

10/26/07

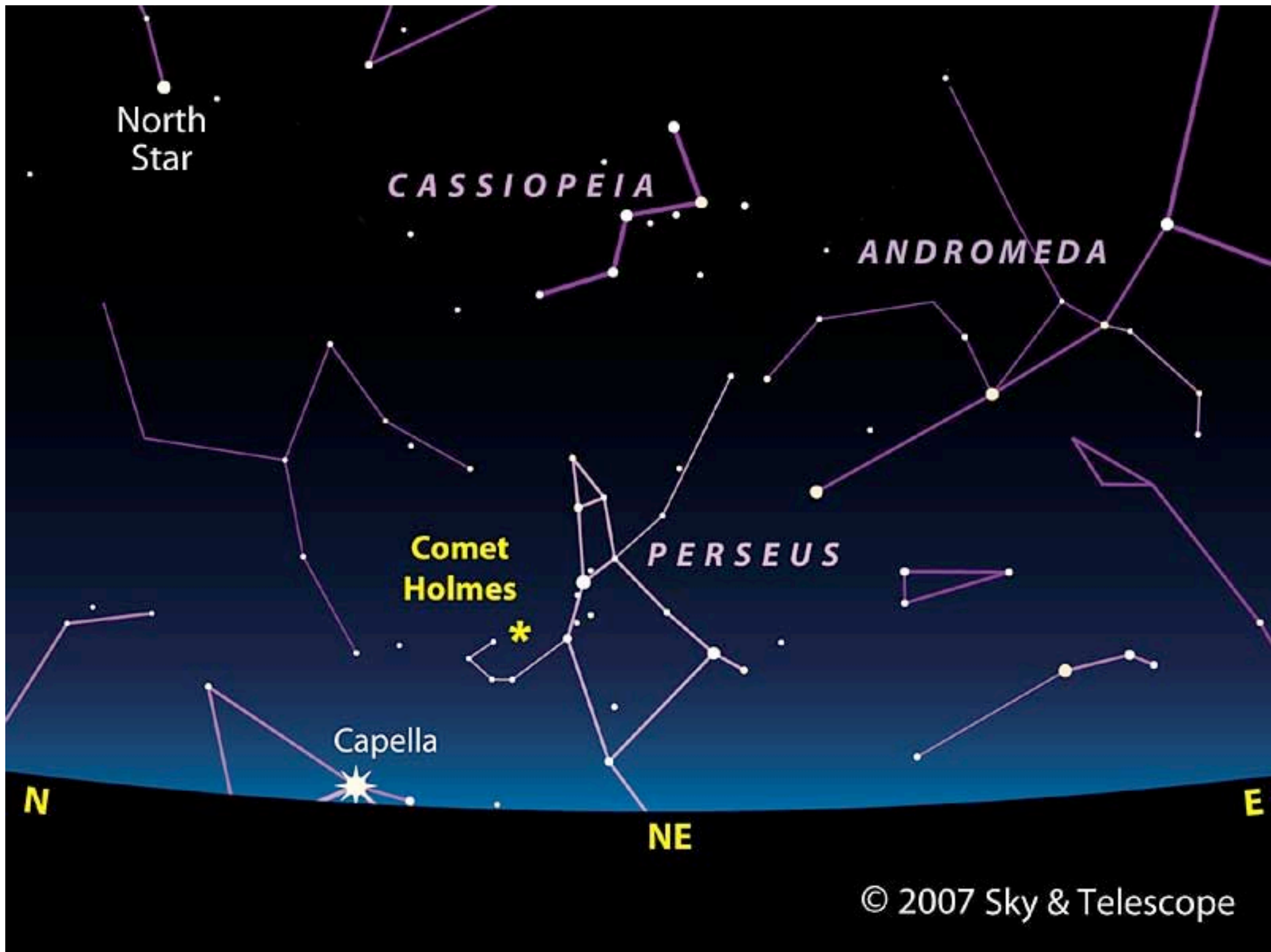
Sky Watch back.

Chinese launched mission to orbit Moon on Wednesday, Chang'e I, goddess who flew to the Moon.

Astronomy in the News - exploding comet, Comet Holmes got brighter this week by a factor of a million. Cosmic Catastrophe.

Pic of the day - Comet Holmes from Tehran





Curved Space - explore with straight lines

Definition of straight line

Shortest distance between 2 points - rubber band

Draw a free hand straight line

Parallel propagation - rulers

Parallel propagation will give the shortest distance between two points without necessarily knowing where the two points are in advance.

Parallel propagation works easily, even when the space is *curved*.

Balloon

Surface is curved 2 D space

3 D space around the balloon, inside the balloon is *hyperspace* with respect to the 2D surface

Imagine a 2 D creature that can only perceive 2 D space.

2 D creatures can learn all about the curvature of the space they inhabit by doing geometry in 2 D - they never need to know about or care about “hyperspace.”

That’s us in 3 D! There might be 4D (or higher!) hyperspace around us, but we don’t perceive it.

We can, in principle, learn everything we need to know about our 3D Universe by doing 3D observations and experiments in the confines of our own dimensionality, just as 2D creatures could learn of their universe, the surface of the balloon.

Geometry on the 2D surface of the balloon

Exercises of drawing straight lines

Surface of the Balloon -

What is a straight line, what is not?

What is “inside?” What is “outside?”

Where is the “center?”

What does it mean to go from surface point to surface point
“through” the balloon interior?

Real 3 D curved space (for us!!) might curve in a 4 D
“hyperspace,” but we do not directly perceive that
hyperspace.

Can determine curvature, shape of 3 D real space by doing
3 D geometry.

Do not need to ask about 4 D (but will!)