

9/10/06

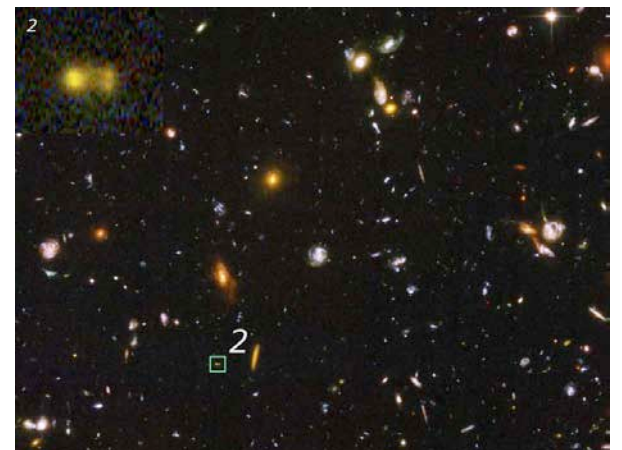
First Test, Chapters 1 - 5, Friday, September 21

Wheeler on travel Wednesday, Arizona State University. In-class review. Come with questions!

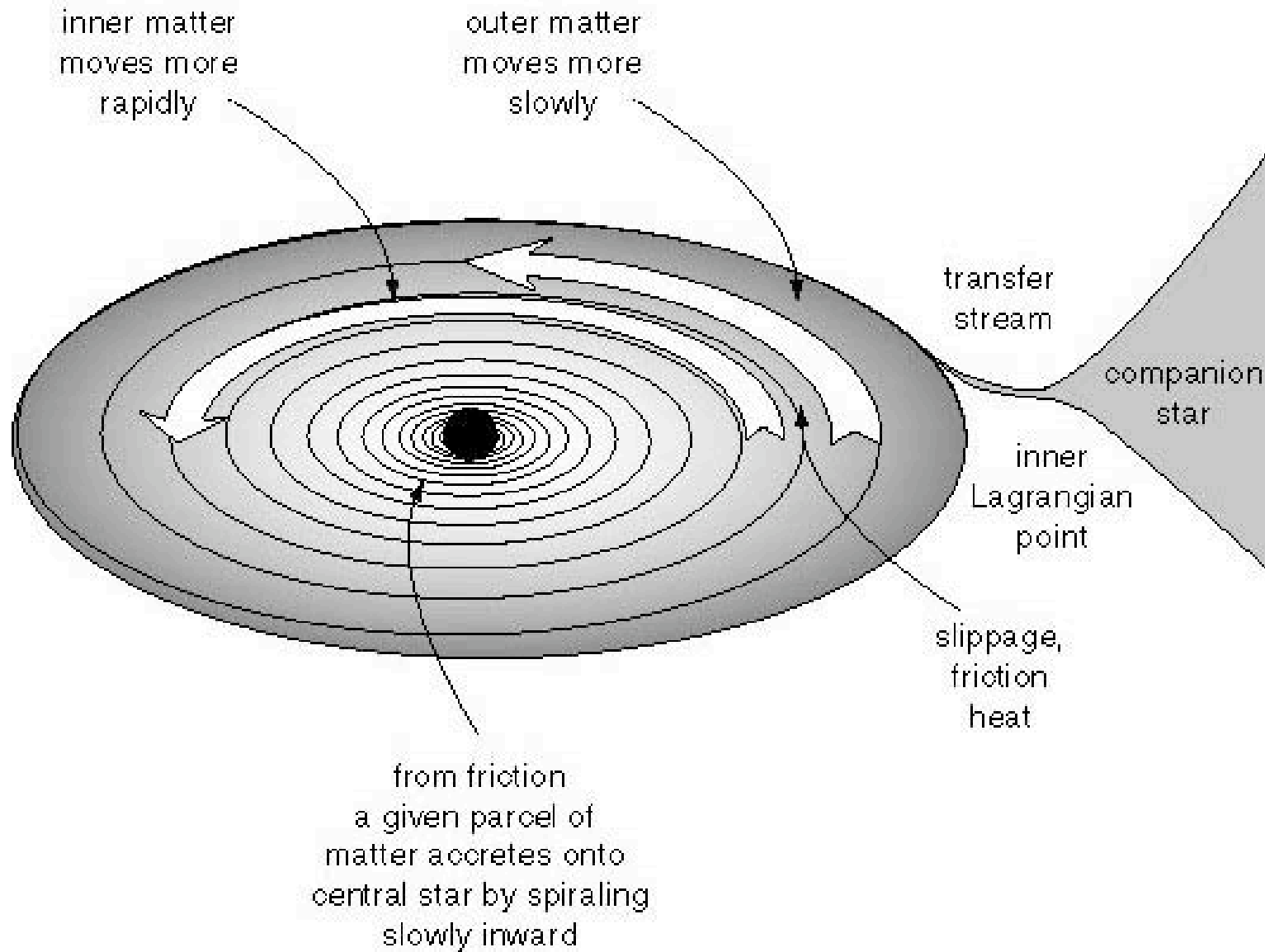
Astronomy in the news? Partial solar eclipse, noon tomorrow, Tuesday

Pic of the Day:

Hubble Deep Field - galaxies everywhere.



Basic Disk Dynamics - Figure 4.1



Basic Disk Dynamics

Orbits closer to the center are faster.

This creates rubbing and friction and heat, everywhere in the disk.

Friction tries to slow the orbiting matter, but it falls *inward* and ends up moving *faster*.

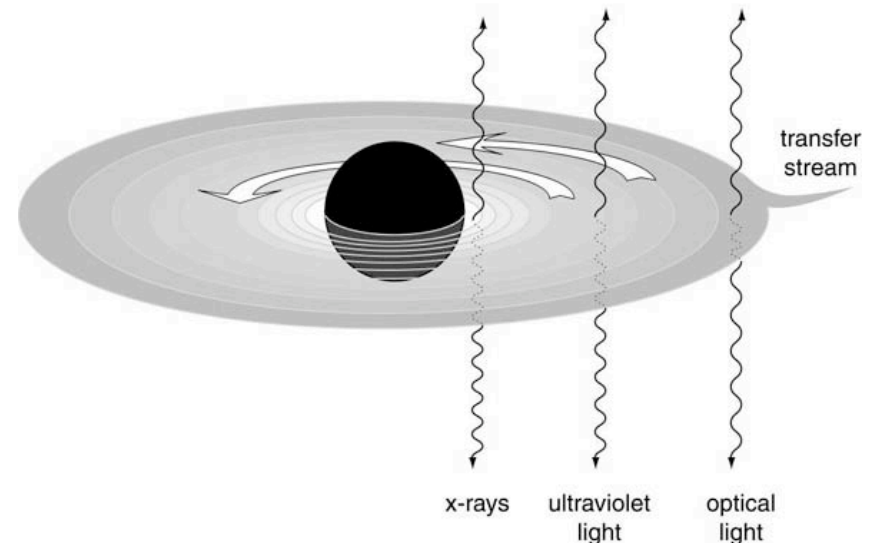
(Just as removing heat from a normal star causes it to get hotter)

Slow settling inward by friction -- *accretion*

Friction also causes *heat*.

Hotter on inside, cooler on outside

Optical → UV → X-rays
WD NS BH



One Minute Exam:

In an accretion disk, friction causes moving matter to

A Slow down

B Speed up

D Move outward

C Pass from one Roche lobe to another

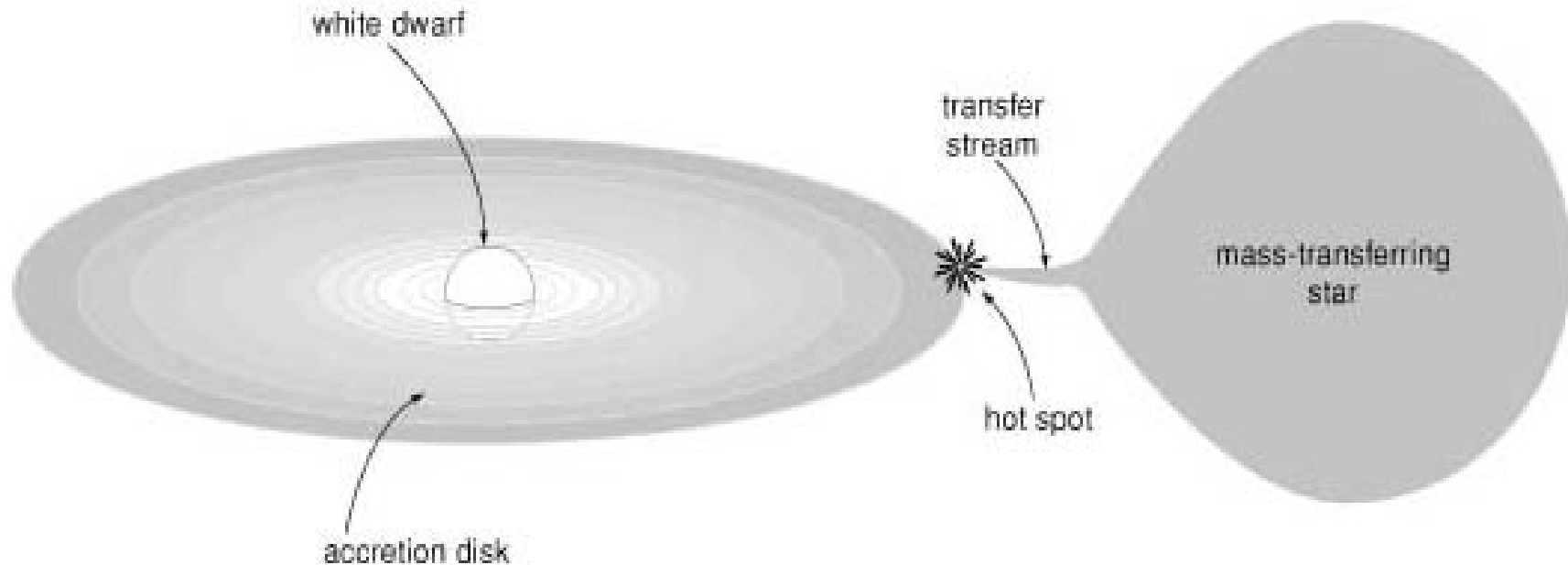
Cataclysmic Variables

Second stage of mass transfer

General Category “Novae”

“New” stars flare up, see where none had been seen before.

All CVs share same general features: *transferring star*, *transfer stream*, *hot spot*, *accretion disk*, and *white dwarf*.



Cataclysmic Variables

Dwarf Nova - flare $\times 10$ brighter

intervals of weeks to months

last days to weeks

Recurrent Nova - flare $\times 1000$ brighter

every 10-100 years

last weeks to months

Classical Nova - 10^4 to 10^5 times brighter

never observed to recur -- suspect 10^4 years

last months to years

Supernova - (one type might originate in a cataclysmic variable)

flare once 10^{10} \times brighter (10 billion times)

last months to years

Dwarf Nova

Activity in the *accretion disk*, not transferring star or central star.

Mechanism - store and flush, works when the transfer rate is low.

Disk is first cool, semi-transparent,

heat radiates away

little accretion, input more than accretion,

matter accumulates in STORAGE STATE

Disk gets denser, opaque, traps heat.

hotter disk generates *more friction and heat*

⇒ *Run away to bright, hot disk*

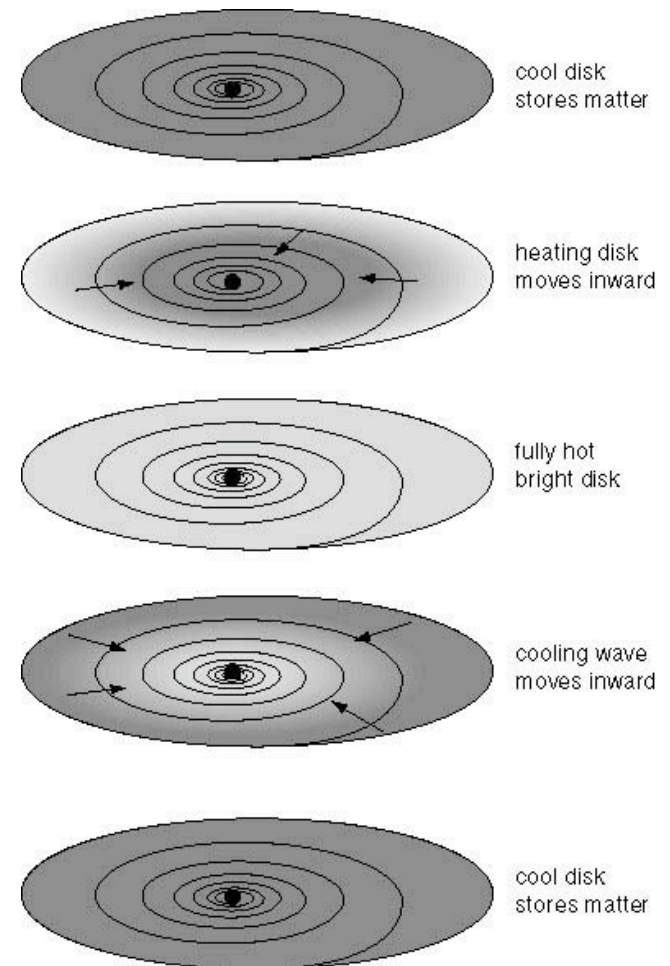
HOT, BRIGHT, FLUSHING STATE

More rapid flow through disk, faster than input

⇒ disk thins out, turns semi-transparent,

cools, returns to STORAGE STATE

REPEAT



Demonstration of Dwarf Nova

Accretion Disk Instability

Need a volunteer