

Vera Rubin

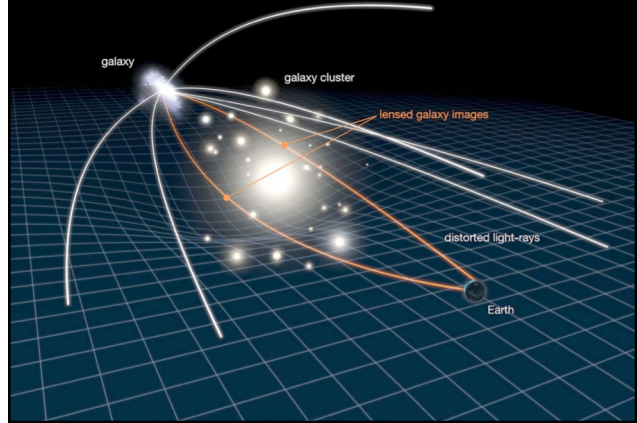


In a spiral galaxy, the ratio of dark-to-light matter is about a factor of ten. That's probably a good number for the ratio of our ignorance-to-knowledge. We're out of kindergarten, but only in about third grade.

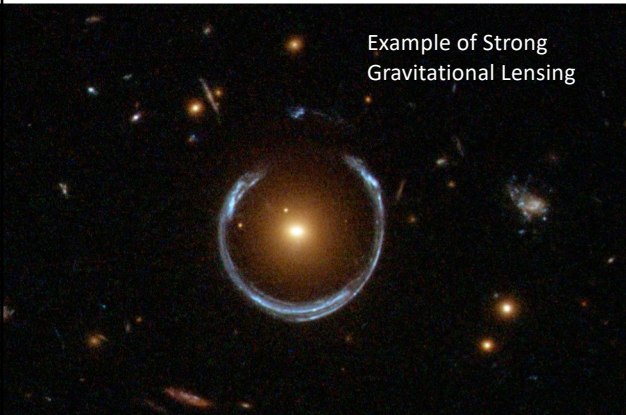
— Vera Rubin —

AZ QUOTES

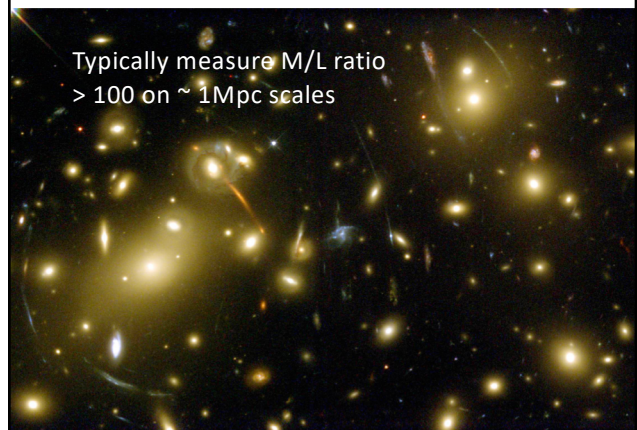
Gravitational Lensing by a Cluster

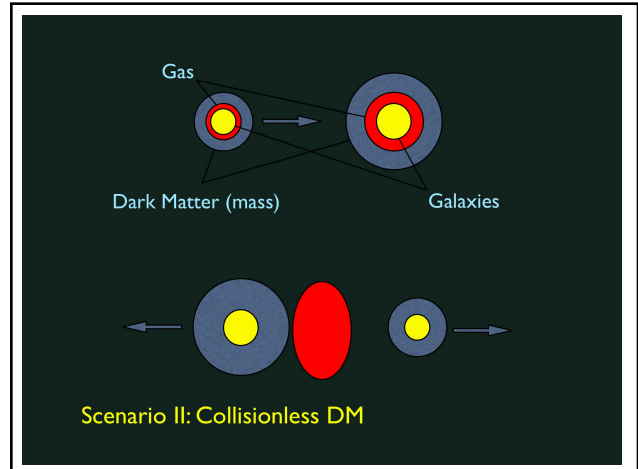
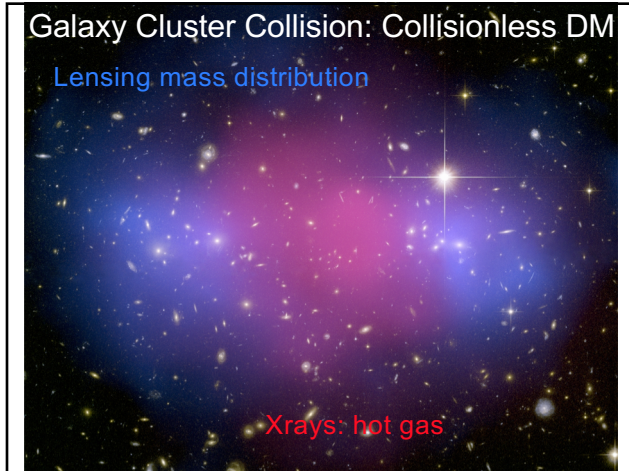


Einstein Ring from nearly perfectly aligned background galaxy



Gravitational Lensing By A Cluster





What is Dark Matter ?

- Cold Baryonic Matter (e.g. H_2) or neutrinos?
 - Violates nucleosynthesis limits from Big Bang & does not appear to be enough neutrinos
- Modified Gravity (MOND)
 - Fails or needs unrealistic parameters to fit observations of large scale structure or CMB structure
- MACHOs = Massive Compact Halo Objects (black holes, brown dwarfs, etc.)
 - Microlensing limits < 10% of MW Halo is MACHOs
- WIMPs = Weakly Interacting Massive Particles ("cold dark matter" = CDM)