IRB: The Infrared Balloon Payload for High-Accuracy, High-Precision Photometry
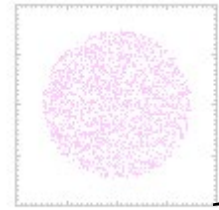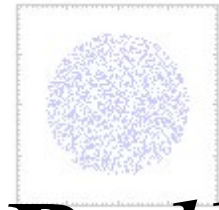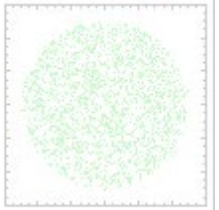
Kathleen Kraemer (BC), Tim Cook (UML), Greg Sloan (STScI, UNC), Charles Engelke (BC), Kuravi Hewawasam (UML), Tom Kuchar (BC), Jason Martel (UML), Supriya Chakrabarti (UML)
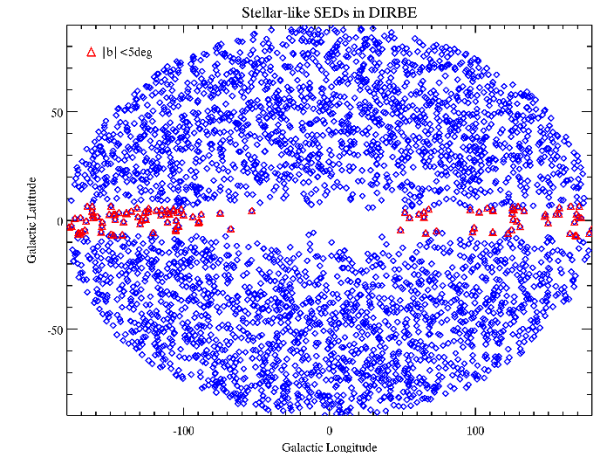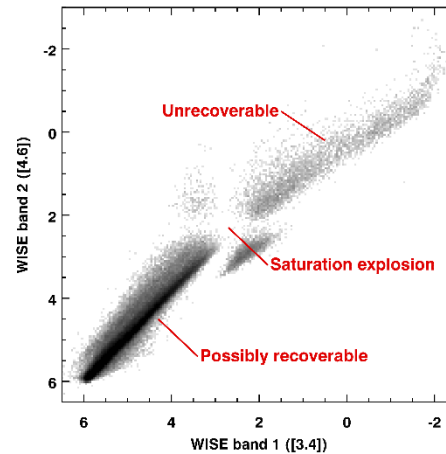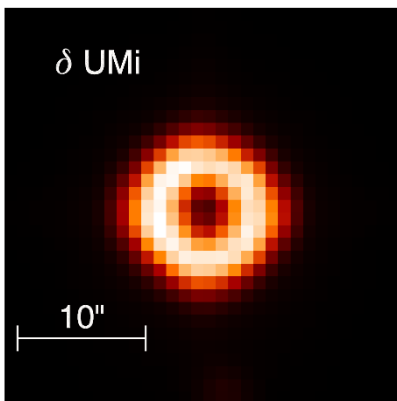
IRB: Science Goals

High accuracy, 1-2%, 1-5 μm photometry (*JHKLM*)
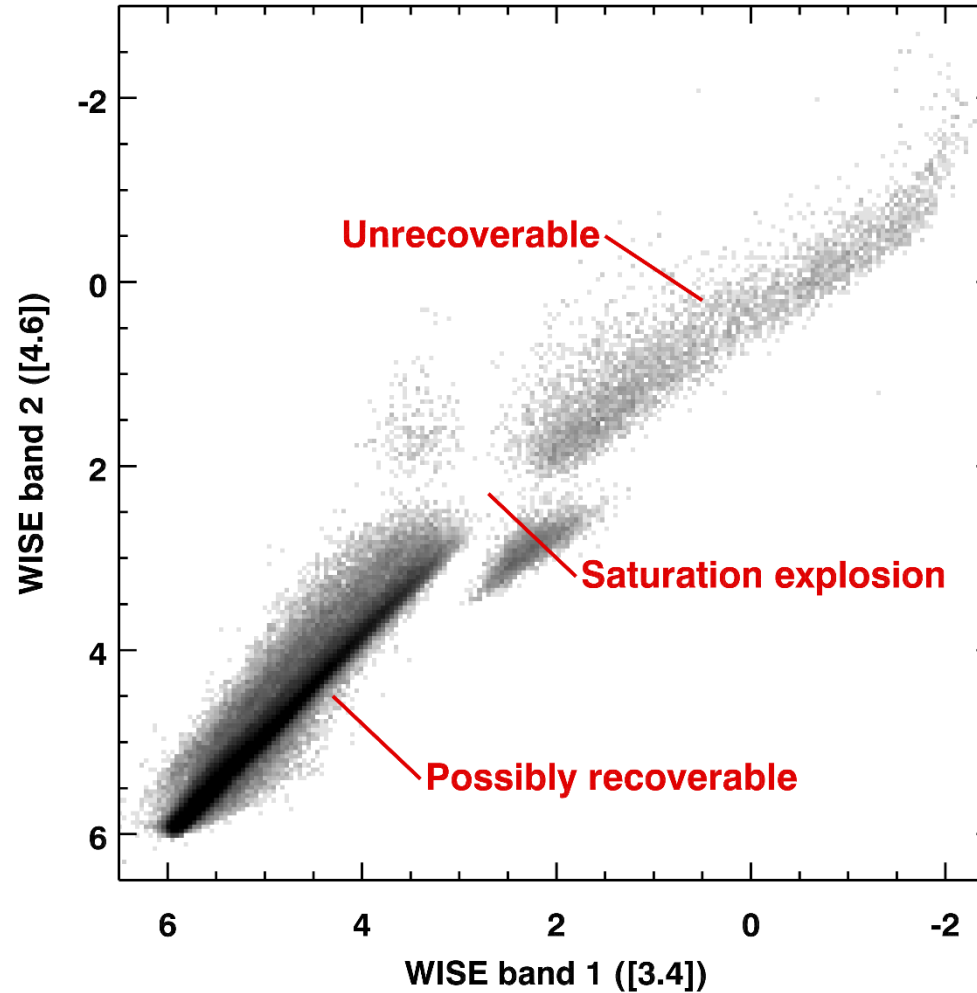
   IR-Bright Stars: <6 mag

> Calibration standards – bridging past & future systems,

    ISO, Spitzer, JWST

> Exoplanet hosts – know the star, know the planet

> Evolved stars – dominate galaxy SEDs, & the IR sky

2MASS Saturation

δ UMi

10"

Unrecoverable

Saturation explosion

Possibly recoverable

WISE band 2 ([4.6])

WISE band 1 ([3.4])

Stellar-like SEDs in DIRBE

|b| <5deg

Galactic Latitude

Galactic Longitude

IRB: Motivation

- Brightest 10,000+ stars:
  - *Saturate* modern IR surveys
  - Historic photometry *limited accuracy*
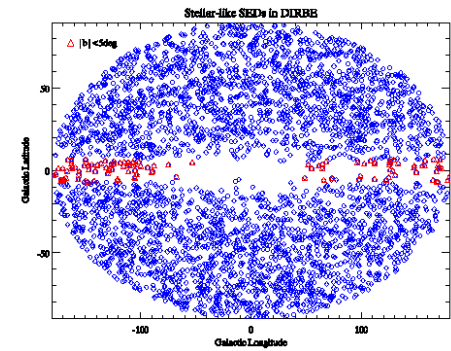- ❖ Best targets for the highest resolution instruments
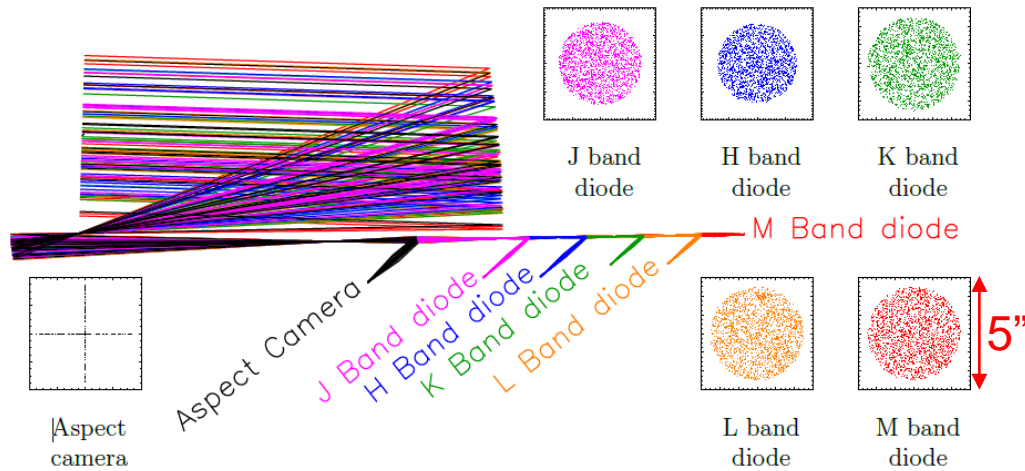

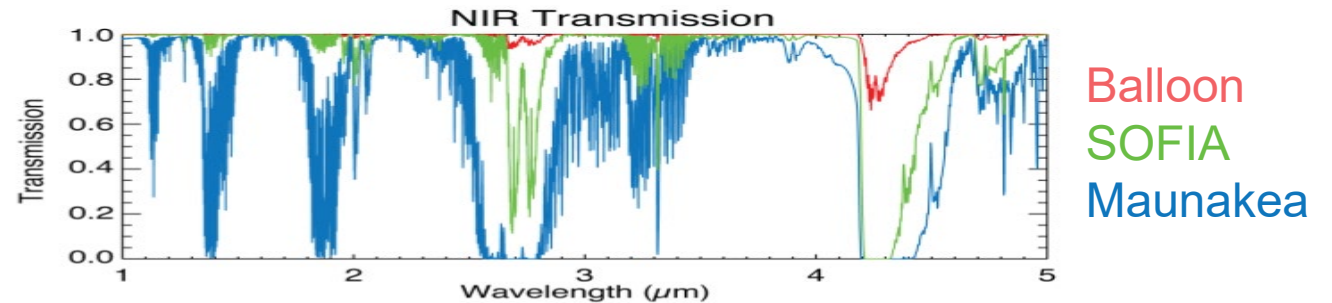WISE bright stars *saturated*
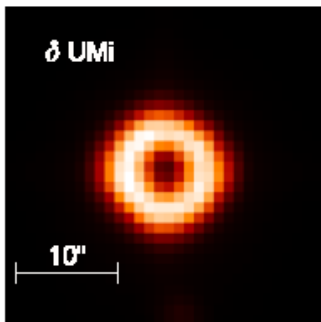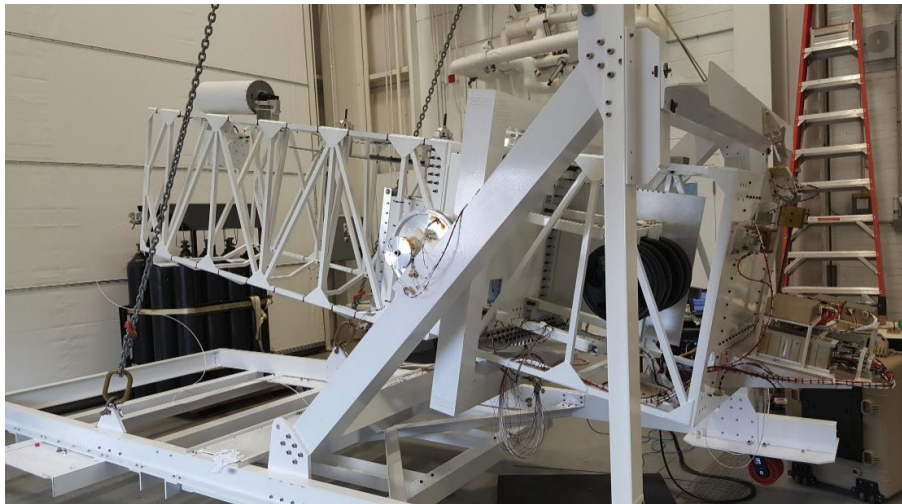
2MASS δ UMI *saturated*

DIRBE stars *confused*

IRB: The Solution

- ✓ **5-band, balloon-borne photometer**
- ✓ **High photometric accuracy**
  - ❖ **<1-2%**
  - ❖ **IR-bright: <6mag**
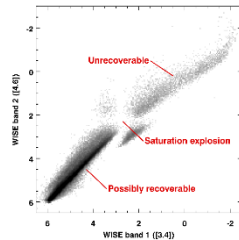- ✓ **Leverage proven instrumentation designs and hardware**
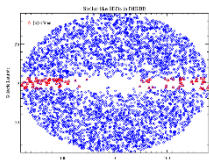
IRB: ASTRO2020

Calibration standards
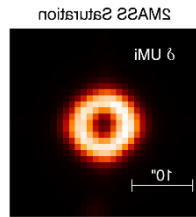
Exoplanet hosts

Evolved stars

Optimizing the Science: Foundations :"The most complex and precise measurements would mean nothing without … calibration"

Stars & Planets: "The star's properties and evolution influence the evolution and habitability…. Precise planet characterization … will motivate the need for better knowledge about the star."

Stellar Evolution: "Many aspects of how stars live and die are currently uncertain enough that it limits the ability to model and interpret…"