

Meeting 10
March 17, 2021

3. DM only gravitate, EM, weak, strong unknown
DE could be particles (p - ρ relation), DE is a field, definitely not particles, relationship unknown
4. Spin up/down, wave has to fit into box
5. Electrons stack up at zero temperature. Early universe is very hot, so not a problem. White dwarf (Sun mass in Earth radius)

Dark Matter

6. Statistical means of measuring mass using the Virial Theorem. Velocities based on redshifts.
7. FZ not well liked....
8. Measurements made possible by technology of image intensifying
9. VR with image intensifier, light curves for many galaxies.
10. Galaxies more complex, this is best guess
11. 10^{23} atoms, much work needed - low signal, much background
12. 1989 Gotthard experiment, cosmic ray showers sort of well understood
13. MANY experiments - Xenon series generally best, AMS look for debris in cosmic rays
14. DM fluctuations leaves 1 degree impression in CMB - can analyze for DM, baryon properties, galaxies emerge with time
15. Intracluster gas 90% of baryons, weak lensing for total mass COM

Dark energy

17. Hubble Key Project - Wendy Freedman
18. 1/galaxy/century, study ones nearby
19. Large effect, up is dimmer
20. Combination of CMB, Hubble data
- 21, 22. Lambda known to 1%, no more low hanging fruit
24. Does not explain everything, but not contradicted by anything
25. Scale factor=expansion, determined by density
26. Density determines scale factor
28. Huge dot during inflation drives density to critical density, creeps away later, can adjust inflation
29. A big fight...
30. These numbers come from six measured parameters
31. Weinberg a sour puss...

Los Endos

