

Fixing the Past; Changing the Future

Fixed Deceleration Epoch

- CMB determination of **matter density** controls all determinations in the **deceleration** (matter dominated) epoch
- **Current status:** $\Omega_m h^2 = 0.14 \pm 0.01 \rightarrow 7\%$
- **Distance** to recombination D_* determined to $\frac{1}{4}7\% \approx 2\%$
- **Expansion rate** during any redshift in the deceleration epoch determined to 7%
- **Distance** to **any redshift** in the deceleration epoch determined as

$$D(z) = D_* - \int_z^{z_*} \frac{dz}{H(z)}$$

- **Volumes** determined by a combination $dV = D_A^2 d\Omega dz / H(z)$
- **Structure** also determined by growth of fluctuations from z_*
- $\Omega_m h^2$ can be determined to $\sim 1\%$ in the future.