11/2/07

Exam 3 will be on Friday, November 9.

Review session, Thursday, November 8, 5:00 PM
Room RLM 4.102

Reading:Chapter 8, Sections 8.1, 8.2, 8.5, 8.6, 8.7, 8.10, Chapter 9

Astronomy in the News -

Pic of the day - Lagoon
nebular and two others

Check out

Dr. Quantum in Flatland

Right in spirit, wrong in some essential details. See if you can figure out what those are.

http://youtube.com/watch?v=KhbGYn7aAUk

Falling to Einstein

According to Einstein - curved space around gravitating objects "flows" inward - ***inward escalator.***

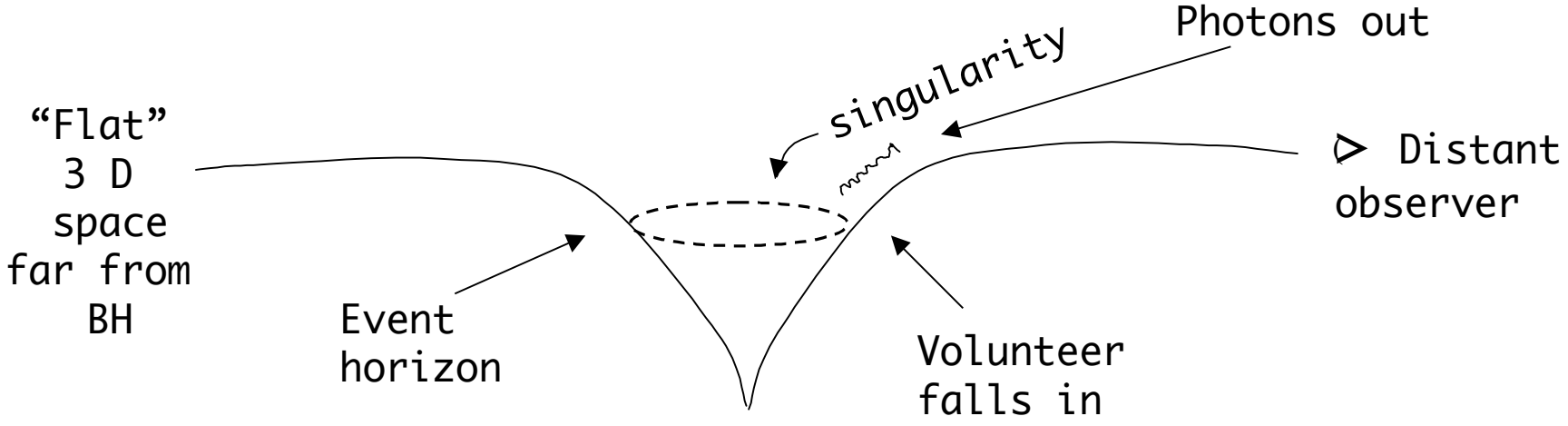
If object floats with ***no force*** in space (free fall), it will move toward the center of gravitation

$\Rightarrow$ falling - all objects respond to same curvature, have the same acceleration

Like water down a drain - sit still in water, but go down the drain.

Must exert force to resist, to avoid free fall, to avoid the flow of space inward toward the center of the gravitating object.

Specifically for Black Holes



Volunteer finds herself rapidly falling through event horizon,
noodleized, dies

Distant observer sees Doppler and gravitational redshifts

Received photons get longer, longer wavelength

Time between photons gets longer and longer

Infinite time for last photon emitted just as volunteer reaches the event horizon

⇒***Distant observer never sees volunteer cross the horizon***

⇒***Photons get undetectable, very long wavelength, most of the time is between photons - absolutely black*** **- why black holes are black.**

One Minute Exam

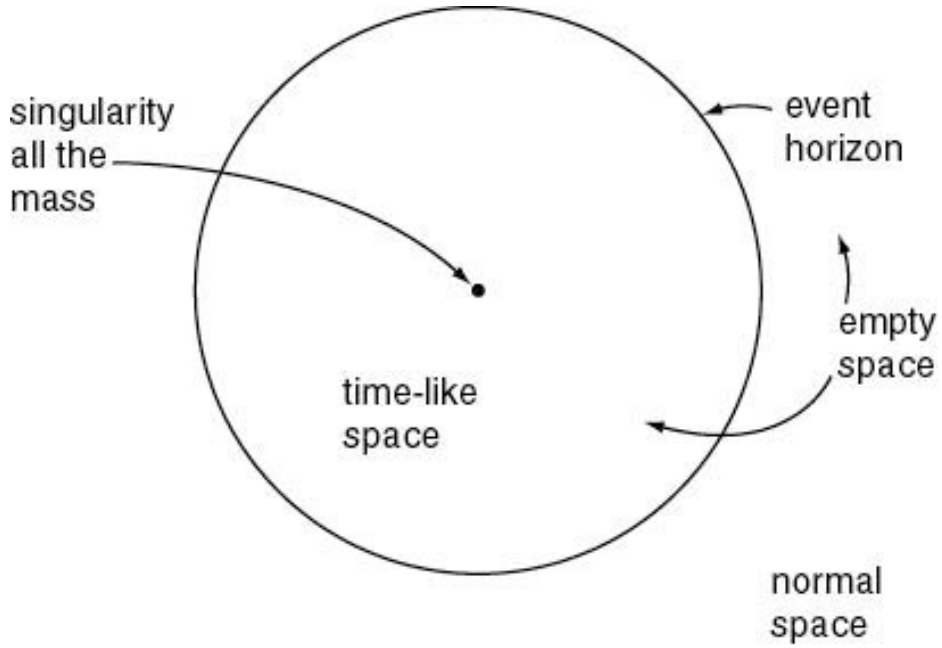
From the point of view of a distant observer, a volunteer who falls into a black hole

A) Will be noodelized and die

B) Will turn black before arriving at the event horizon

C) Will age more rapidly

D) Will shrink to a point



Singularity - all the mass is in a zero volume point in Einstein's theory.

Violates the Uncertainty Principle of Quantum Theory: cannot specify the position of anything exactly.

Need theory of ***Quantum Gravity*** to rectify, to understand what the "singularity" really is. **Deepest issue in modern physics**.