Pair of Slacks

One day, as you're walking up the stairs from the Unit 3 laundry room, a gust of wind seizes a pair of your slacks, whisking them into space.

(a) On the board at your table and below, draw and annotate a figure detailing how parallax is used to measure distances.

(b) How far away would your slacks need to be in order to physically take up one degree on the sky? What about one arcminute? One arcsecond?

(c) How far away would your slacks need to be in order to measure a parallactic angle of one degree? What about one arcminute? One arcsecond?

(d) Worried that you'll be unable to measure the parallactic angle of your pair of slacks, you decide to phone a friend on another Solar System planet. Which planet would have the best chance of viewing your slacks?

(e) Your friend on that planet has a telescope with a radius of 50 meters (parts are cheaper out there!). What's the greatest distance they could measure using the parallax method at a wavelength of 400 nanometers? How does that compare to a 1-meter radius telescope on Earth?

Starbursts

Annelise, a budding observational astronomer, is **very** excited to begin her first observing run! She hopes to take radial velocity measurements of a Sun-like star and isolate a signal from a planet. Eduardo, a jaded and cynical theorist specializing in stellar structure, decides to burst her bubble.

(a) On the board at your table and below, draw and annotate a figure depicting the structure of the Sun.

(b) What aspects of stellar structure might Eduardo cite to destroy Annelise's hopes for a clear radial velocity signal?

(c) Undeterred, Annelise goes ahead with her investigation. Her first target is an M-type star. What color does it appear (absent Doppler shifting, scattering, etc.)? Why?

(d) Annelise publishes a paper soon after her first observing run. Eduardo is a bit salty. When Annelise mentions that her next observing run will be focused on transiting planets, Eduardo leaps into action: He claims that she should be wary of starspots, as they could look just like transits. Is he right?