

ASTR 160

now open to ALL
non-science majors

Problem Set # 1 due

THURSDAY

(available on classes server)

TF office hrs tomorrow

classes forum for questions
(on v2 click "discussion")

CB's Starbucks hours

Mondays 10 - 11:45

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Categories of Solar System Objects

1) Sun

2) inner "terrestrial" planets
rocks (silicon, iron)
very thin coating of
ice (melted
gaseous)

masses $10^{-7} - 10^{-5}$ of Sun

circular orbits

3) asteroid irregular small rocks

4) outer "jovian" planets

gas/ice

\downarrow
H, He

\rightarrow water, ammonia,
methane

$10^{-4} - 10^{-3}$ of Sun

rings, many moons,

circular orbits

5) Kuiper Belt object
Pluto etc

rocky $< 10^{-7} M_{\odot}$
elliptical inclined orbits

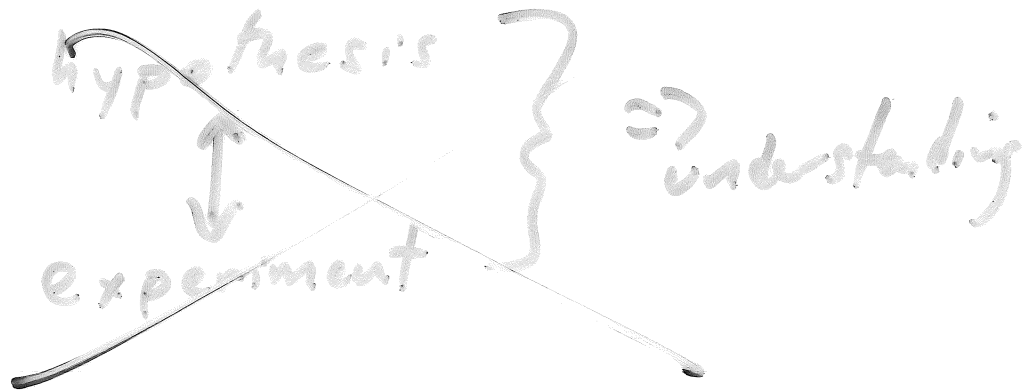
6) Oort cloud - comets
balls of ice

INTERPRETATION

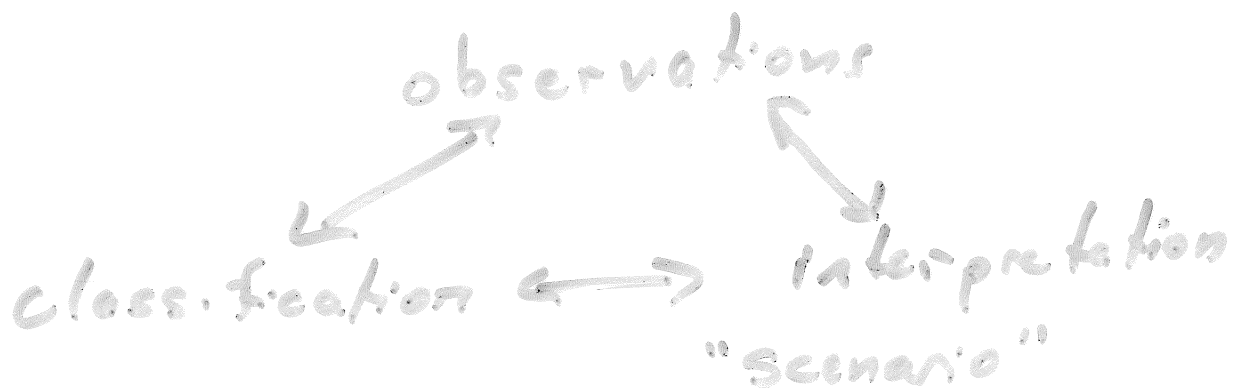
(next time)

What do you do with all
this solar system info?

scientific method.



observational sciences



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Can't See Exoplanets Directly

Newton's 3rd Law:

"every action has equal & opposite reaction"

"conservation of momentum"

Momentum: $M \times v$
 ↑
 speed & direction



+ →



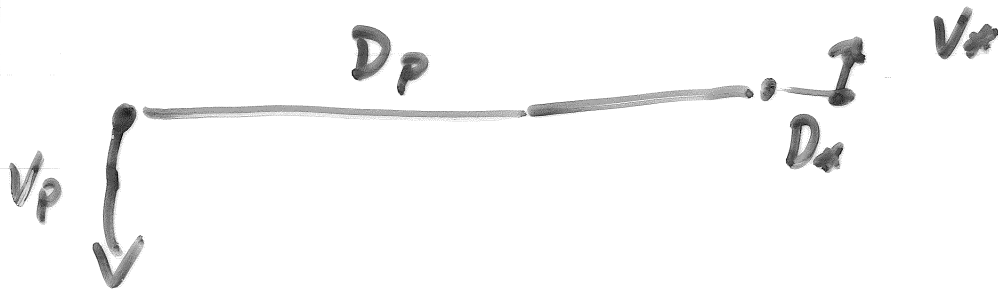
over $\frac{1}{2}$ orbit
momentum
is
reversed

STAR MOVES TOO

$$M_p v_p = M_* v_*$$

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orbit around
"center of mass"



$$V_{TOT} = V_p + V_*$$

$$D_{TOT} = D_p + D_*$$

$$D_{max} = a$$

can measure this

$$V_p M_p = V_* M_*$$

$$D_p M_p = D_* M_*$$

↑ large
↑ small

$$\text{Sun} = 2 \times 10^{30} \text{ kg}$$

$$\text{Earth} = 6 \times 10^{24} \text{ kg}$$

$$\text{Jupiter} = 2 \times 10^{27} \text{ kg}$$

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$V_* \ll V_{\text{planet}}$ but can be detected