
April 1
May 1
April 10
May 9
April 19
April 25
May 15

I have a question on figure 2 the lower-right panel. Why does the flux peak before the planet goes behind the star? Shouldn't it be going down since the planet is getting further from the telescope and therefore its brightness is increasing?

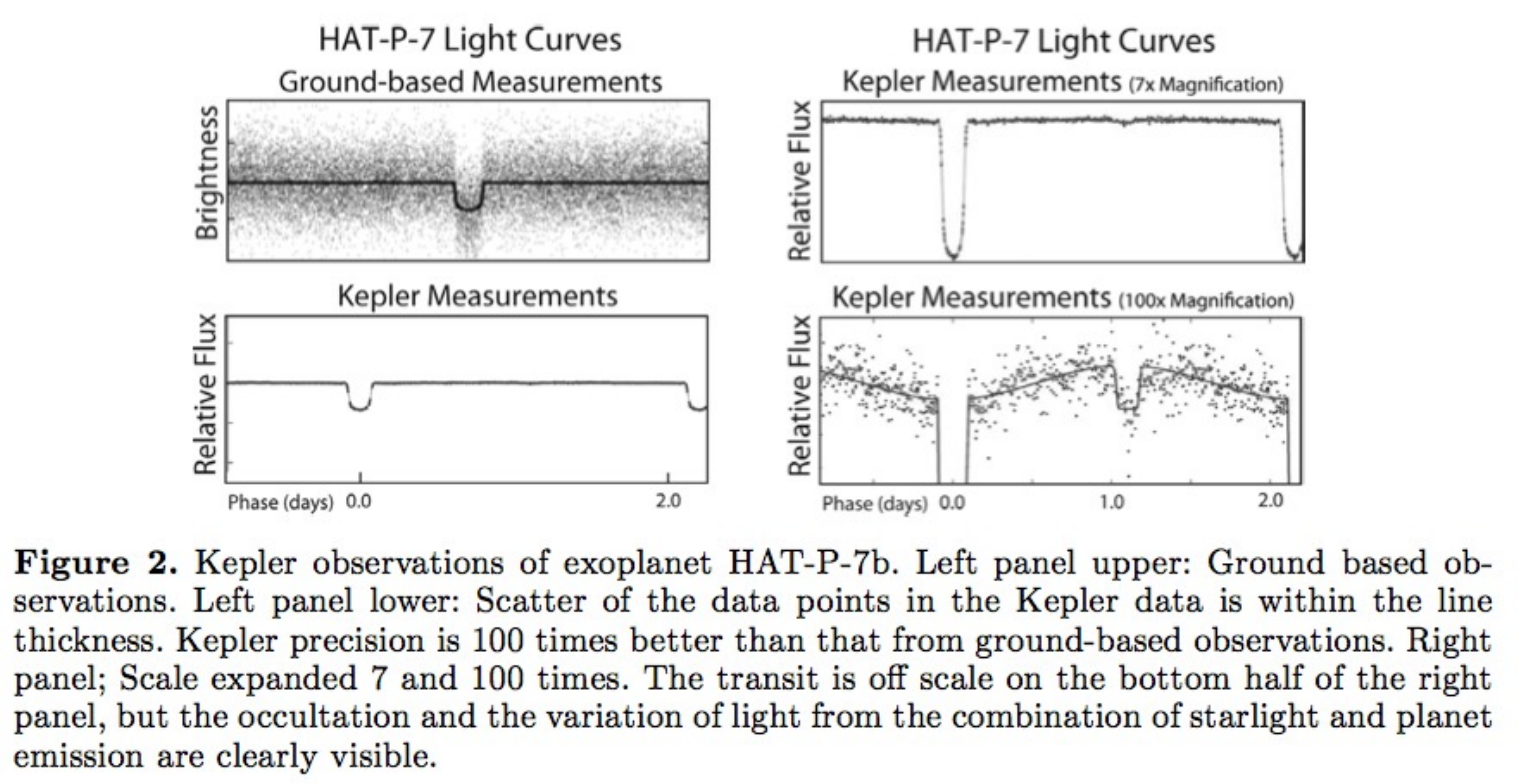
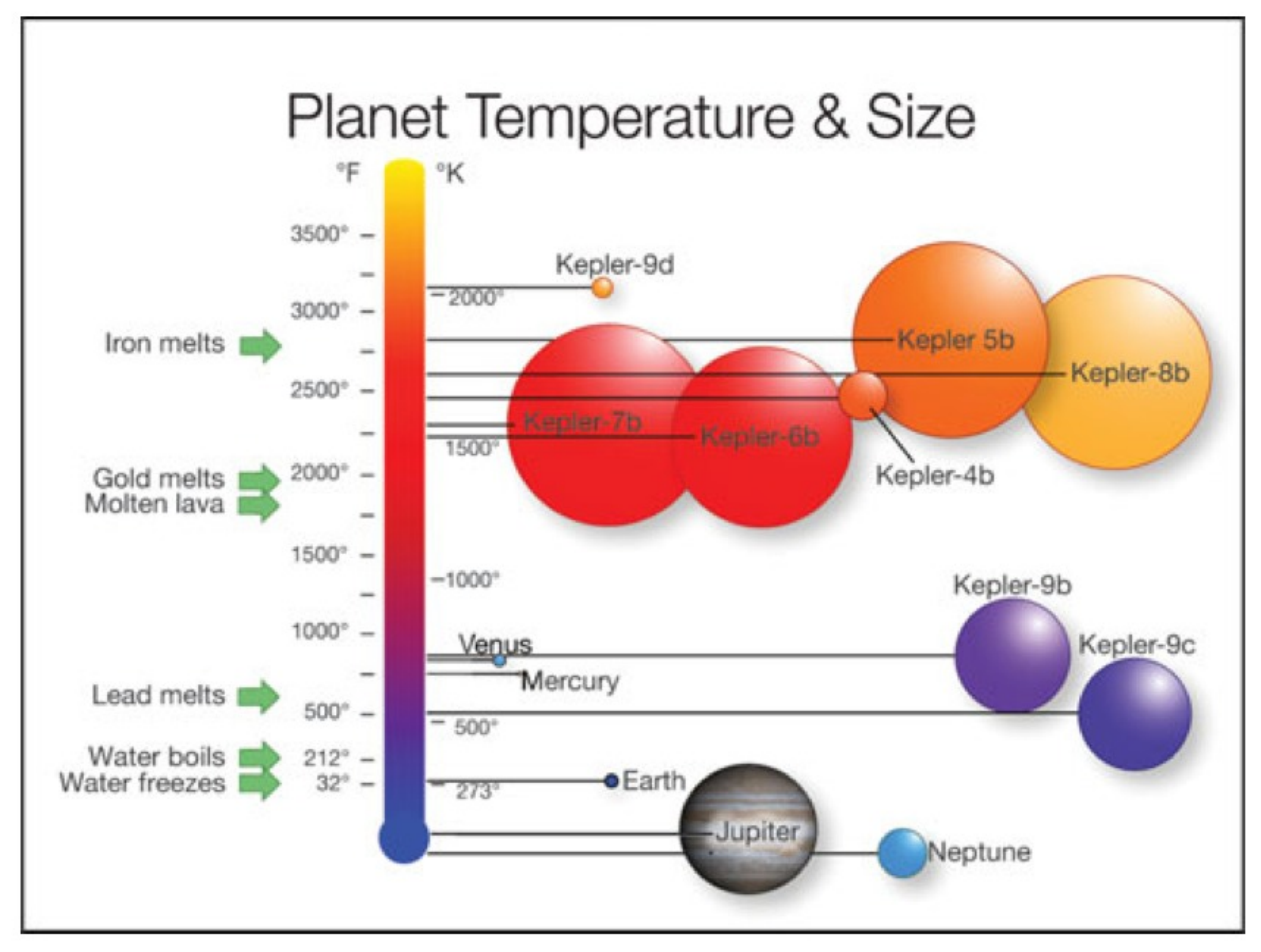


Figure 2. Kepler observations of exoplanet HAT-P-7b. Left panel upper: Ground based observations. Left panel lower: Scatter of the data points in the Kepler data is within the line thickness. Kepler precision is 100 times better than that from ground-based observations. Right panel; Scale expanded 7 and 100 times. The transit is off scale on the bottom half of the right panel, but the occultation and the variation of light from the combination of starlight and planet emission are clearly visible.

For the talk, at around 34 minutes there is a graph involving equilibrium temperature and relative size. What does he mean by equilibrium temperature?



This is actually a general physics/chemistry question, but it came about from the paper. At the beginning of section 7, the paper mentions hot, "self-luminous" planets and later discusses the planet with an occultation that's deeper than its transit. This made me realize that I have no idea how lava and other really hot things produce their own light.

Borucki kept talking about the habitable zone for exoplanets- defined as the region around a star in which earth like planets may be found. This seems very earth centric to me. Do astrobiologists consider it unlikely that life else where may be fundamentally different than that on earth and exist conditions uninhabitable by humans, or do they think they would not be able to interpret the chemical signature of these lifeforms as life even if they detected it?

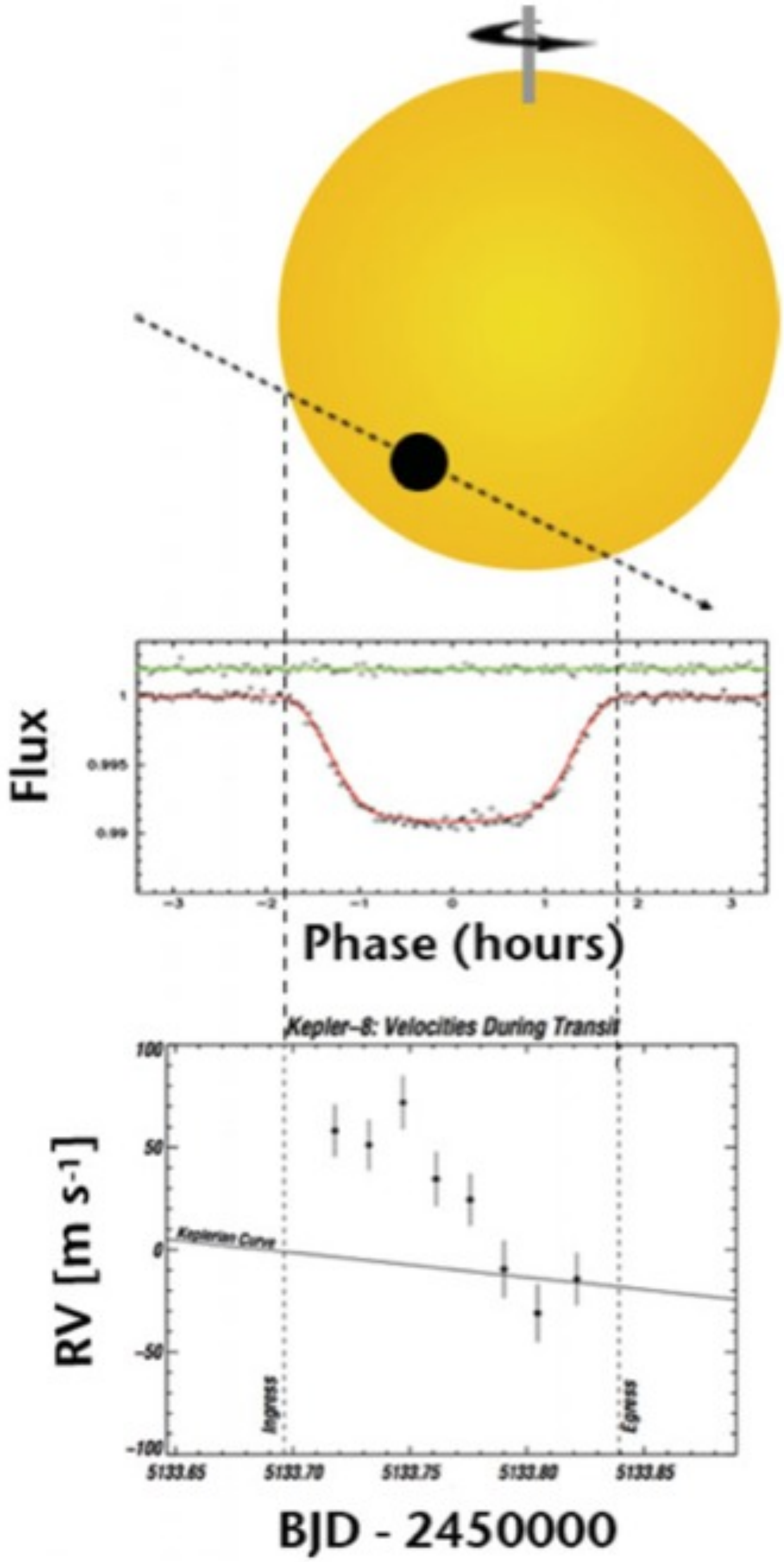


Figure 5. Rossiter-McLaughlin effect for Kepler-8b. Although the orbit plane is not perpendicular to the stellar spin axis, the transit shape is normal, but a strong asymmetrical shift in the spectral lines occurs.

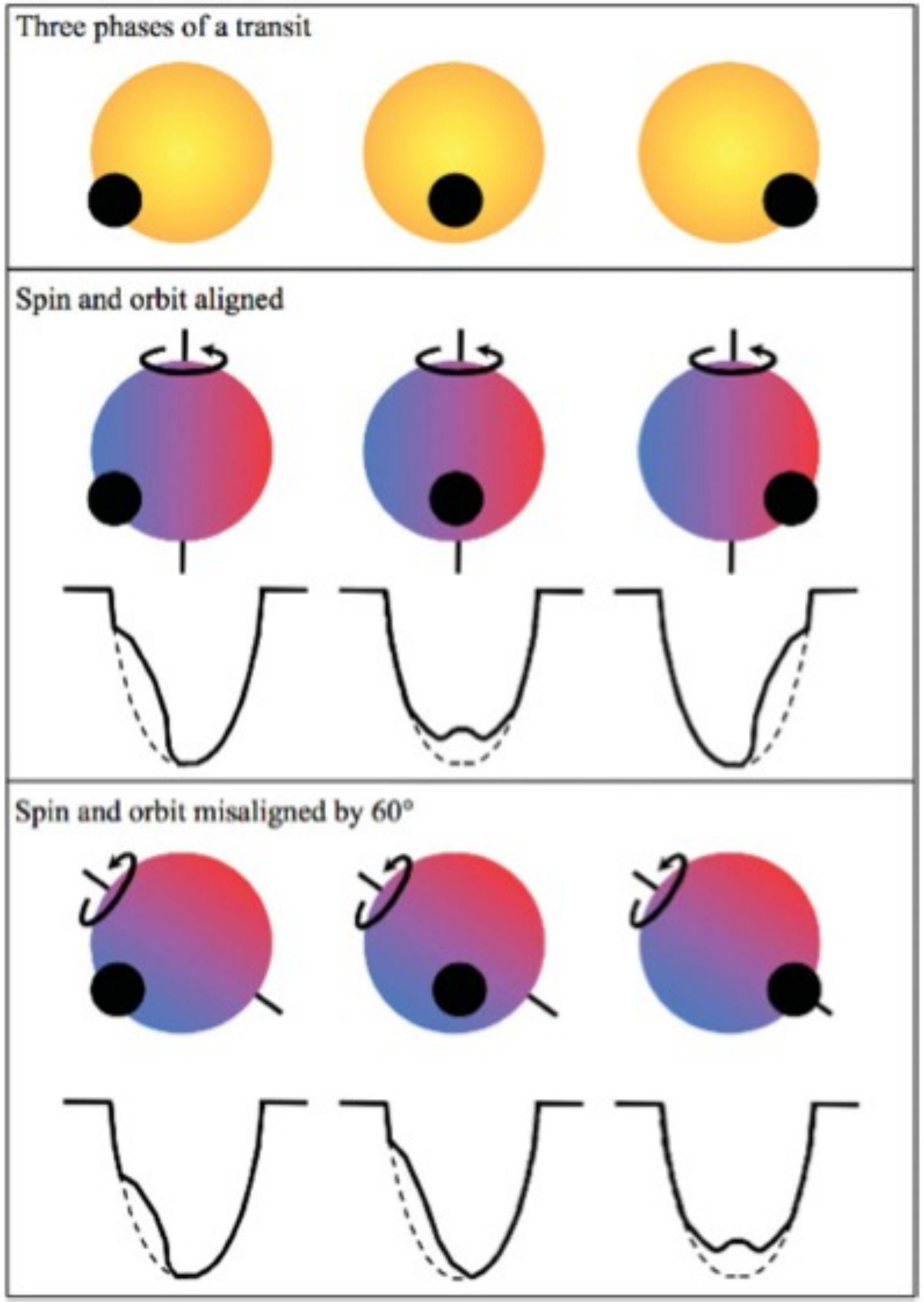


Figure 2. The RM effect as a spectral distortion. Top: three successive phases of a transit. Middle and bottom panels: same, but showing the line-of-sight rotation velocity of the photosphere as a gradient, as well as the distorted spectral line profile. Middle: a low obliquity. The spectral distortion moves from the blue side to the red side. Bottom: a projected obliquity of 60°. In this case the obscuration by the planet weakens the blue wing throughout most of the transit. By observing and modeling the time-varying spectral distortion throughout the transit, one can measure the projected obliquity of the star (see, e.g., Collier Cameron *et al.* 2010).

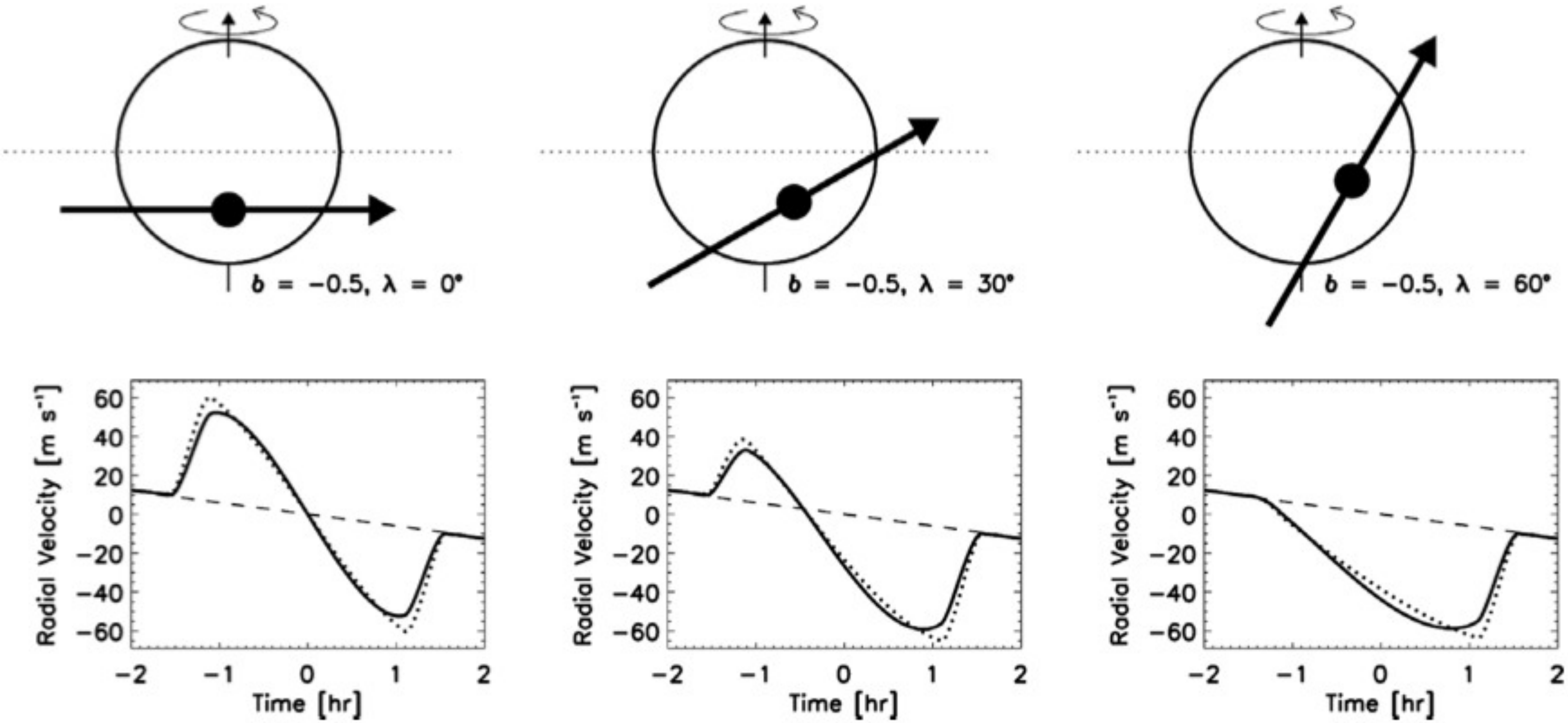


Figure 1. The RM effect as an anomalous Doppler shift. Top: three transit geometries that produce identical light curves, but differ in spin-orbit alignment. Bottom: corresponding radial velocity signals. Good spin-orbit alignment (left) produces a symmetric "redshift-then-blueshift" signal, a 30° tilt (middle) produces an asymmetric signal, and a 60° tilt (right) produces a blueshift throughout the transit. From Gaudi & Winn (2007).

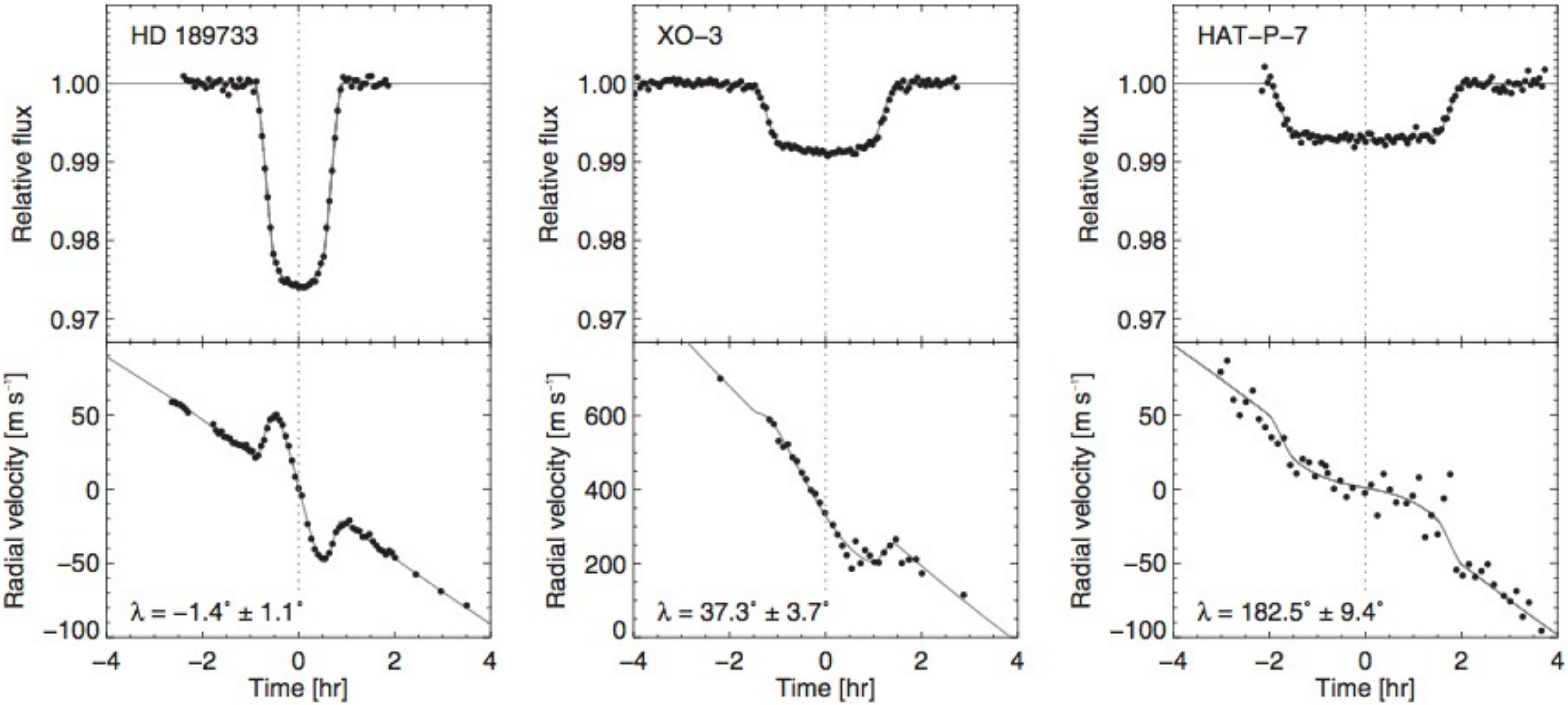


Figure 3. Examples of RM data. The top panels show transit photometry, and the bottom panels show the apparent radial velocity of the star, including both orbital motion and the anomalous Doppler shift. The left panels show a well-aligned system, the middle panels show a misaligned system, and the right panels show a system for which the stellar and orbital "north poles" are nearly antiparallel on the sky. From Winn *et al.* (2006; 2009a,b).

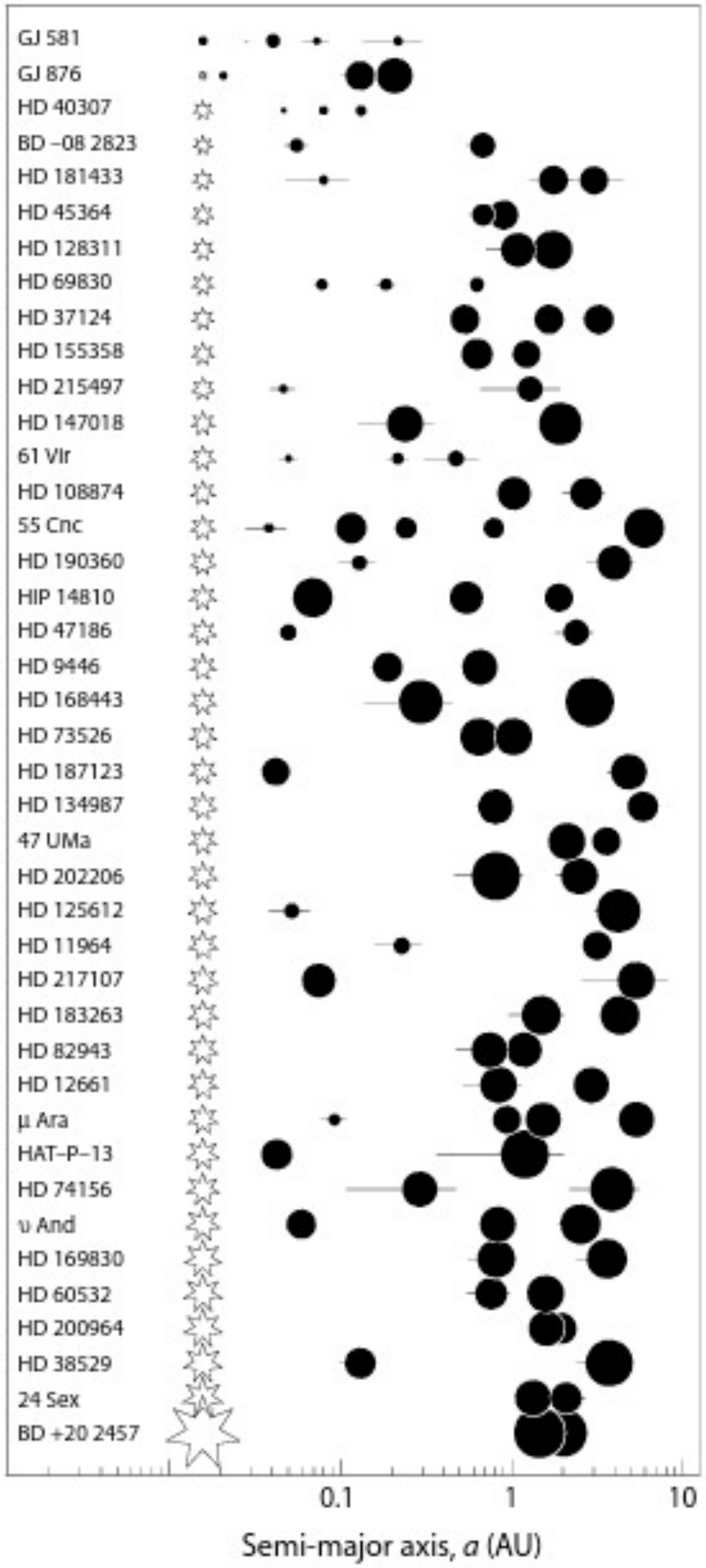


Figure 2.29: Multiple planet systems, ordered by host star mass (indicated at left with size proportional to $M_\star$, ranging from $0.31 M_\odot$ for GJ 581 to $2.8 M_\odot$ for BD+20° 2457). Each planet in the system is shown to the right, with sizes proportional to $\log M_{\rm P}$ (ranging from about $0.01 - 20 M_{\rm J}$). Horizontal bars through the planets indicate maximum and minimum star–planet distance based on their eccentricities. Data are for 97 planets in 41 systems from `exoplanets.org`*, 2010–11–01. From a concept by Marcy et al. (2008, Figure 13).*

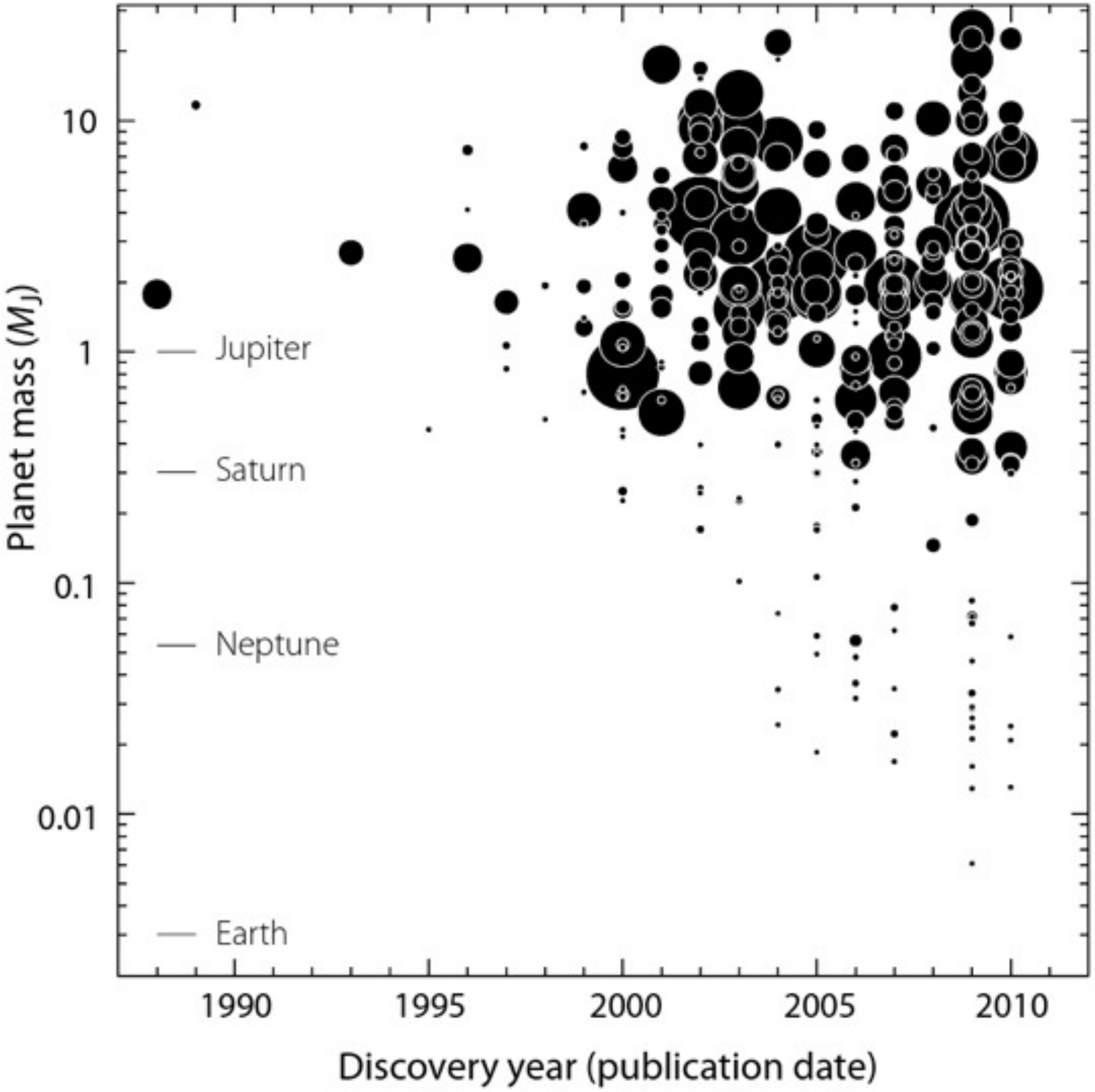


Figure 2.17: Planets discovered by radial velocity measurements, according to mass and year of discovery. Circle sizes are proportional to the semi-major axis a. Data are for 383 planets from `exoplanets.org`*, 2010–11–01.*