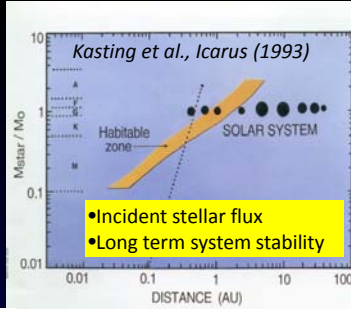


# What Do We Mean By Characterization?

- Orbital location and stability
- Mass and density
- Atmospheric properties
- **Transit observations can make dramatic advances in all these areas if the host stars are bright enough for follow-up**



# Finding New Strange Worlds to Explore: The Earth Like Transit (ELEKTRA) Mission

C. Beichman, for the ELEKTRA Team

## Next Step: Near-IR All-Sky Survey To Find Transits of Bright Stars

- Kepler & Corot focus on <0.025%-0.25% of sky
- CoRoT (CNES/ESA) has found ~20 transiting planets
- Kepler (NASA) has confirmed ~20 planets and released over 1200 candidates
- **Faint hosts make follow-up confirmation & characterization difficult**

### The All Sky Advantage

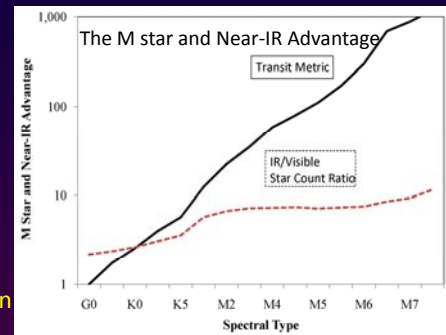
Brightest, closest transiting systems

### The M star advantage

- M stars are numerous
- Habitable zone close to star → increasing observability
- Habitable zone orbits are rapid → increasing observability
- M stars are small → increasing transit signal for initial detection and subsequent follow-up

### The Near-IR Advantage

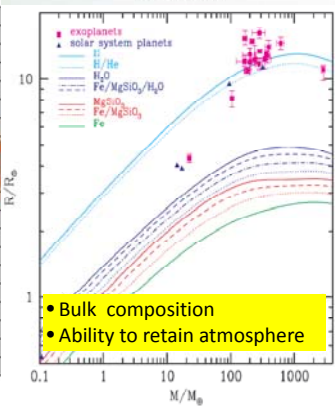
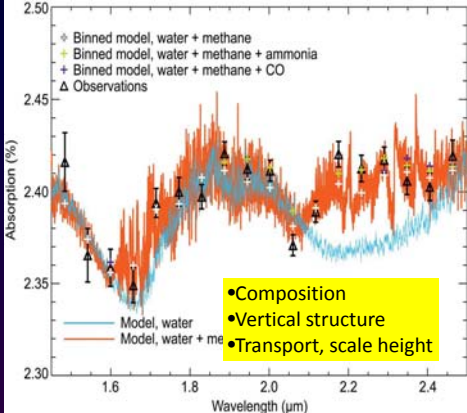
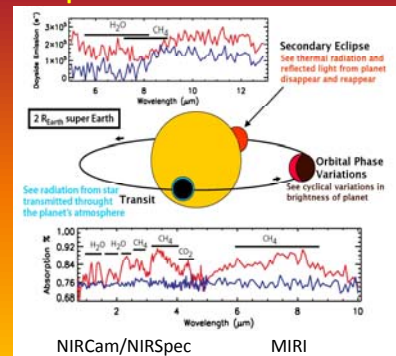
- M stars are brightest in near-IR (up to 100x brighter for >M4)



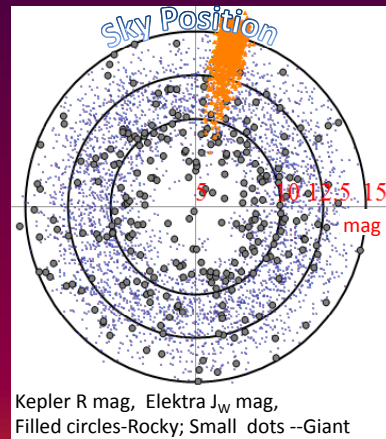
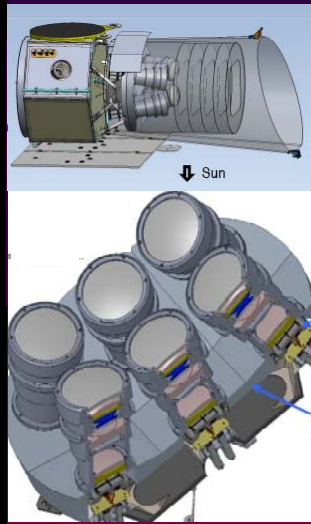
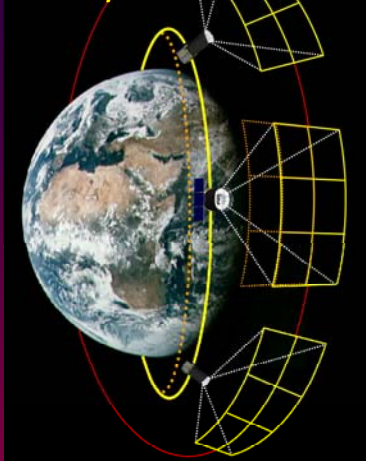
### ELEKTRA Surveys 2 Million Stars (5 < J<sub>w</sub> < 14 mag) To Find Transiting Planets

Spec Type	# Stars	#Rocky	#Giant	T <sub>planet</sub> (K)
AF (<300 pc)	0.6 × 10 <sup>5</sup>	36	265	1200
G (<300 pc)	2.6 × 10 <sup>5</sup>	81	1082	1100
K (<300 pc)	5.4 × 10 <sup>5</sup>	36	783	400
M0-M4	9.6 × 10 <sup>5</sup>	70	357	300
M5-M6	1.7 × 10 <sup>5</sup>	31	46	280
M7-M8	0.2 × 10 <sup>5</sup>	367	4007	
Total, SNR > 7	20 × 10 <sup>5</sup>			

## JWST and Ground Telescopes Will Follow Up ELEKTRA Planets

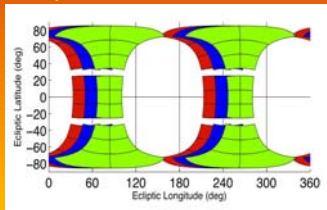
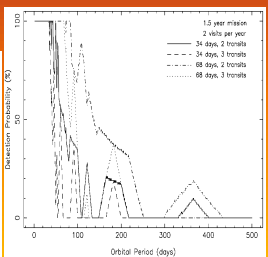
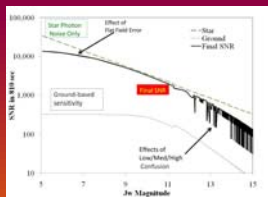


## ELEKTRA Covers >80% of Sky in Near-IR



## ELEKTRA Mission Design

- Six 12 cm cameras with 2x2 mosaics of H2RG 1.7 μm cutoff detectors (17°x17°)
- 25% of sky/orbit, 15 orbits/day
- 34-70 days/star every 6 months (=f(ecliptic lat)) for completeness for P<30-50d orbits (HZ for K & M stars)
- 1.5 yr mission



## Programmatic Status

- ELEKTRA is a proposal now under consideration by NASA's Explorer Program
- Launch by 2016 with survey results available for JWST follow-up
- Science Team includes JPL, Caltech, IPAC/NExSci, US Naval Observatory, NASA Ames, UCSC, UCB, Yale, AMNH, STScI
- Industry Partners include JPL, LBNL, SLAC, Space Dynamics Lab, Ball Aerospace