

by
March } 2015
April }

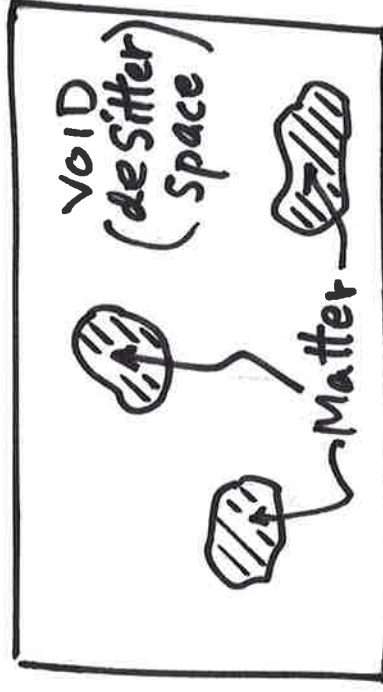
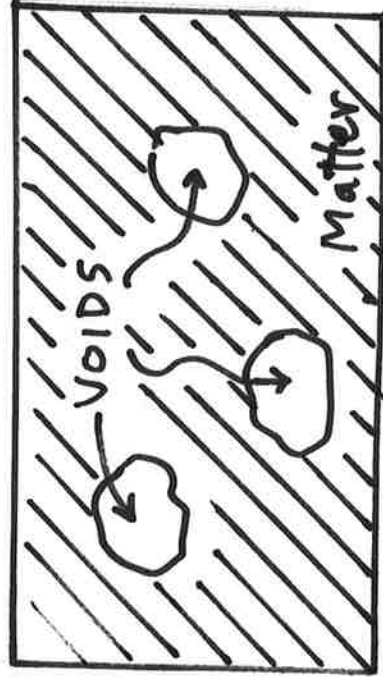
VOIDS

The Usual Definition:

The Suggested Definition

DENSITY CONTRAST

RIEMANN CURVATURE



BEFORE ($\rho(t) \ll 1$)

AFTER ($\rho(t) \gg 1$)

RIEMANN CURVATURE

$$R_{\mu\nu}^{\alpha\beta} \sim \frac{GM}{r^3} \begin{pmatrix} 2 & & & & & \\ & -1 & & & & \\ & & -1 & & & \\ & & & 2 & & \\ & & & & -1 & \\ & & & & & -1 \end{pmatrix}$$

tr to tp of r0 r4

Schwarzschild

$$R_{\mu\nu}^{\alpha\beta} \sim \Lambda \begin{pmatrix} & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \end{pmatrix}$$

de Sitter

THE NEWTONIAN LIMIT

Tidal tensor: $T_{ij} = \nabla_i \nabla_j \phi \sim$ Newtonian potential

If $Tr \rho^2 \gg \Lambda$, Matter

If $Tr \rho^2 \ll \Lambda$, de Sitter Void

THE SUGGESTION

- Locate the boundary surface in LSS simulations
- Learn by doing
- Is evolution of boundary surface sensitive to quintessence models?
- Study motion of "test particles" in voids
- Apply what is learned to real life (much harder)