

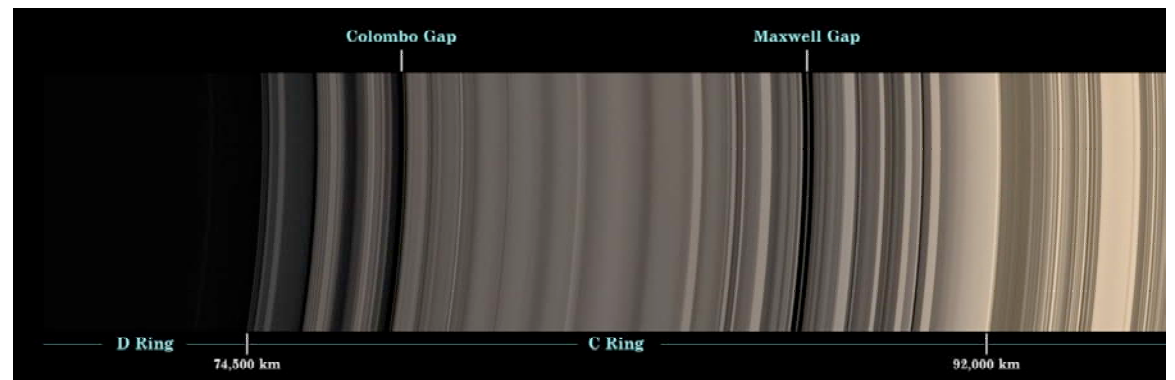
10/24/07

Exams back, key posted.

Sky Watch back Friday.

Astronomy in the News - Shuttle launched yesterday to the International Space Station, women in command of both

Pic of the day - gaps in Saturn's rings



## Skywatch Extra Credit Targets constellations only, not all visible

### Magnetar Candidates

<b>Name</b>	<b>Location</b>	<b>Rotation (seconds)</b>	<b>Year Discovered</b>
SGR 0526-66	Large Magellanic Cloud	8.0	1979
SGR 1900+14	Aquila	5.16	1979
SGR 1806-20	Sagittarius	7.56	1979
SGR 1801-23	Sagittarius	-	1997
SGR 1627-41	Ara	6.4	1998
AXP 1E 2259+586	Cassiopeia	7.0	1981
AXP 1E1048.1-5937	Carina	6.4	1985
AXP 4U 0142+61	Cassiopeia	8.7	1993
AXP 1RXS J170849-400910	Scorpius	11.0	1997
AXP 1E 1841-045	Scutum	11.8	1997
AXP AX J1844-0258	Aquila	7.0	1998
AXP CXOU J010043.1-721134	Small Magellanic Cloud	8.0	2002
AXP XTE J1810-197	Sagittarius	5.5	2003
AXP CXO J164710.2-455216	Ara	10.6	2005

# Black Holes

Mitchell, Laplace, late 18th Century: with Newton's Gravity  
could have escape velocity greater than the speed of light =>  
light could not get out, completely dark, *corps obscurs*.

Now know Newton was wrong.

Excellent approximation for weak gravity - "true" in that case

Conceptual problems  $F = \frac{G M_1 M_2}{r^2}$

infinite force for zero separation (in physics infinity  
=> problem )

instantaneous reaction => infinite speed of gravity

Experiment - wrong deflection of light.

Need Einstein and more!

# *Great conceptual differences between Newton and Einstein on the Nature of Gravity*

Newton - Force between two objects

Einstein - Mass curves space, objects move *with no force* in curved space

Need to explore curved space - use geometry in multiple dimensions

## SPACE - *The Final Frontier*

***Dimensions*** - defined by the number of mutually perpendicular directions

0 D - point

1 D - line

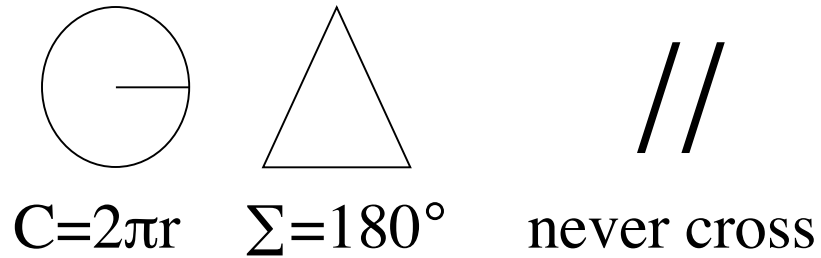
2 D - area

3 D - volume (secret hand sign)

4 D - ?

Hyperspace - space with more dimensions than the one under consideration

## Euclidian - Flat Space Geometry



Answers only good in *flat space*: operational definition of flat space

## *Non-Euclidian geometry - curved space*

Both flat space and curved space use concept of “straight line”