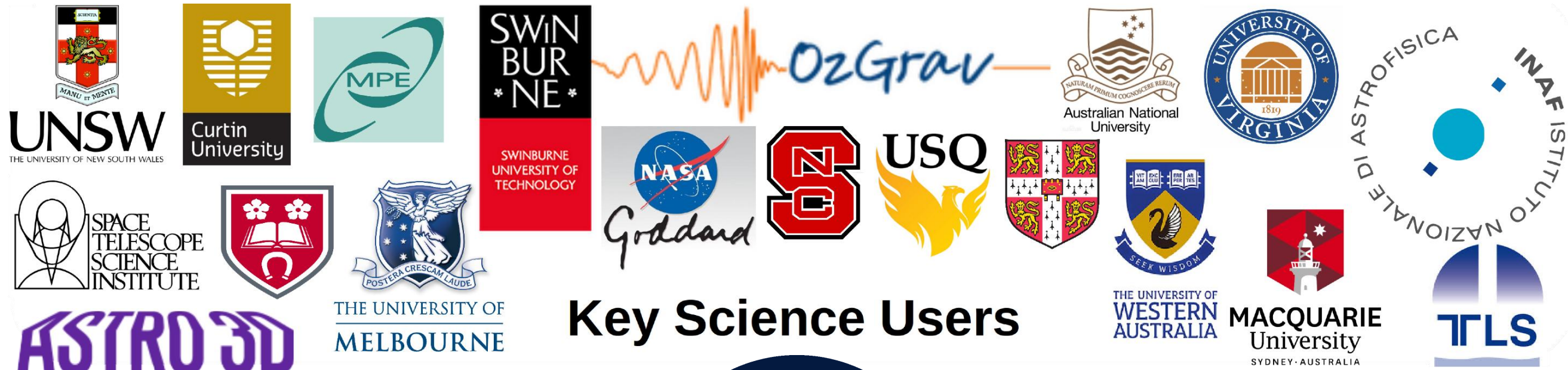
- **Simultaneous imaging in four bands**

- Design optimized for photometric redshift determination of time-variable sources



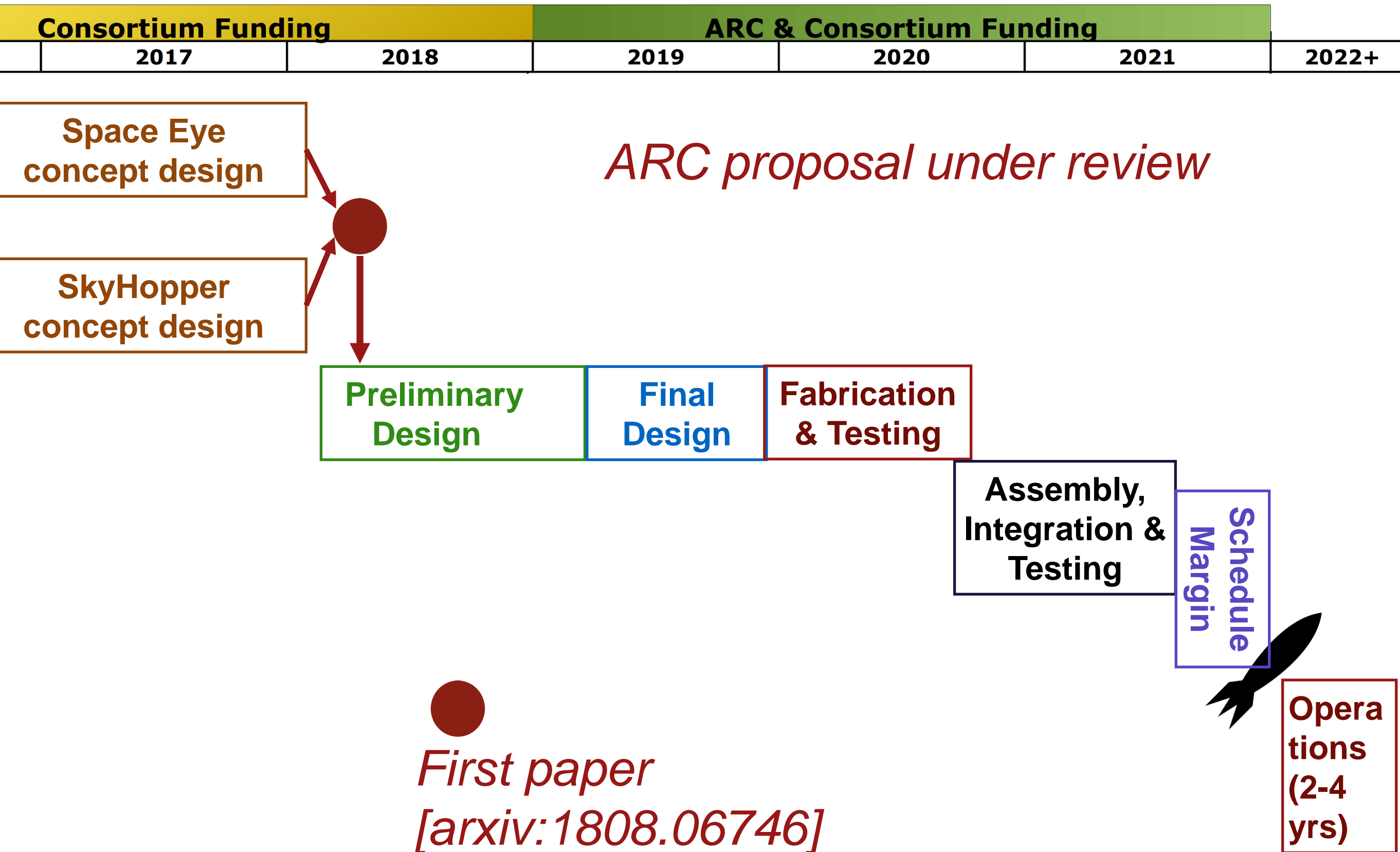
Simulated postage stamps around $z \sim 8$ GRB afterglow

Team: Strong collaboration



- **University of Melbourne-led consortium has broad Australian participation**
- And committed international partners


SkyHopper: Timeline



Info & updates



<http://skyhopper.space>

 THE UNIVERSITY OF MELBOURNE

SkyHopper

A pioneering new cubesat space telescope to observe the most distant explosions in the Universe and to find planets around other stars

SEARCH MENU



@SkyHopperSpace

SkyHopper: GRB focused CubeSat



- SkyHopper is an infrared imaging CubeSat
- Delivers cutting-edge science in high-impact areas:
 - **GRB afterglows**, Exoplanets, (Planetary Science)
- Innovative telescope + cryogenic infrared imager
- Capable of rapid response to target of opportunities
- Launch expected in 2022 (subject to funding)

New collaborators/partners welcome
New collaborators/partners welcome