

February 1, 2010

First Exam Friday

Reading assignment, Chapter 6 Sections 6.1 - 6.3, plus Section 1.2.4, Sections 2.1 - 2.5, Section 5.1

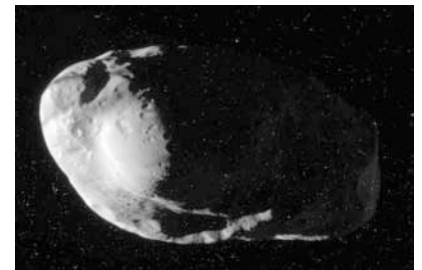
Review Sheet posted Monday afternoon for download,

Review Session Thursday 5 PM, RLM 15.216B.

See Moon, Mars Friday?

Astronomy in the News? President's budget released today. Return to Moon cancelled? Being announced now. New plans for commercial rockets for humans announced tomorrow 9:00 AM. Both on www.nasa.gov/newsaudio.

Pic of the Day - Saturn moon Prometheus



Sky Watch Extra Credit - location of supernovae

SN 1006 - Lupus/Centaurus

SN 1054 Crab Nebula - Taurus

SN 1572 Tycho - Cassiopeia

SN 1604 Kepler - Ophiuchus

Cassiopeia A - Cassiopeia

***Betelgeuse - Orion, Red Supergiant due to explode
“soon” 15 solar masses***

*Antares - Bright Red Supergiant in Scorpius, 15 to 18 solar masses
(+companion)*

Rigel - Orion, Blue Supergiant due to explode later, 17 solar masses

U Sco - Scorpius, possible white dwarf supernova progenitor.

One Minute Exam

Tycho's supernova of 1572 shows no sign of a compact object left over in its center. This suggests that:



It made a jet



It was formed by the collapse of a massive star



It was formed by an exploding white dwarf



It actually exploded much earlier than 1572

Discussion point: What's going on here?



All supernovae since 1680, since invention of telescope, modern astronomy, have been discovered in other galaxies.

Galaxies like our Milky Way produce supernovae about once per century.

Our Galaxy is overdue for another!

Recognition (early in the 20th century) that some “novae” were in distant galaxies and hence were 10,000 to 100,000 times brighter than classical novae in the Milky Way.

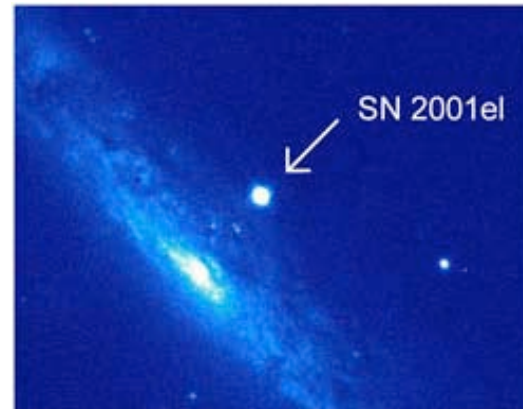
Led to the recognition and naming of “super” novae.

Web site of recent bright supernovae:

<http://www.rochesterastronomy.org/snimages/>

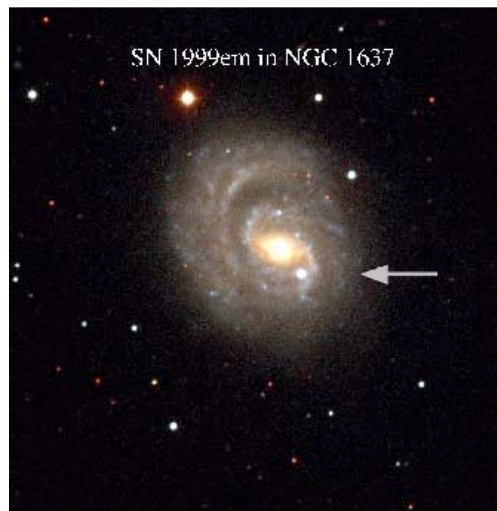
Sample of extragalactic supernovae

SN1994D



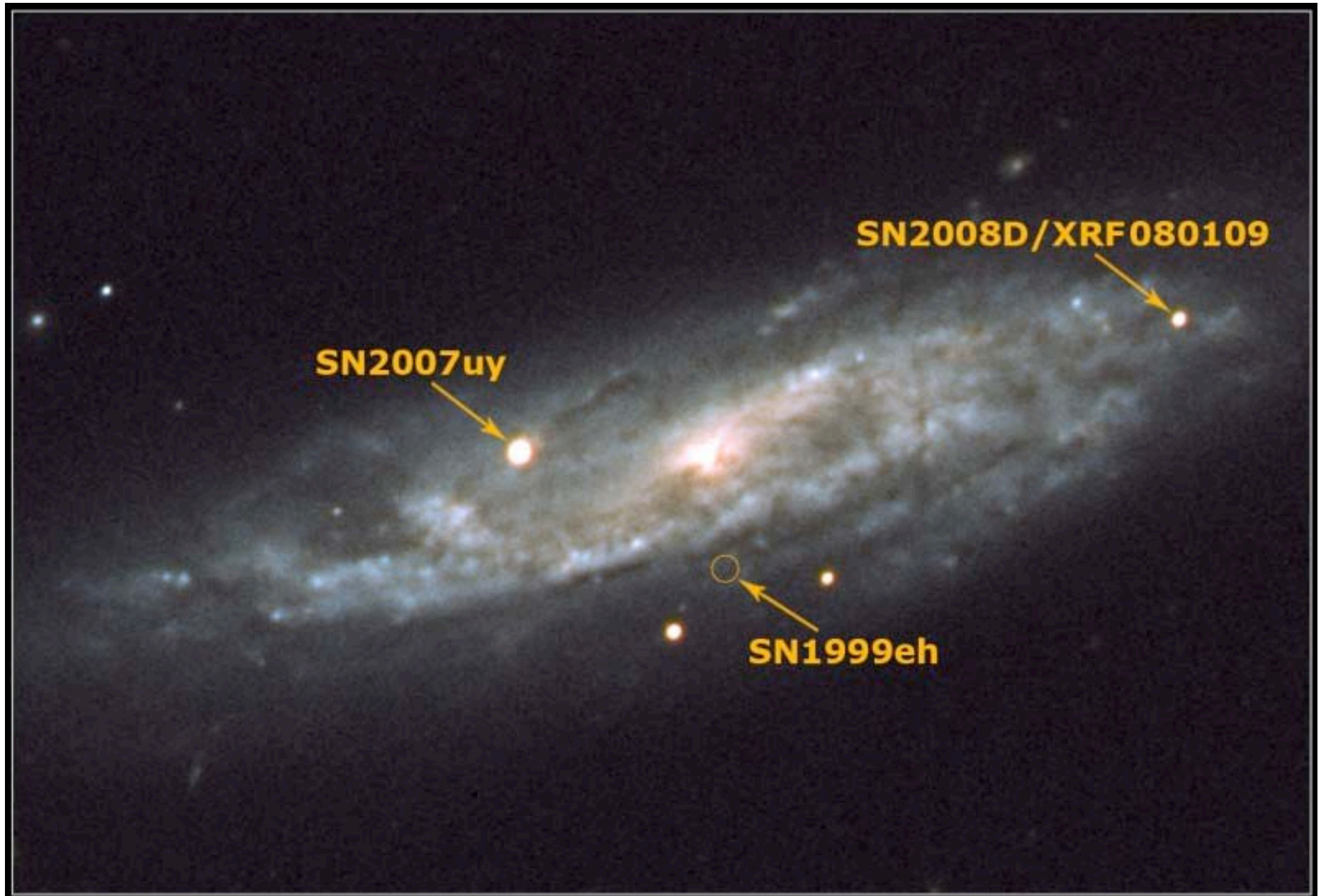
SN2001el

SN1999em



SN 2006X

Some galaxies are rapid producers of supernovae.



Extra Galactic Supernovae: the basis for modern astronomy of supernovae

Cannot predict which galaxies will produce a supernova, so watch lots of galaxies

We found two dozen per year prior to SN 1987A, but with new attention and use in cosmology, now find several hundred per year, most at great distances, more difficult to study.

Nomenclature: A-Z, aa-az, ba-bz, etc.

SN1987A - 1st of 1987 (also most important, but that is not what the “A” means).

This year’s latest, SN 2010S, discovered January 15 - #19 so far in 2010.

Discussion Point:

How would you tell that an explosion was from a massive star or from a white dwarf star?

Categories of Supernovae

1st category discovered

Type Ia - no detectable Hydrogen in the spectrum, rather “intermediate mass elements” such as oxygen, magnesium, silicon, sulfur, calcium. Iron appears later as the light fades.



These occur in all galaxy types:

In **spiral galaxies** they tend to avoid the spiral arms, they have had time to drift away from the birth site → *the star that explodes is old*

In **irregular galaxies**

In **elliptical galaxies** where star formation is thought to have ceased long ago → *the star that explodes is old*

⇒ *the progenitor that explodes must be long-lived, not very massive, suggesting a white dwarf.* Sun is long-lived, but won't explode