

Dark Matter in NGC3762—3 Nov

- No class on Wed, Nov 26th
- To find mass of NGC3762 and the location of the mass.
- Where is the mass?
 - Answer: Mass is not where the stars are.
- Galaxies are made mostly of what we cannot see.



Most mass here. not where stars are.

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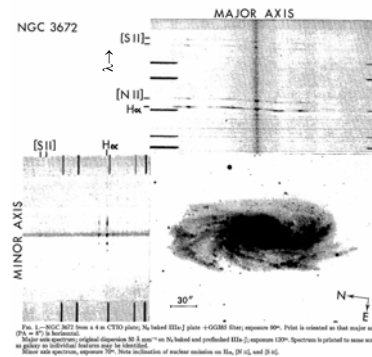
Review

- Astronomers use the same physics (Kepler's 3rd law) to measure the mass of and the galaxy NGC 3672.
- 3. Under influence of the gravity of the sun (galaxy), a planet (cloud of gas) moves a given distance. If the time is short, the mass is
 - A. greater.
 - B. smaller.
- 4. Rather than the form of Kepler's 3rd law $M=R^3/T^2$, astronomers use $M=Rv^2$ and the Doppler effect for measuring the mass of a galaxy, because
 - A. galaxies are much farther away.
 - B. the period is too long to measure directly.
 - C. the periods are different for different clouds of gas.

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1. What in the spectrum along the major axis shows different parts of the galaxy are moving at different speeds? My answer is
 - A. right.
 - B. wrong.
2. Why is the same motion not seen in the spectrum along the minor axis? My answer is
 - A. right.
 - B. wrong.

NGC 3672, Vera Rubin, Norbert Thonnard, & Kent Ford, jr., 1977, *Astrophys. Journal* 217, L1.



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1. How fast is the galaxy moving from us?
 - A. 2040 km/s
 - B. 1850 km/s
 - C. 1650 km/s
2. Why is the galaxy moving from us?
 - A. It is rotating
 - B. Big bang
 - C. Supernova
3. If the mass of the galaxy were greater, would this speed be different?
 - A. Yes
 - B. No
4. What is the rotation speed of gas that is 16 kpc from the center?
 - A. 2040 km/s
 - B. 1850 km/s
 - C. 190 km/s
5. If the mass of the galaxy were greater, would this speed be different?
 - A. Yes
 - B. No

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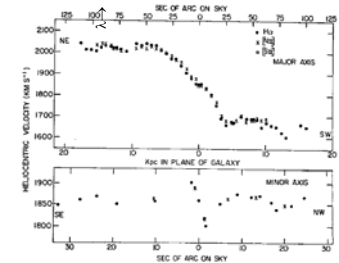


FIG. 3.—Upper, major axis heliocentric velocities on plane of sky, as a function of distance from the nucleus. Lower, minor axis velocities as a function of distance from the nucleus; note change in scale from upper plot. The steep velocity gradient in nuclear region along minor axis is prominent.

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