

Dark Matter in a Nutshell

- ⊙ Vera Rubin - 1967 – astronomer Washington, D.C.
 - Observed stars in Andromeda galaxy had higher than expected orbital speeds.
- ⊙ Have observed the same phenomena in nearby Triangulum galaxy.
 - A galaxy is a large cluster of stars. All of it moves/orbits
- ⊙ Physicists see outer stars as orbiting the central mass of a galaxy.
 - The more larger the mass, the faster the stars will orbit.
 - (Look at the formula below)

Think: more mass = more F_g = more pull = object moves faster around.
(just like my beanbag on a string)

- ⊙ By measuring orbital speed of stars in Triangulum and using

$$M_{\text{galaxy}} = \frac{v^2 r}{G}$$

physicists calculate the central mass of Triangulum galaxy to be equivalent to 46 billion stars!

- ⊙ However, by using a different method, the brightness method, physicists calculate the central mass is only 7 billion stars!!

That's a discrepancy of 39 billion stars!

- ⊙ This unseen matter is called "Dark Matter".
 - It does not give off or reflect light, so it is not observable by the Brightness Method.
 - But we know its there because it helps swing those outer stars around fast!
- ⊙ This observation is repeated in every known galaxy.
 - Dark matter seems to account for 90% of the mass of galaxies!
 - We're not sure exactly WHAT dark matter is.