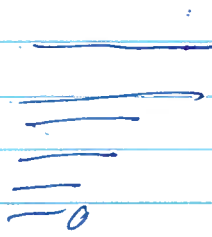
Evan Reed

2/20/15



$p \rightarrow \mathcal{E}_{kin} = \frac{p^2}{2m} \rightarrow \mathcal{E}_{tot}^{kin} \sim p_f^2 \sim \frac{1}{R^2}$ (classical)

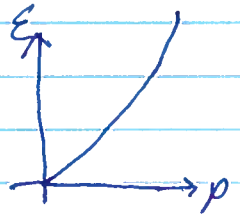
$\mathcal{E}_{grav} \propto \frac{1}{R}$

$\mathcal{E}^2 = p^2c^2 + m^2c^4$ special relativity

$\mathcal{E}_{kin} = \sqrt{p^2c^2 + m^2c^4} - mc^2$

$mc^2 + \frac{p^2}{2m} + \ldots$ for very small p

$\mathcal{E}_{kin} \cong pc$ for extremely large p



For Sirius B

$p_f = 670,000 \frac{eV}{c}$

$mc_e = 511,000 \frac{eV}{c}$

could end up in situtation where fermi pressure does not balance gravity if relativitic terms are taken into account

Chandrasekhar limit (white dwarfs) $= 1.4 \times M_{sun}$

- as Mass increases, R decreases

Type 1a Supernova

- white dwarf accumulates mass from (Giant) companion exceeds Chandrasekhar limit, goes supernova

- Supernova for Supergiants

Fusion for Supergiant

- Onion ($25 M_{sun}$)

various elements form layers (cores) that burn at different times

as core collapses energy is released, enough to seperate elements into nucleons and collapse e^- to p

$p + e^- \rightarrow n + \nu_e$

n

end product neutron star