Exam 1Friday

Chapters 1 - 5

Review sheet posted on web site

Review session this evening: RLM 15.216B 5-6 PM
office hours today 2 PM, Mike tomorrow, 10 AM

News?

Pic of the day - Ivan

Reading:

Chapter 6 Supernovae

Also § 2.1, 2.2, 2.4 & 2.5 for background

Issues to look for in background:

Why is it necessary for a thermonuclear fuel to get hot to burn - charge repulsion § 2.1 & 2.2

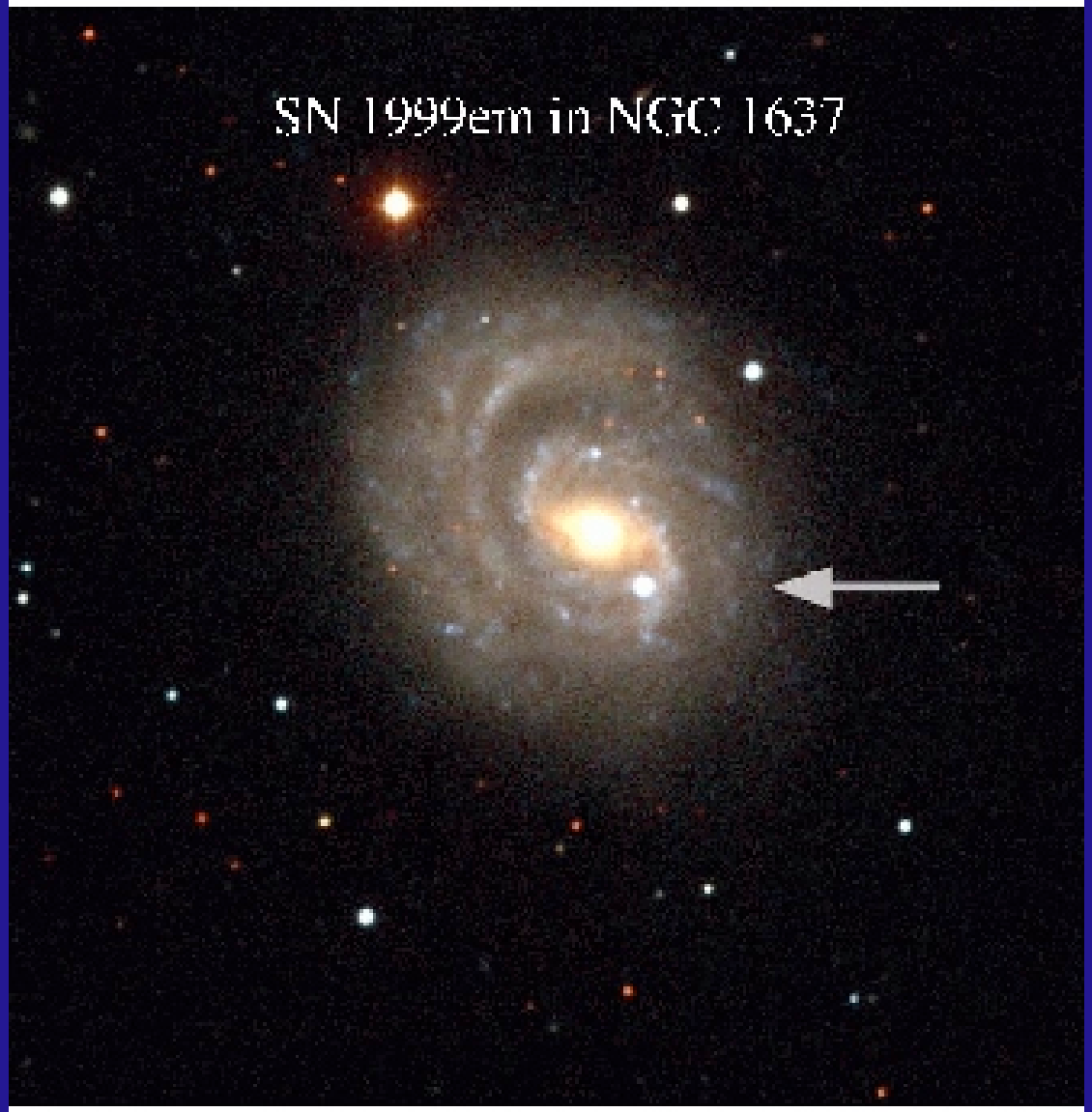
Core Collapse § 2.4 & 2.5

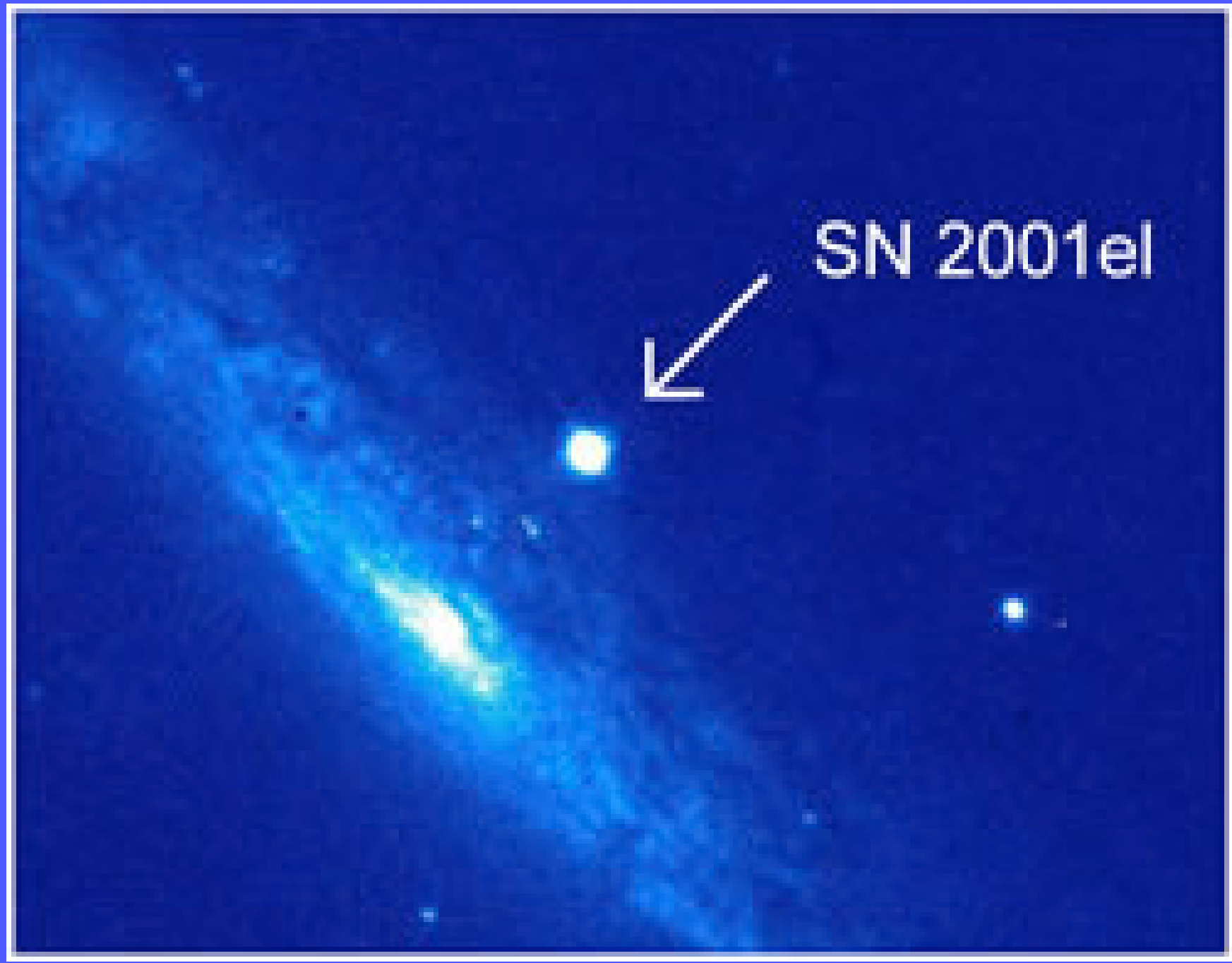
All SN since 1680, since invention of telescope, modern astronomy, have been discovered in other galaxies.

Our Galaxy is overdue for another!

It was recognizing (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 that led to the recognition and naming of “super” novae.

SN 1994D in the Whirlpool Galaxy


SN 1999em in NGC 1637


SN 2001el

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 over 100 per year, most at great distances, more difficult to study.

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

SN1987A - 1st of ‘87 (also most important, but that is not what the “A” means).

This year latest, last Thursday - SN 2004ef
$26 + 4 \times 26 + 6 = 26 + 104 + 6 =$ 136th of 2004

Categories of Supernovae

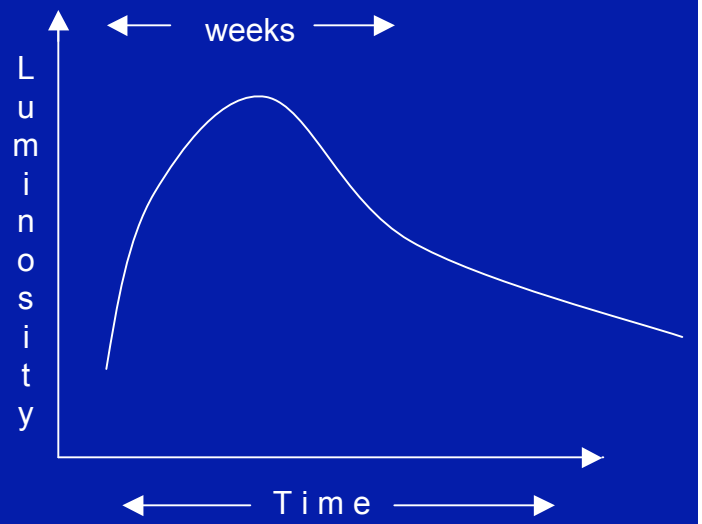
1st discovered

Type Ia - no detectable Hydrogen in the spectrum, rather "intermediate mass elements" like 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

Type Ia Light Curve
brightness vs. time
consistent with an
exploding C/O white dwarf
no neutron star



If U Sco becomes a supernova it will probably be a Type Ia

SN 1006, almost definitely

Tycho, SN 1572 almost definitely

Kepler, 1604, some argue yes (no sign of neutron star), but some ambiguities suggesting a massive star progenitor