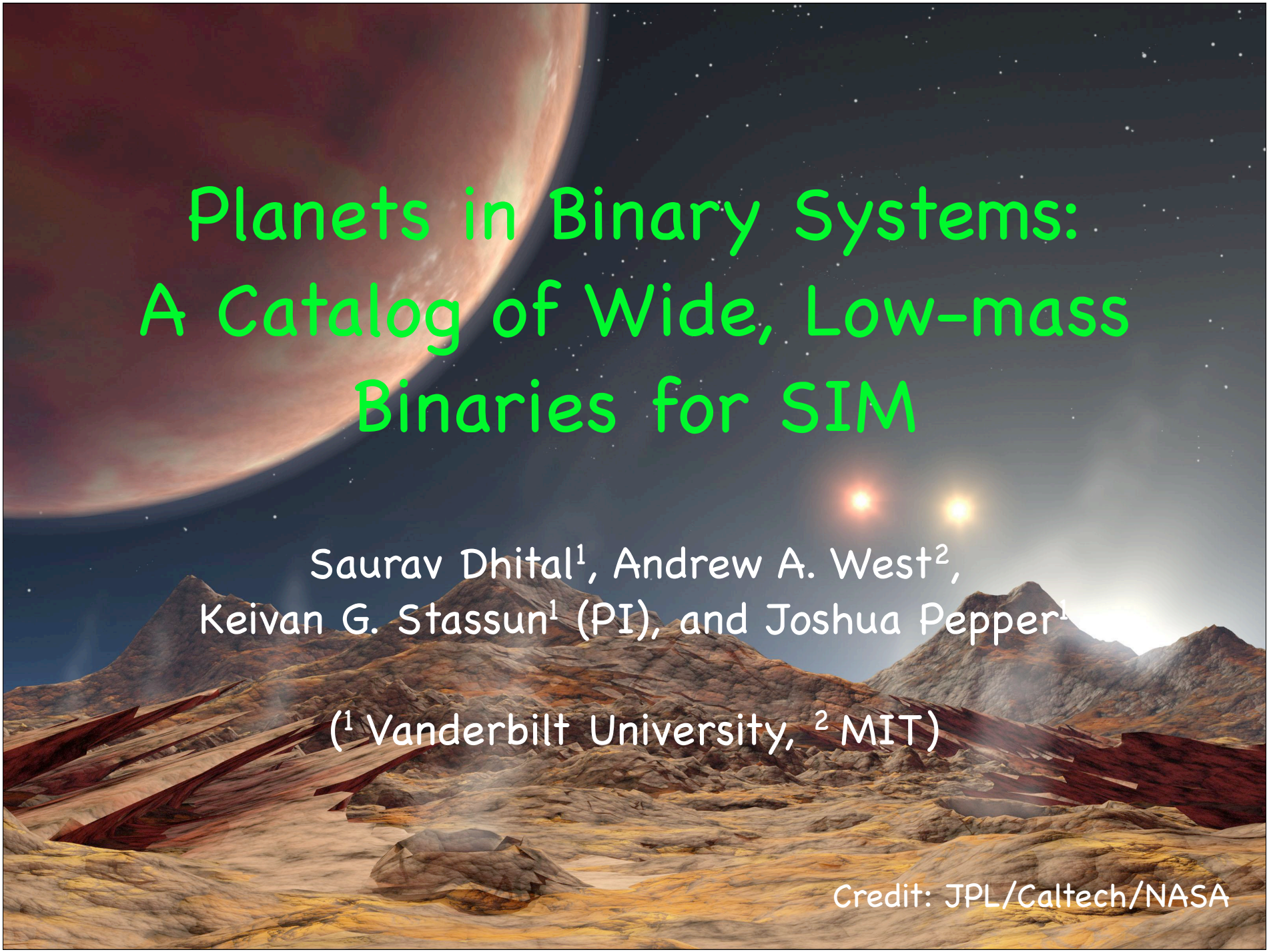

Planets in Binary Systems:
A Catalog of Wide, Low-mass
Binaries for SIM
Saurav Dhital[1], Andrew A. West[2],
Keivan G. Stassun[1] (PI), and Joshua Pepper[1]
([1] Vanderbilt University, [2] MIT)
Credit: JPL/Caltech/NASA

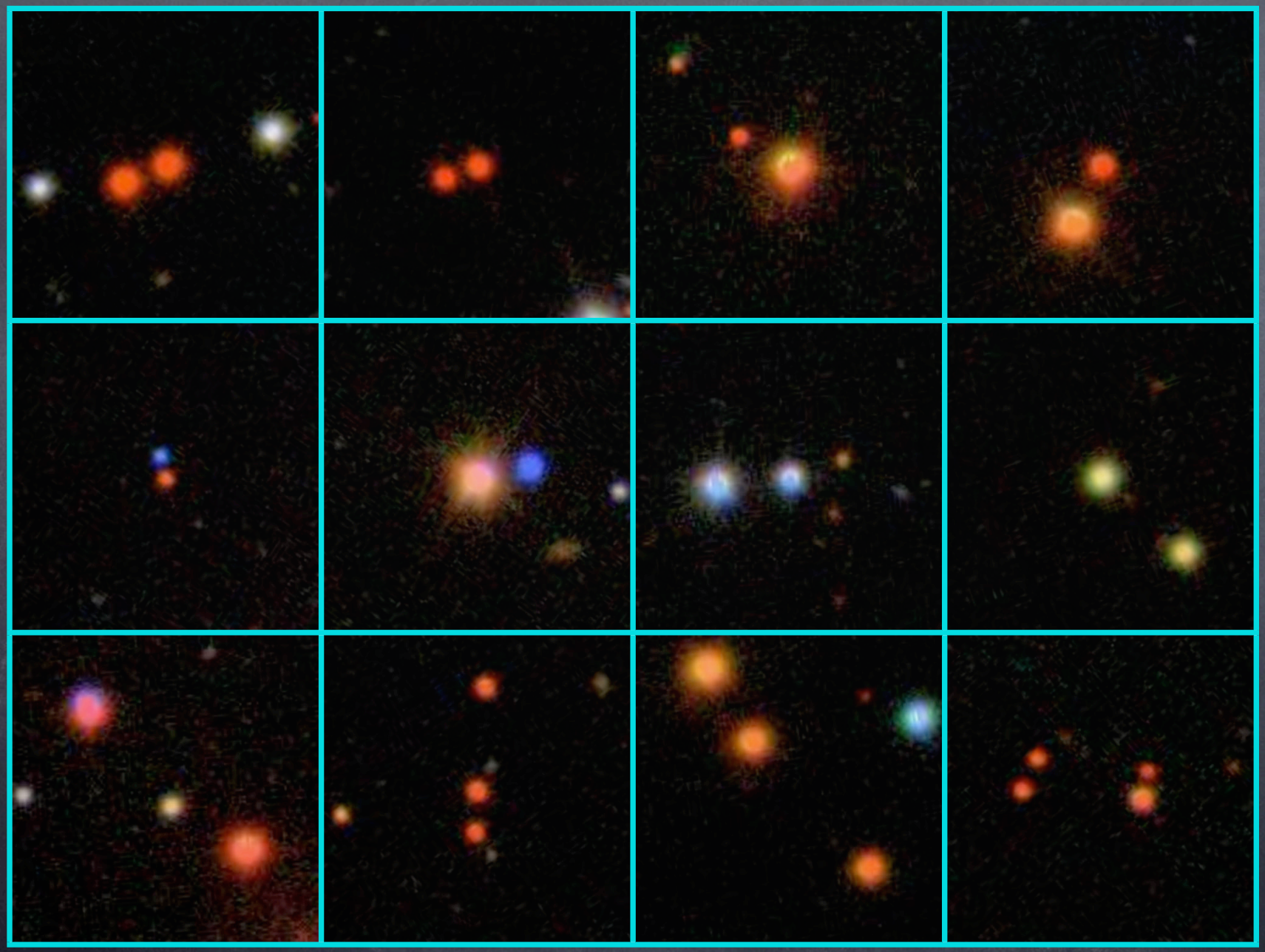
Project Goals

1. Construct catalog of wide, low-mass binaries from SDSS
2. Identify optimal binary systems for detection of planets by SIM
3. Examine the feasibility of obtaining orbital parameters of binary systems with SIM

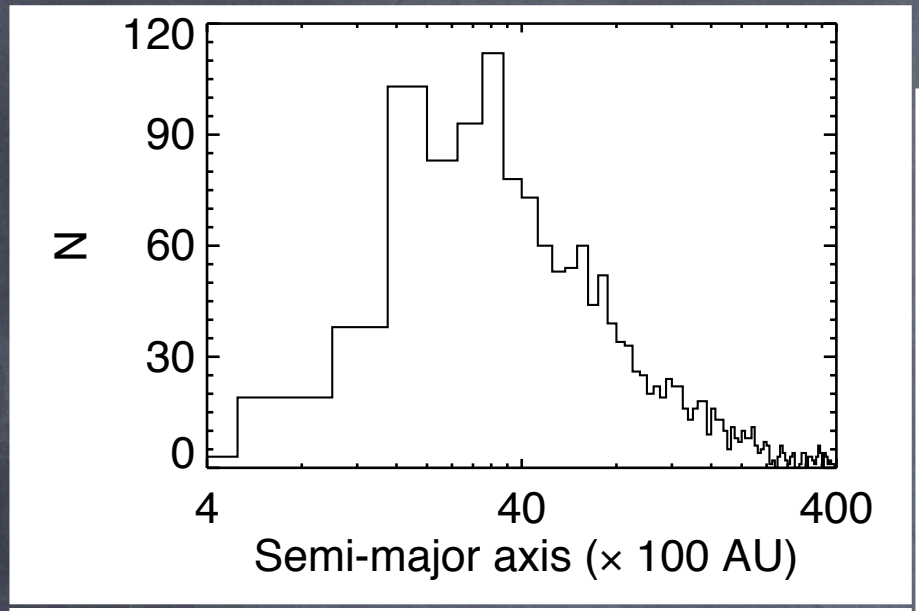
Goal 1: Catalog of wide binaries SLoWPoKES

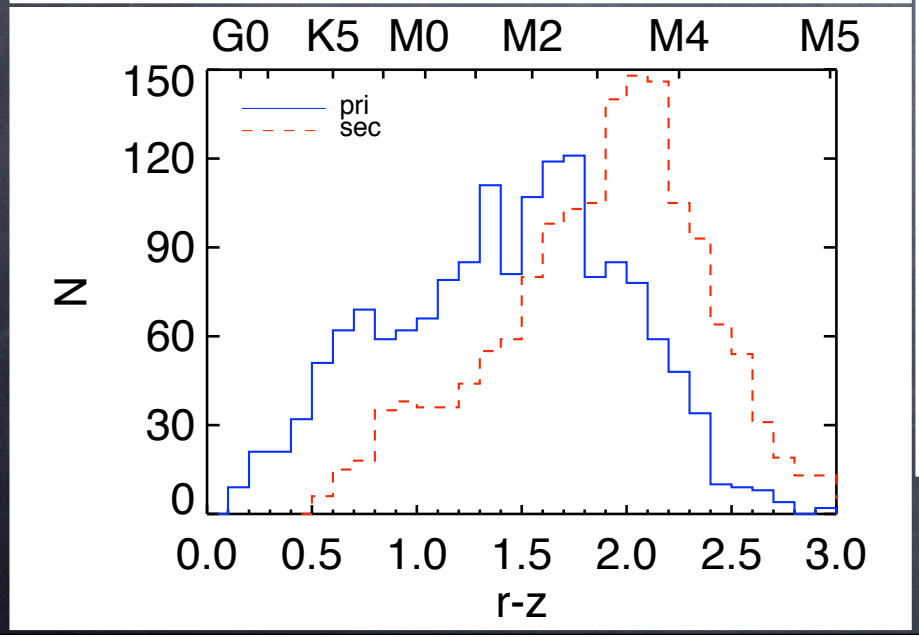
Sloan Low-mass Wide Pairs of Kinematically Equivalent Stars

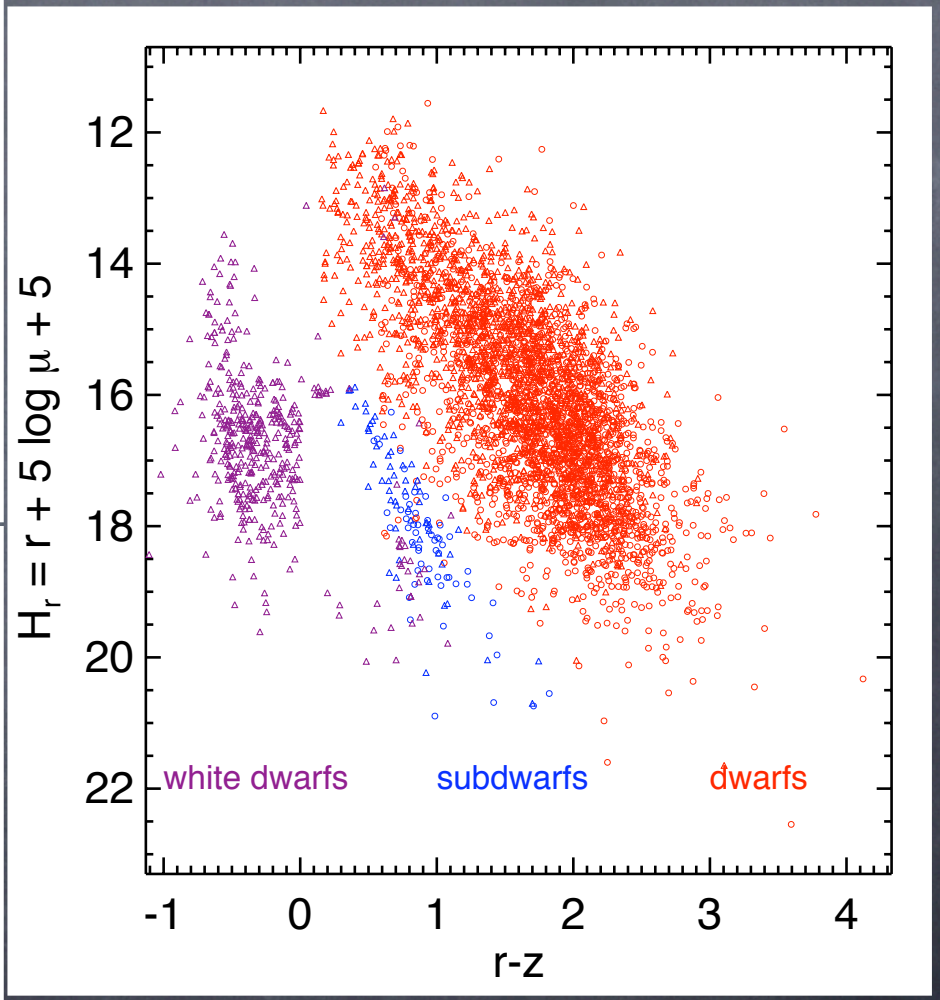
- Catalog of wide, low-mass binaries in the SDSS
  - 2000+ common proper motion pairs
  - "live" public catalog with photometric & spectroscopic data and system properties



SLoWPoKES characteristics







Goal 2: Input Catalog for SIM Planet Search

- SIM broad survey: ~2100 stars with wide range of parameters including binary stars (PI: M. Shao)
- Planets in SLoWPoKES binaries
  - Low-mass: better sensitivity to rocky (and gaseous) planets around M dwarfs
  - Wide: disks survives longer
  - Coeval twins: same mass and age but evolved independently

Optimizing the sample for SIM

- Feasibility of planet detection with SIM
  - 1 M_J (1 $M_\oplus$) planet around M0 star at 300 pc: 426 mas (1500 μas) for P = 1 year
  - Integration time: 240 s
- Sifting the best binaries for SIM
  - Radial velocity confirmation
  - Magnetic activity
  - Closer companions not seen in SDSS

Goal 3: Stellar Orbits?

- M-L relation will be calibrated using ~100 short-period binaries (PI: T. Henry)
- With μas resolution, SIM could extend this to very wide binaries
- We will conduct simulations to see if this is feasible
  - SIM observes only a tiny portion of the orbit
  - 10" binary at 100 pc $\Rightarrow$ P ~30,000 yrs, $v_{orbital}$ ~2 mas yr^{-1}

Conclusions

- SLoWPoKES, a large catalog of wide, low-mass binaries, has been assembled.
- We hope this will be a valuable input catalog for SIM planet and stellar research.

Contact: Saurav.Dhital@Vanderbilt.Edu