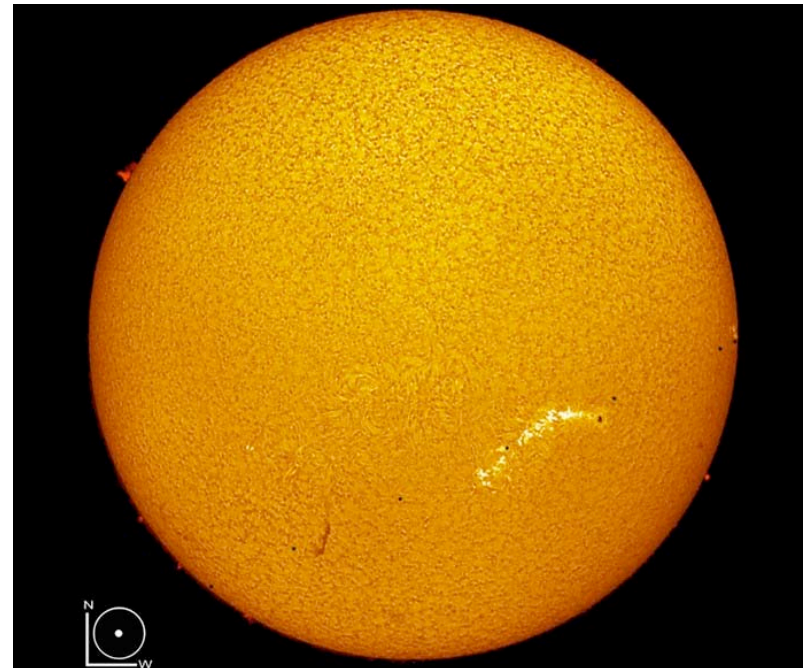11/8/06

Reading- Chapter 9 sections 6 - 8

News? Transit of Mercury

Pic of the day - Ditto!
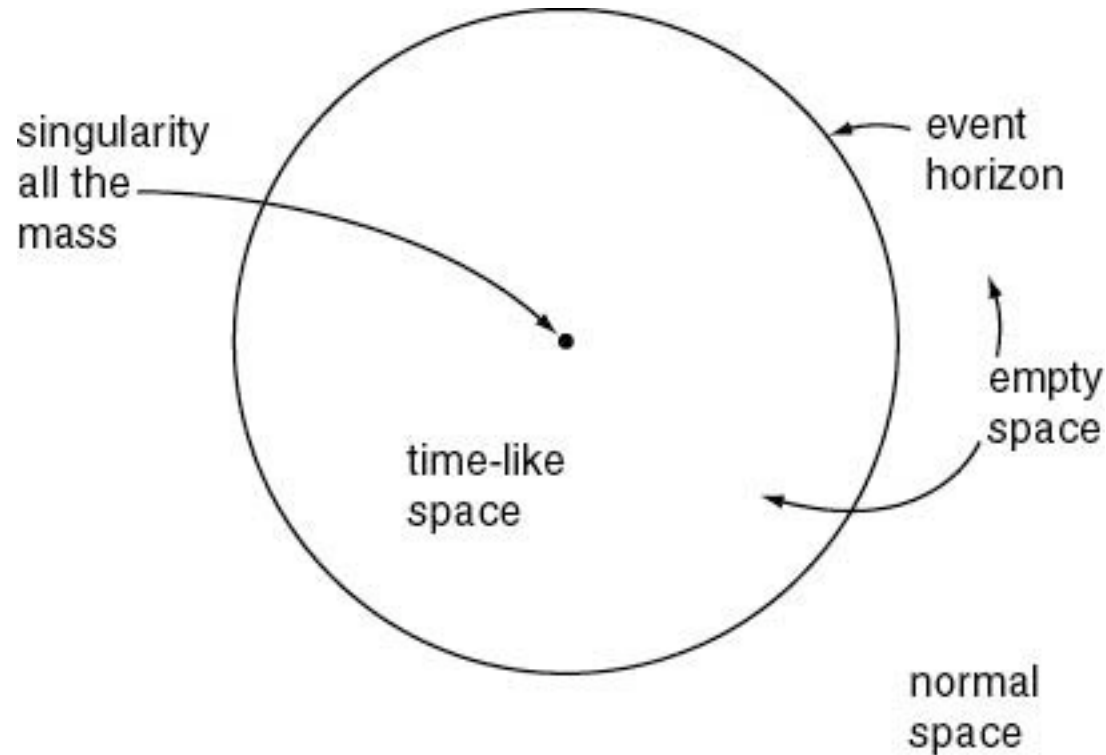
One Minute Exam

According to Stephen Hawking:

A) Black holes are totally black

B) Combining a neutron star and an anti-neutron star will make a black hole

C) A singularity is a point

D) Black holes can explode

§ 8 Time-like Space
Figure 9.1

"Time-like" space forces motion in one direction. Space moves faster than the speed of light compared to a distant observer; the real reason black holes are black.

Non-rotating Schwarzschild Black Hole

singularity all the mass

event horizon

empty space

time-like space
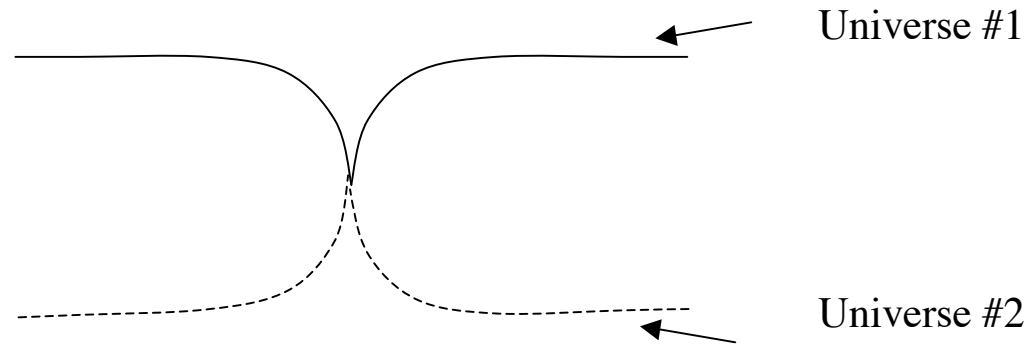
normal space

Mass, but no spin, no electrical charge

Assume all mass in singularity, no mass anywhere else (assumption necessary to solve equations)

Find two Universes, each of infinite space, connected at one instant by singularity.

Cannot pass from one to the other if travel at less than the speed of light
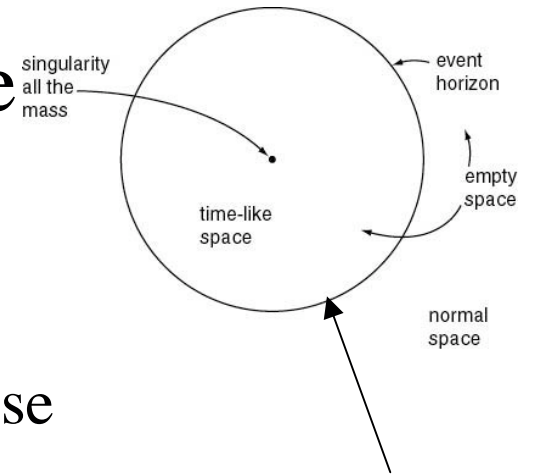
Event horizon is also surface of infinite redshift
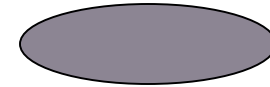
Universe #1

Universe #2

Rotating Kerr Black Hole

Mass and spin, but no electrical charge

Assume all mass in singularity, no mass anywhere else
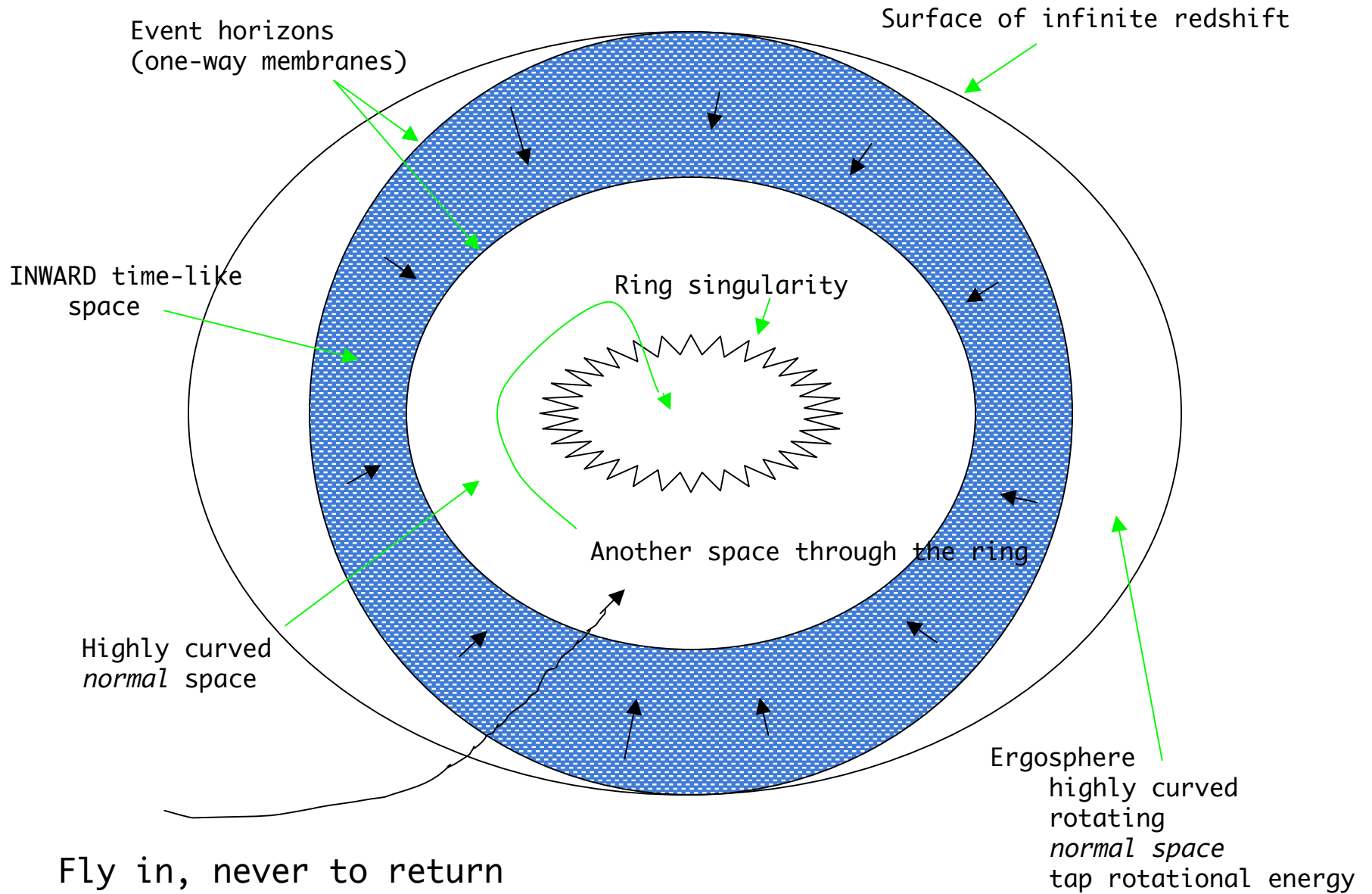(assumption necessary to solve equations)

Find *singularity is a ring* (not a point)
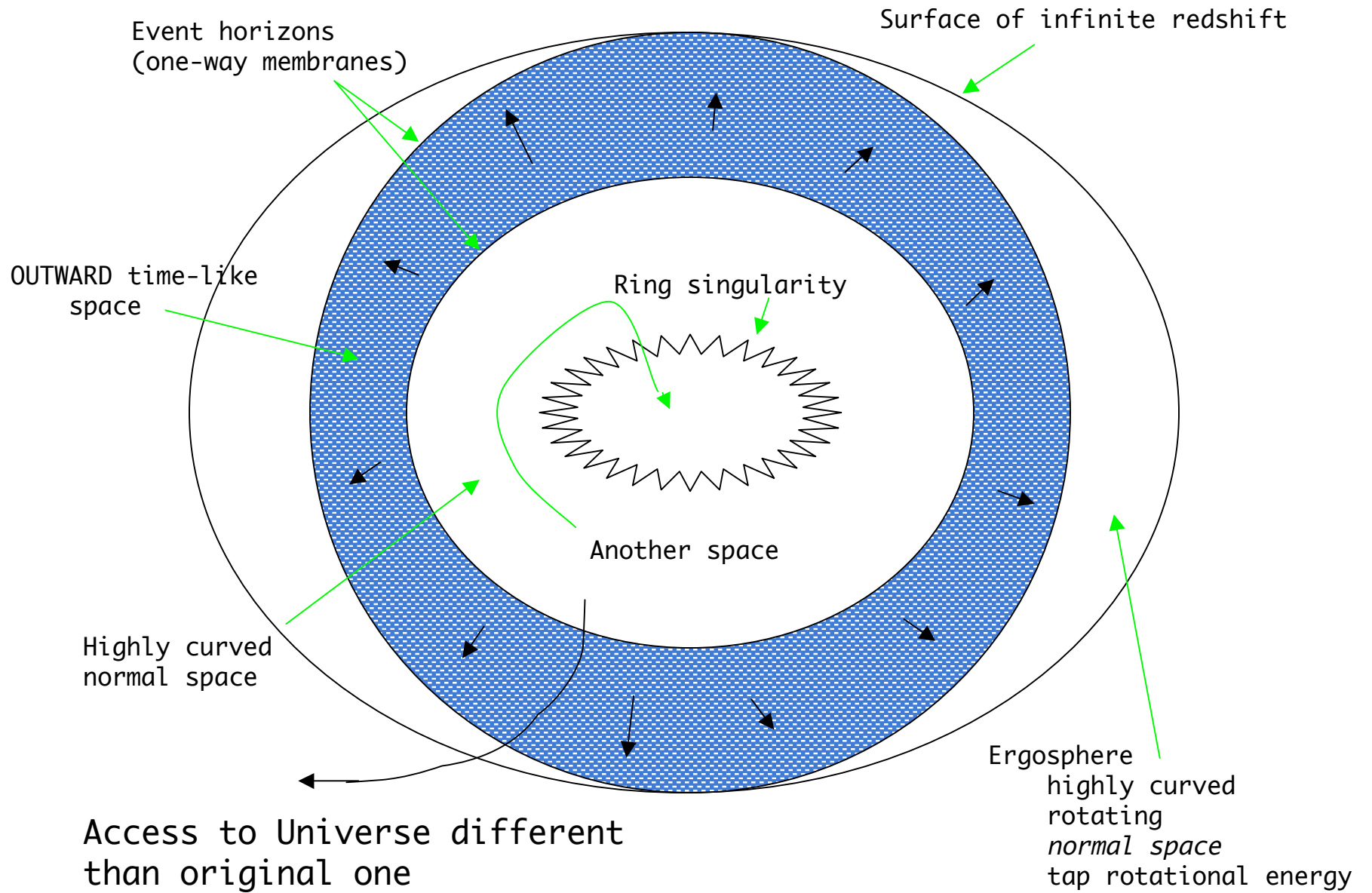
0 thickness, ∞ density, still uncertainty problem

Infinite Universes!

Cross-sectional view of rotating Kerr black hole

Event horizons
(one-way membranes)

Surface of infinite redshift

INWARD time-like
space

Ring singularity

Another space through the ring

Highly curved
normal space

Ergosphere
highly curved
rotating
normal space
tap rotational energy

Fly in, never to return

In future

Event horizons
(one-way membranes)

Surface of infinite redshift

OUTWARD time-like
space

Ring singularity

Highly curved
normal space

Another space

Ergosphere
highly curved
rotating
normal space
tap rotational energy

Access to Universe different than original one

Are Different Universes Real?

In Real Universe:

Light falls in

Accelerated to higher energy: Bluesheet
     warp space
     change mathematical, hence physical solution

So, probably not in this case, but stay tuned…

One Minute Exam

In a rotating black hole:

A) The surface of infinite redshift is identical to the event horizon.

B) You can escape the black hole back to the universe from which you entered.

C) There are exactly two universes.

D) The space entered through the singularity is different than the space surrounding the singularity.