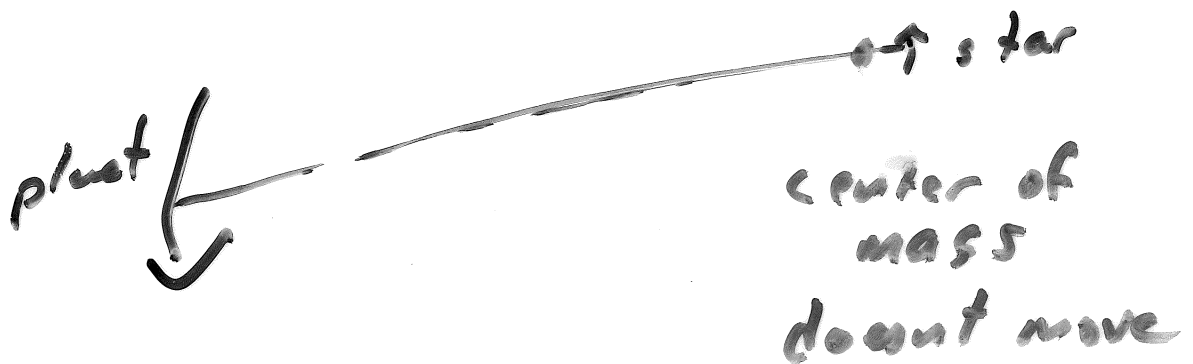


FABLE: demotion of Pluto
MORAL: science can be affected
by a culture



orbital periods P
same planet and
star

V, a are different

$$\begin{array}{ccc} V_s & \text{vs} & V_p \\ a_s & \text{vs} & a_p \end{array} \quad \left. \vphantom{\begin{array}{ccc} V_s & \text{vs} & V_p \\ a_s & \text{vs} & a_p \end{array}} \right\} \begin{array}{l} V_{rot} \\ a_{rot} \end{array}$$

$$V_p = v_{\text{rot}} = \left(\frac{GM}{a} \right)^{1/2}$$

↳ short orbits
→ large velocities

$$V_* = V_p \frac{M_p}{M_*} \rightarrow \text{large planet masses}$$

→ large star velocities

obese: short orbit → high V_p

: low V_* → low planet mass

Hot Jupiters

short periods

moderate/high V_*

⇒ MASSIVE PLANET

short period + massive

⇒ UNEXPECTED

FABLE: Discovery of 51 Peg b
MORAL: expected the unexpected
look at your data

within a few years
dozens of Hot Jupiters

→ "ordinary" planets are rare?

Hot Jupiters easier to find

short periods } ⇒ large
massive planets } ⇒ values
of V_r

also easier to observe
shorter period

SELECTION EFFECT

But even one hot
Jupiter messes up
Theory

Alternatives: #1

low inclination double star
2nd object is a star

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high velocity but low
radial velocity

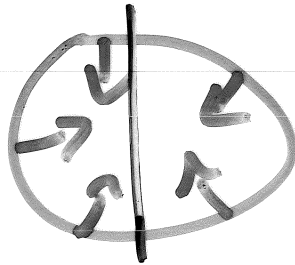
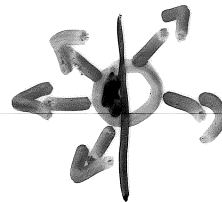
(because orbits are
"face-on", not
"edge-on")

problem # 1: no evidence for
light from more than
1 star

#2: may hot Jupiters
can't all be
face-on

alternative #2

pulsating stars



see	first	+ve	V_R
	then	-ve	V_R
	then	+ve	V_R

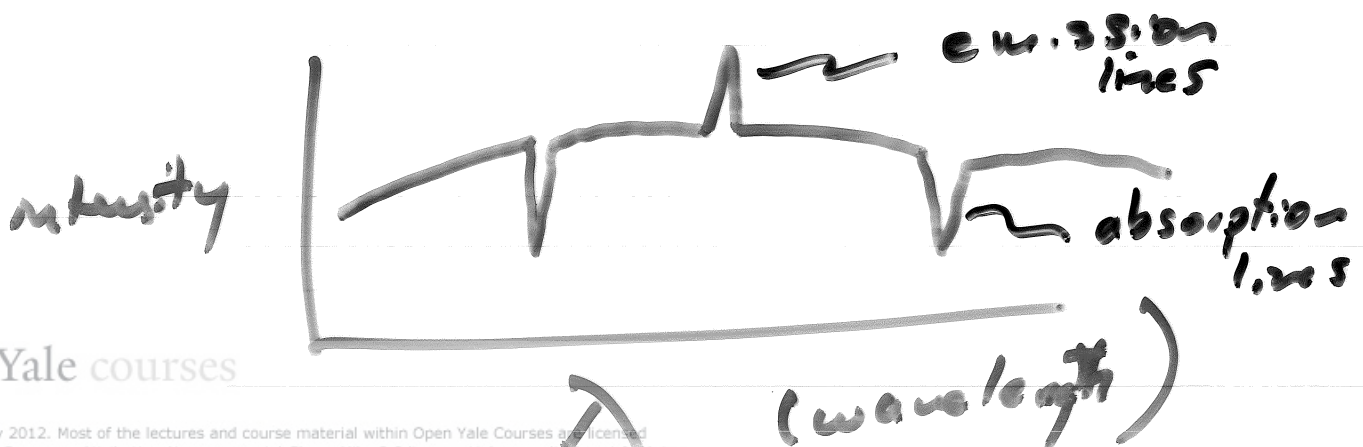
problems with pulsating stars:

- 1) solar type stars aren't supposed to have large pulsations
- 2) pulsation don't lead to sinusoidal wobbles in V_R

TESTABLE PREDICTION

measuring Doppler shifts

look at a ~~spectrum~~ "spectrum"



There are specific λ with
much less ~~less~~ or
more emission

Caused atomic transitions
from a specific chemical
element

→ determine composition of
stars

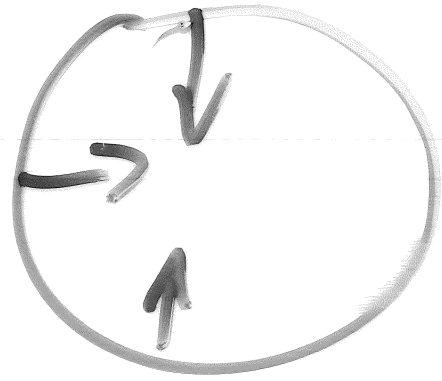
Can measure these λ
at rest in a lab

be a blow up of an
absorption line



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pulsation



part of
star moves
away

part of star
moves sideways

PREDICTION:

for pulsations the
SHAPE of "lines"
change

for orbital motion only
POSITION of lines change

⇒ NOT PULSATION but is
consistent with orbit

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MORAL:

disproof of pulsation as
explanation for velocity curves
sometimes science works
the science

80% is A/B
(16/20) divide

single digits
(out of 20)

come talk to us.

BUT DON'T PANIC