

# SPICA Science Overview

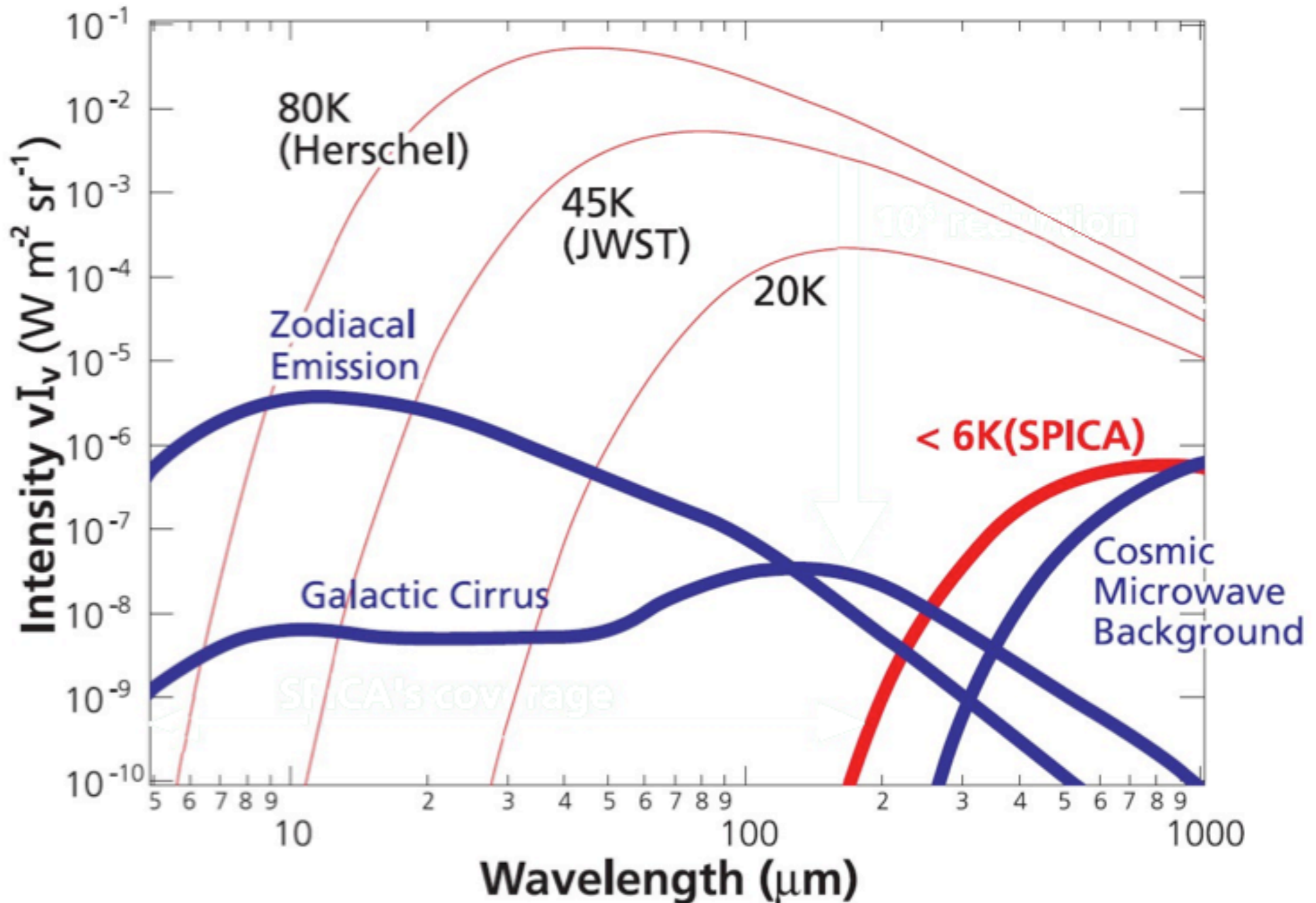
Dave Clements  
Imperial College London

# The SPICA Observatory

- 2.5m space telescope at L2
- Telescope cooled by mechanical coolers
- Lifetime ~5 years
- Launch date ~2029
- E-ELT, LSST, SKA, ALMA will be mature, JWST will be ~finished

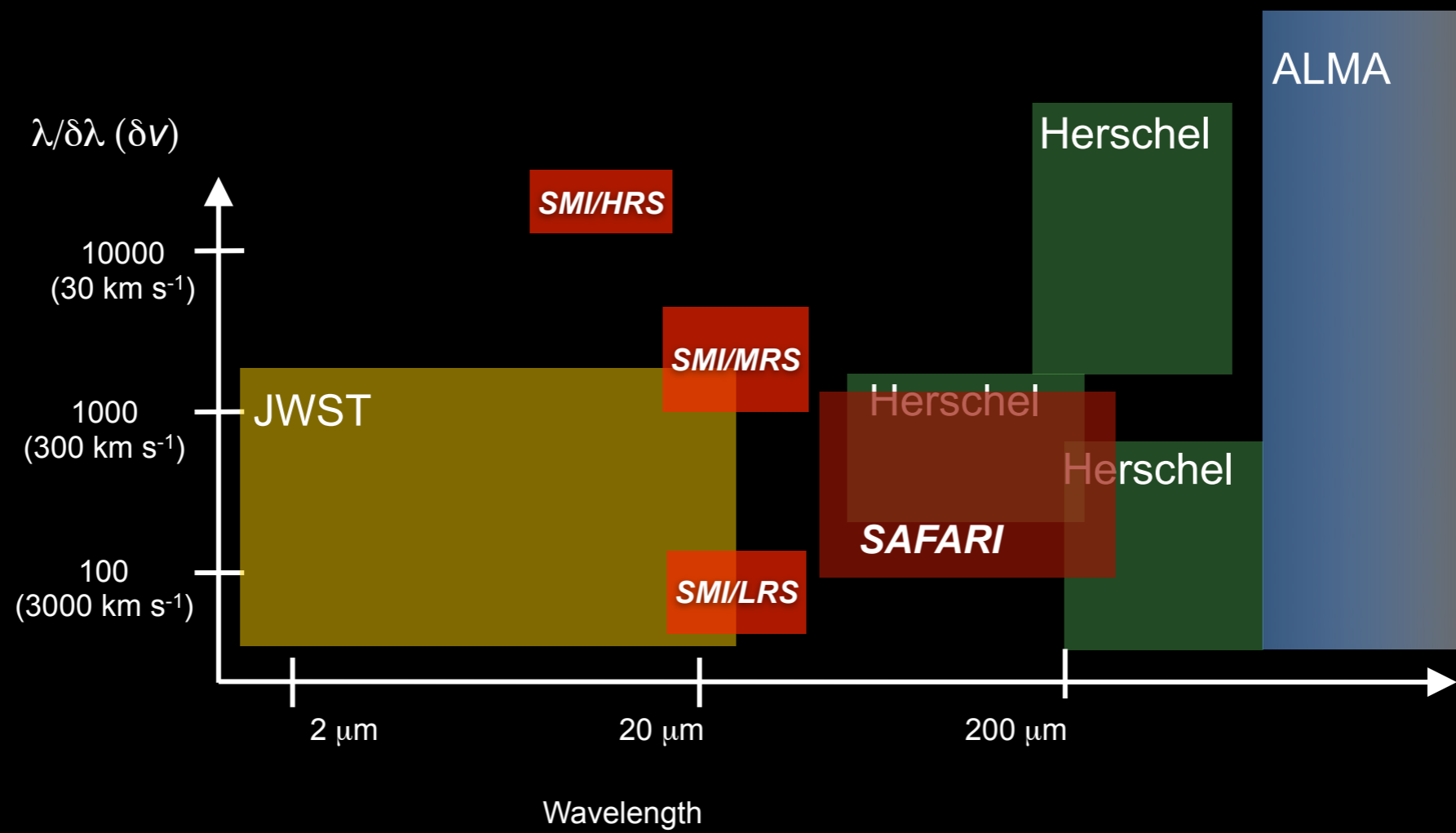
# Backgrounds

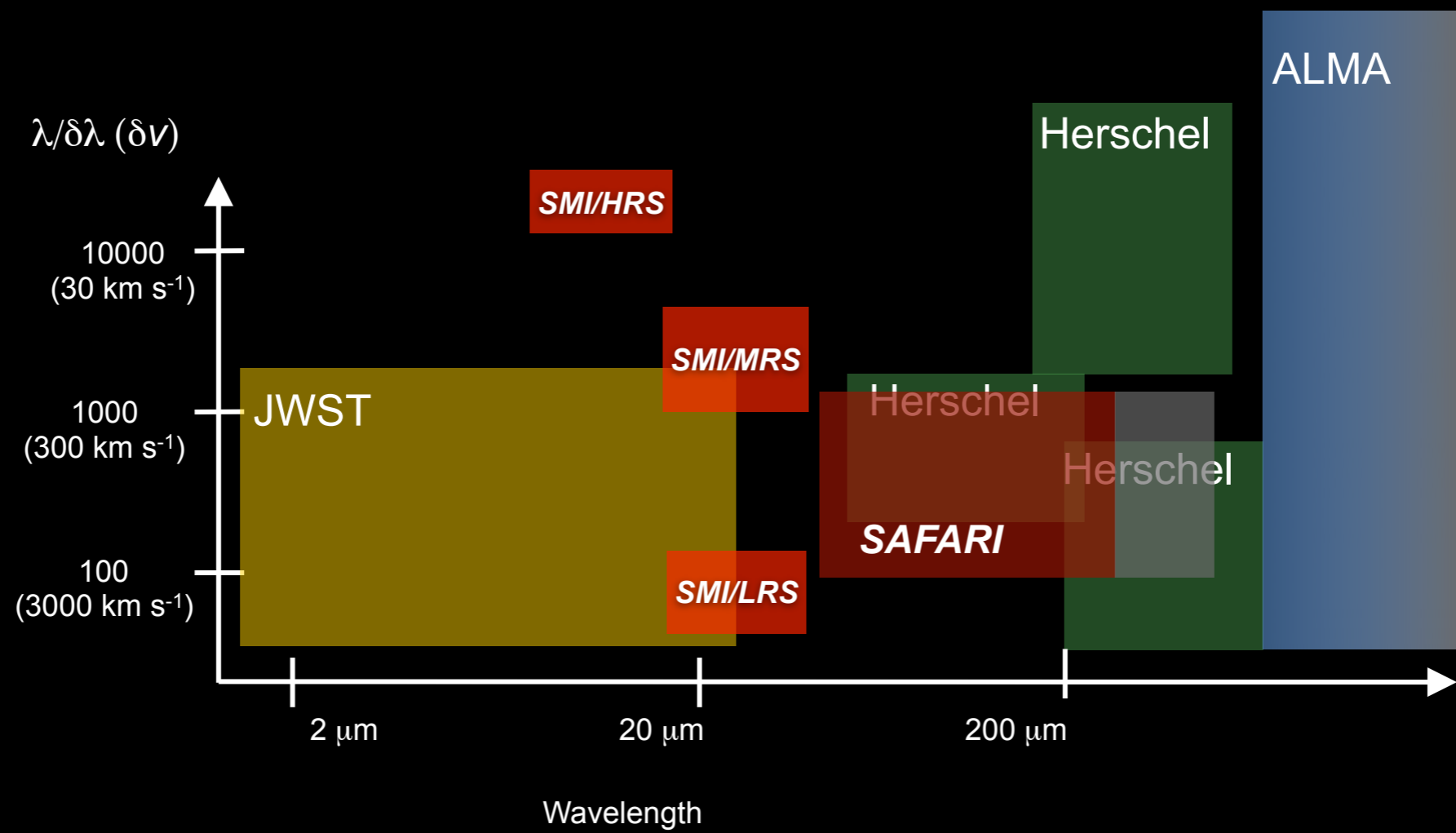
# Backgrounds



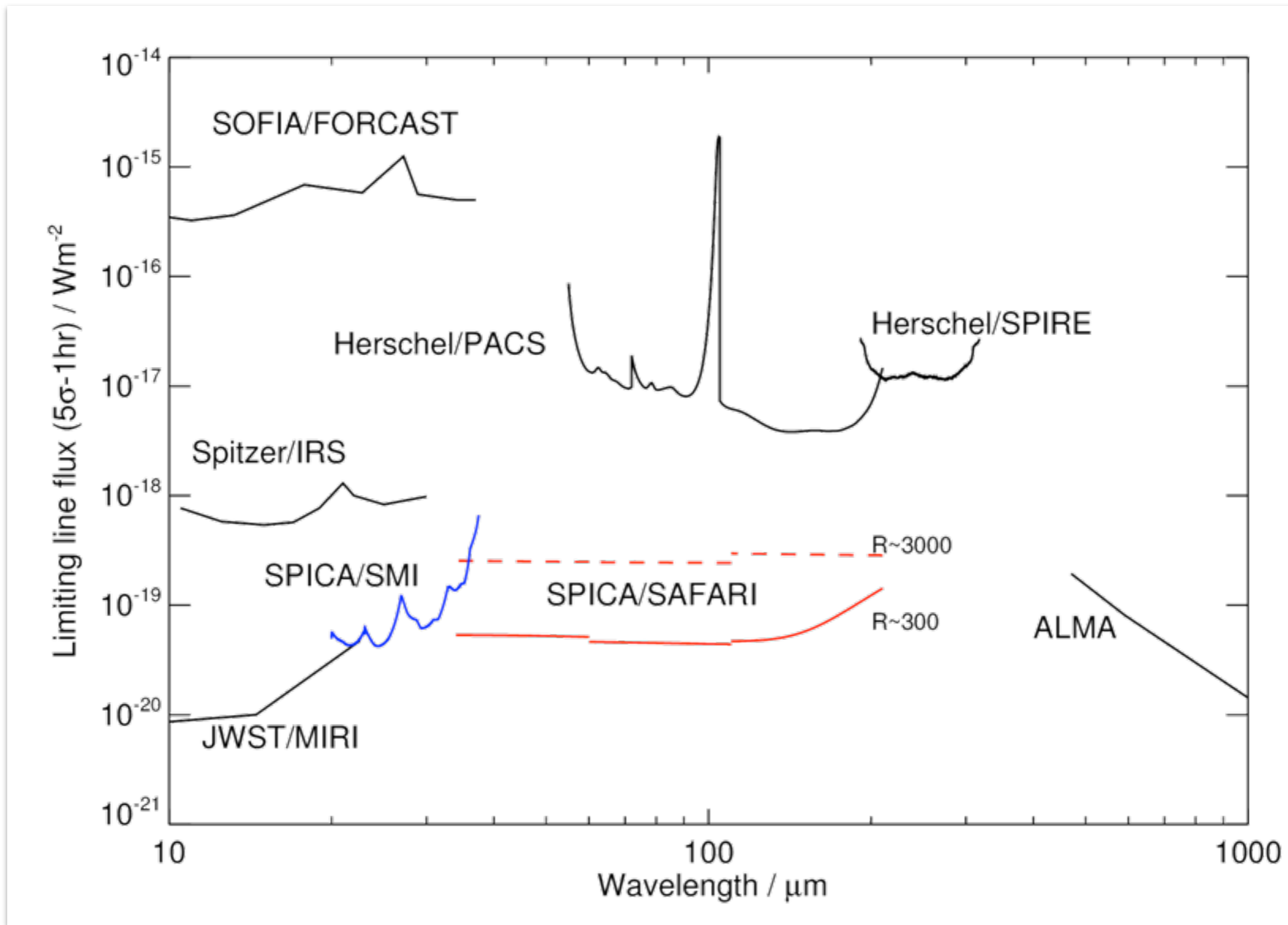
# Instruments

- 2 planned instruments at the moment
- SAFARI far-IR spectrometer
  - 35 to 210 microns
  - R~300 and R~3000 modes
- SMI mid-IR spectrometer
  - 12 - 37 microns
  - R~50 to 26000
  - Slit viewer 35 micron camera





# Sensitivity





# Science Organisation

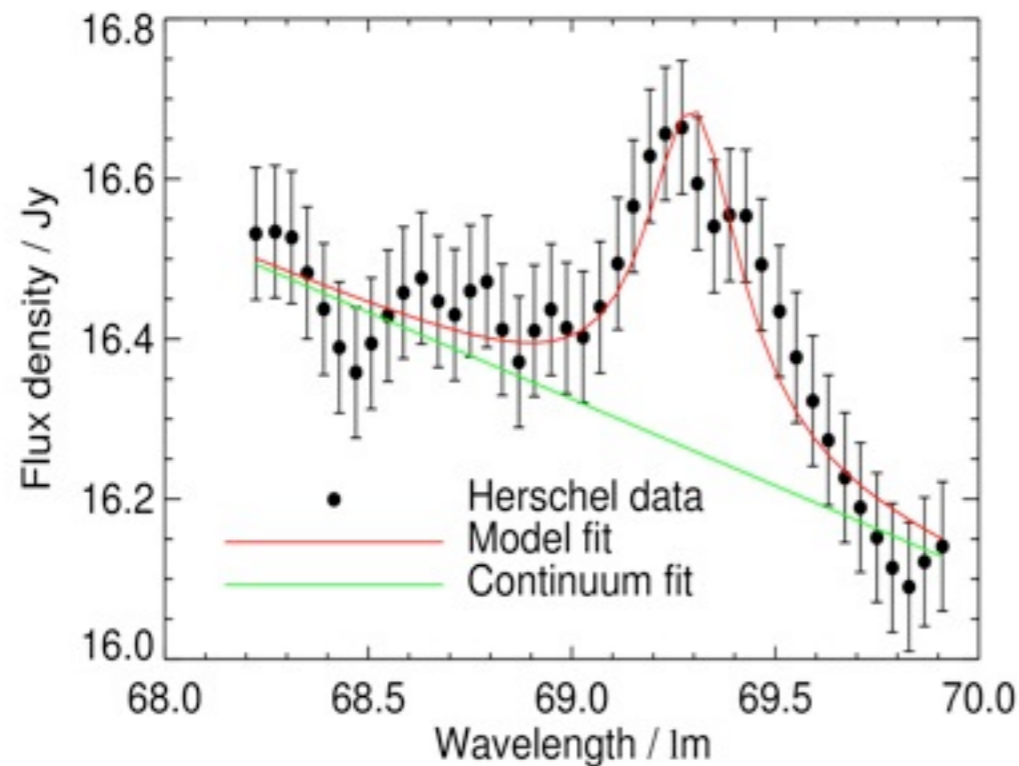
- SPICA science team divided up into 3 areas
  - Galactic science
  - Nearby Galaxy Science
  - Distant Galaxies & Cosmology
- Shapes science talks later in this meeting

# SPICA Science Objectives

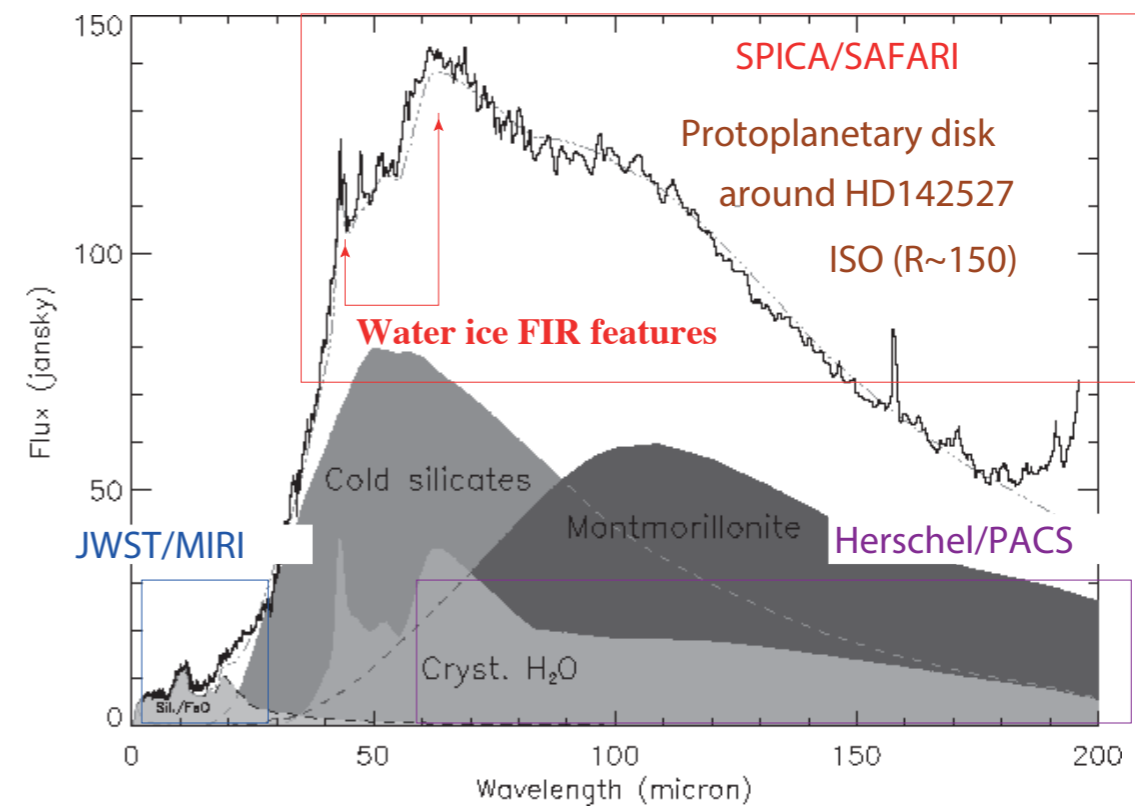
- What processes govern star formation across cosmic time - what starts it, controls it, and stops it?
- What is the origin and composition of the first dust, and how does this relate to present day dust processing?
- What is the thermal and chemical history of the building blocks of planets?
- + much more as well

# Observational Tools

69  $\mu\text{m}$  feature for  $\beta$ -Pic (de Vries et al. 2012)

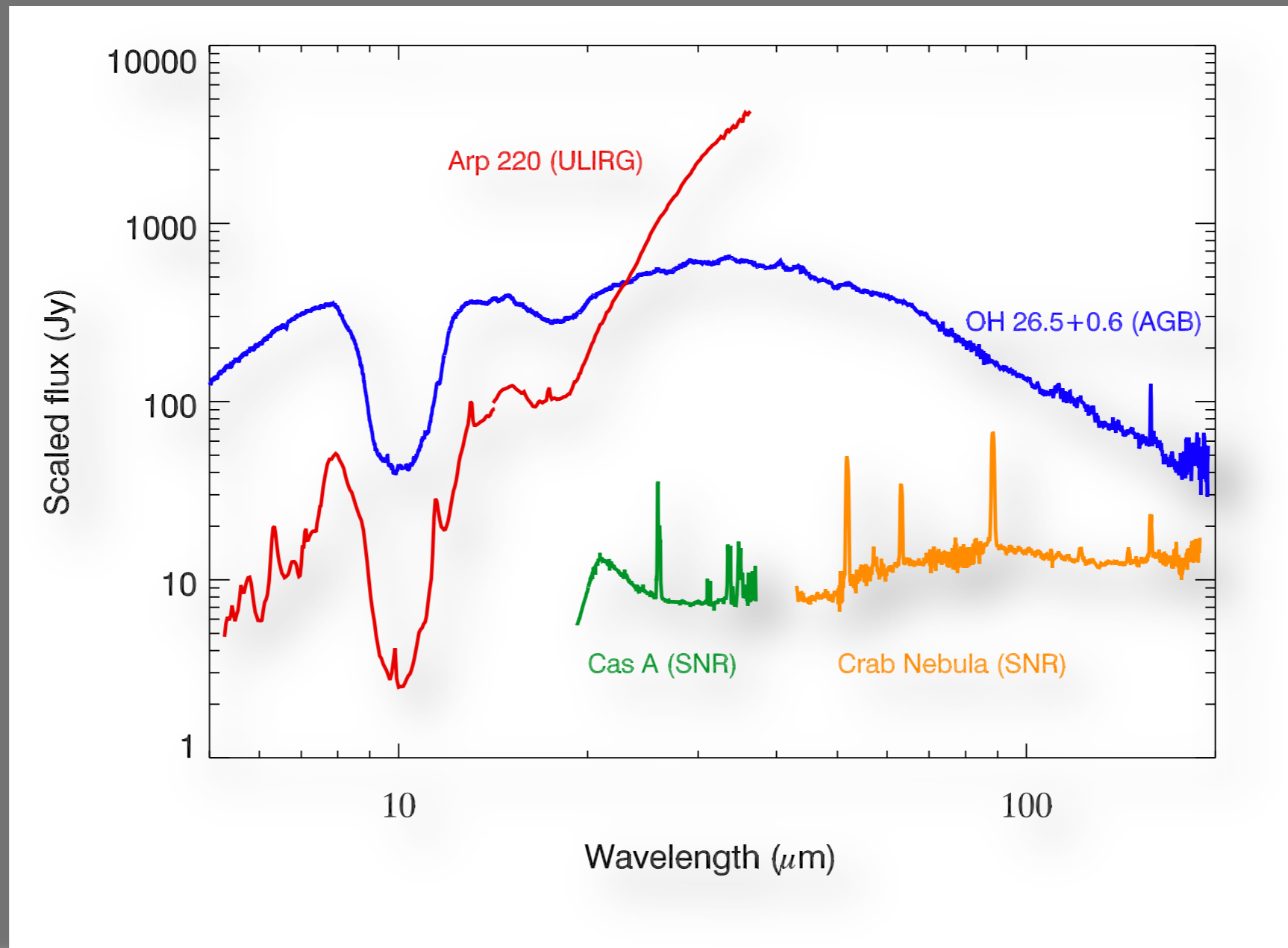


Mineralogy of debris disks



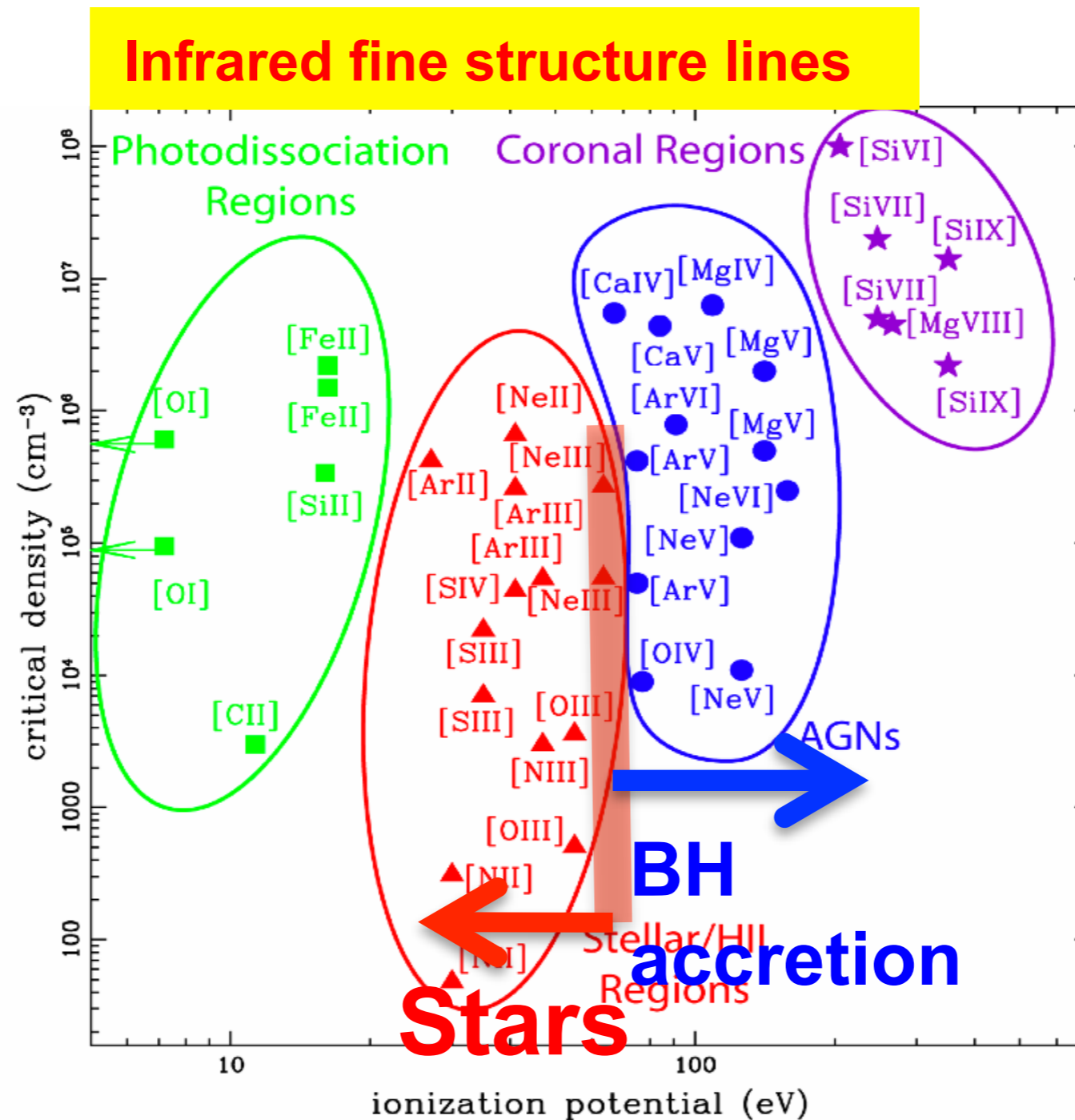
Ice features in protoplanetary disks

# Observational Tools



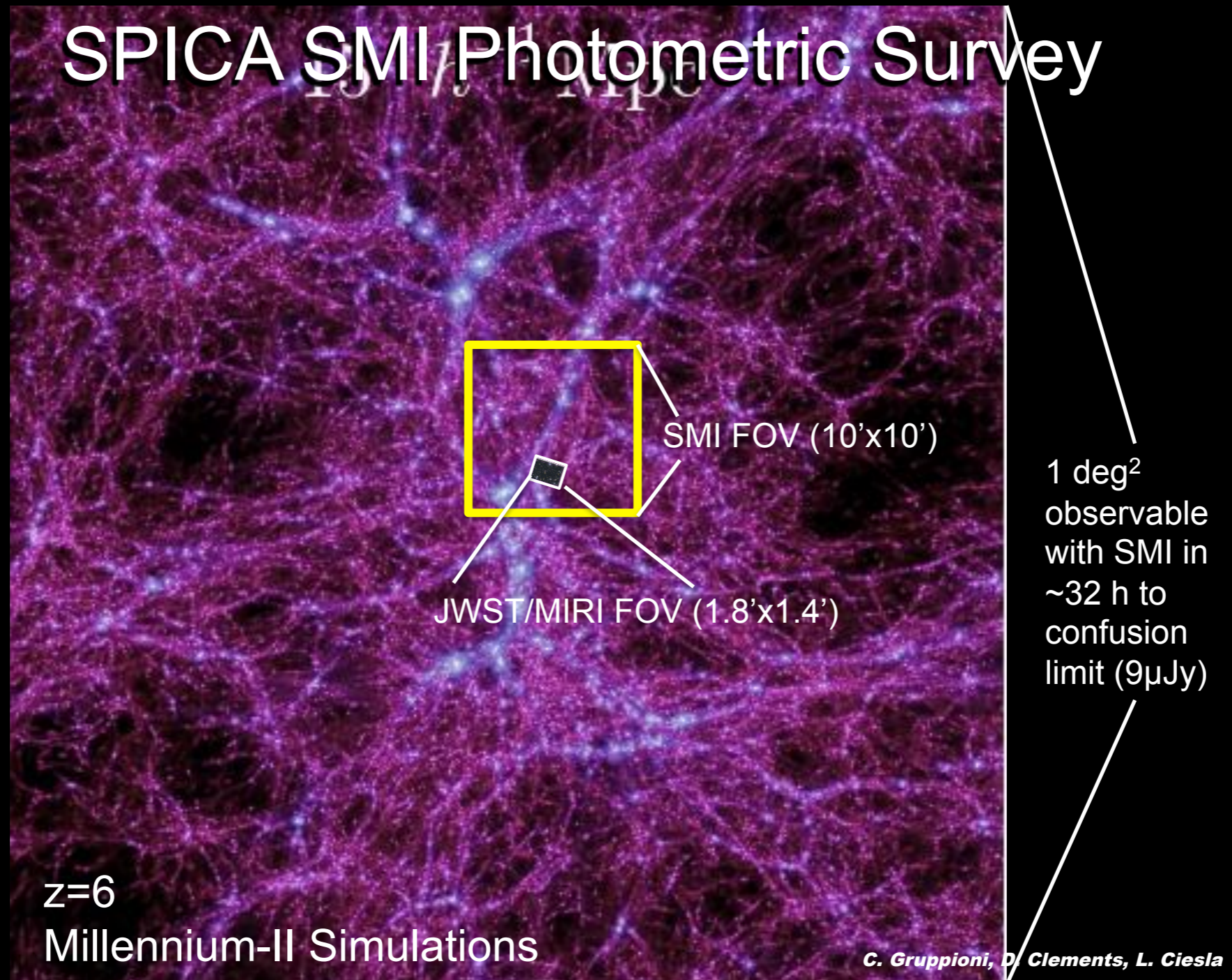
Origins of dust: from local galaxies to highest redshifts

# Observational Tools

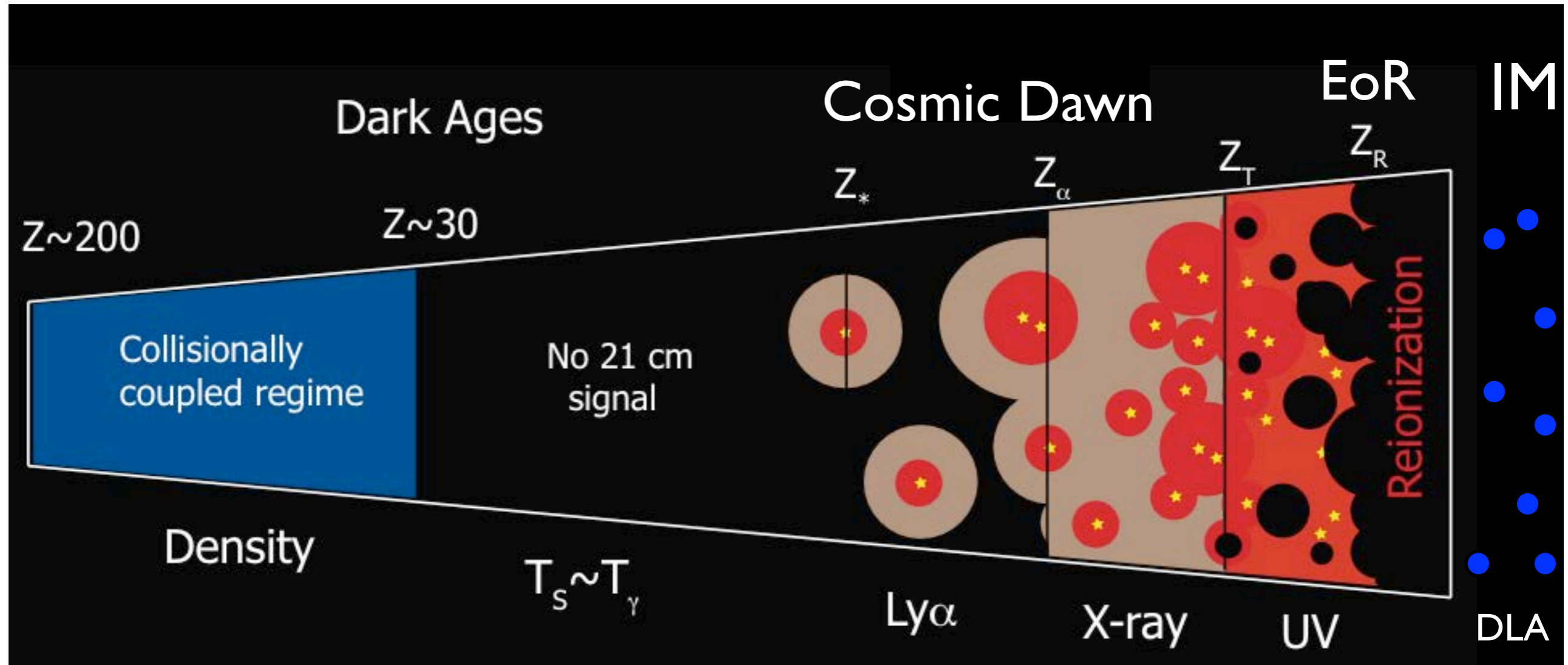


Obscuration independent  
diagnostics out to  $z \sim 3$

# Observational Tools



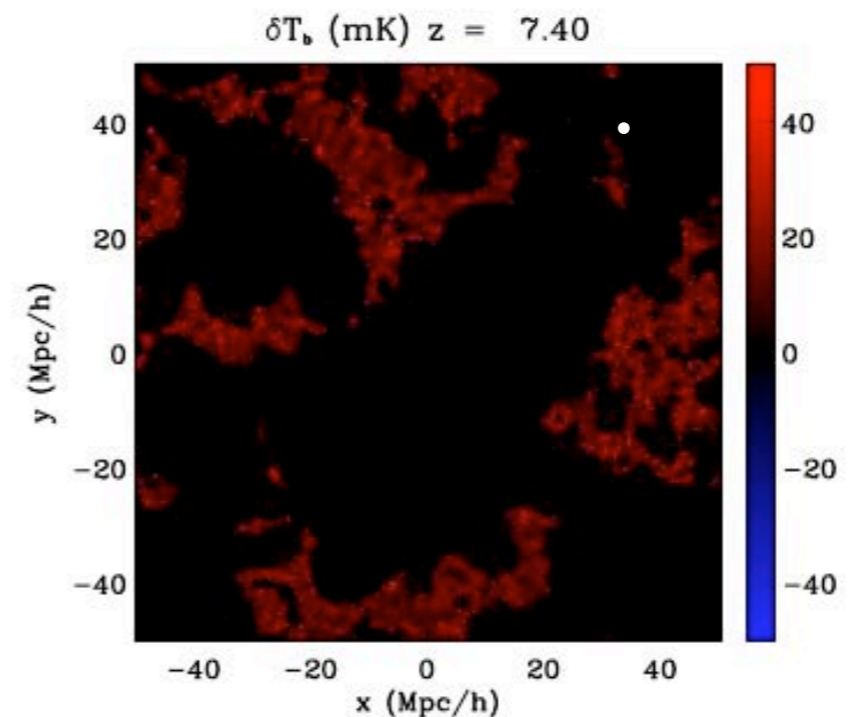
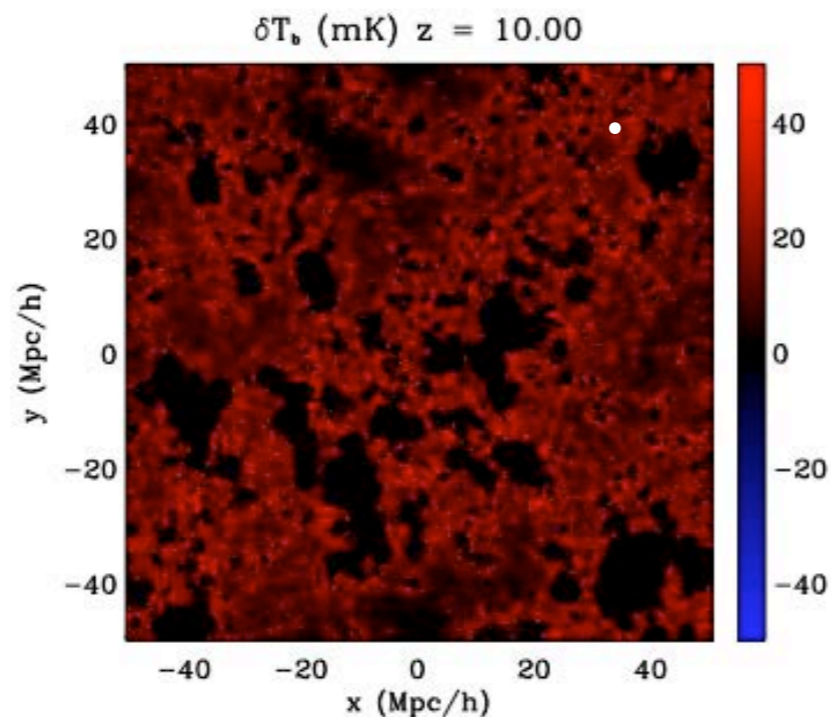
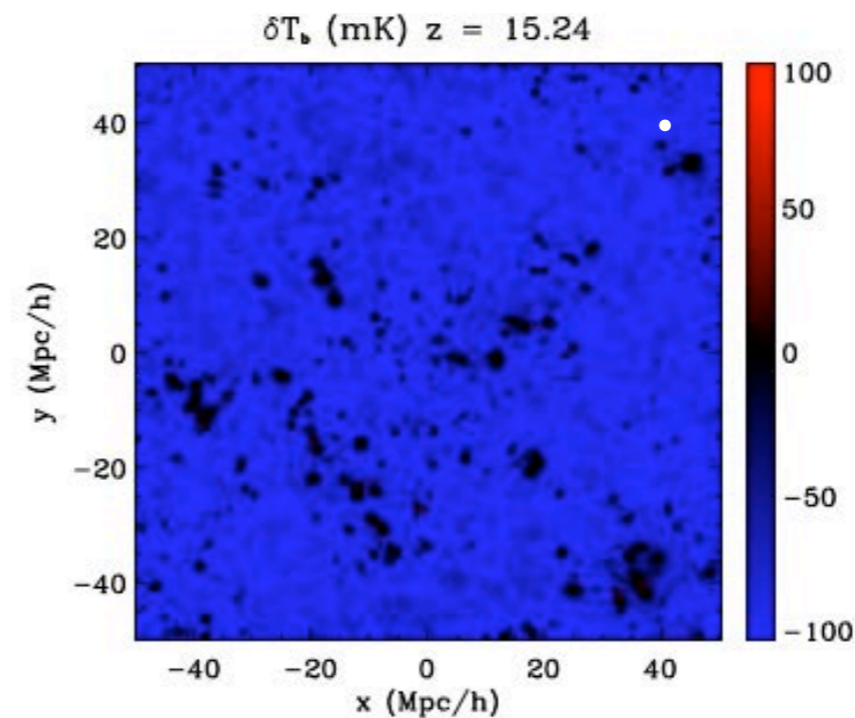
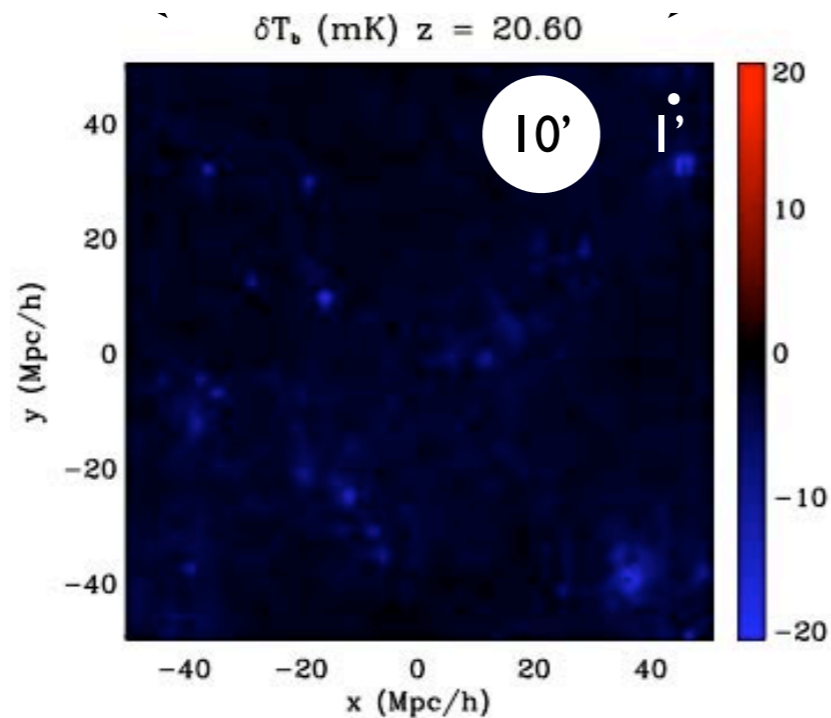
# SPICA & SKA



Epoch of reionisation will be well explored by SKA  
when SPICA flies

Pritchard, 2013

# Brightest reionising sources identified



But how did they form?



# Molecular Hydrogen in the EoR

- 9.66 micron (0-0)<sub>S3</sub> H<sub>2</sub> line will be brightest H<sub>2</sub> line over  $z=10-30$  (Gong et al. 2013)
- Detectable in brightest sources by SPICA out to  $z=20$
- Unique SKA followup science

# Just a taster!

- Quick intro to all the great science SPICA can do
- Now have talks & discussion on each the 3 main areas