INTRODUCTION: The collisionless accretion shock at the virial radius of a cluster should primarily heat the ions since they carry most of the kinetic energy of the infalling gas. Assuming that cluster accretion shocks are similar to those in supernova remnants, the electron temperature \( T \) immediately behind the shock would be lower than the ion temperature. The equilibration between electrons and ions would then proceed by Coulomb collisions. Near the virial radius, due to the low density, the Coulomb collisional time scale can be comparable to the age of the cluster, and the electrons and ions may not achieve equipartition in these regions (Fox & Loeb 1997). In fact, non-equipartition of ions and electrons is also known in various astrophysical shocks. Since X-ray and SZ observations measure the properties of the electrons in the ICM, the net effect is to underestimate the total thermal energy content within clusters. This might account for some or all of the missing thermal energy in the ICM derived by recent X-ray and SZ observations (Afshordi et al. 2007, Evrard et al. 2008).

Effects of Non-equipartition on Projected Temperature Profiles:
- The non-equipartition effect can introduce a \( \sim 10\% \) bias in the projected temperature at around \( R_{200} \) for a wide range of \( \beta \).
- The effect of non-equipartition on the projected temperature profiles can be enhanced by increasing metallicity.

Effects of Non-equipartition on X-ray Surface Brightness Profiles:
- In the low energy band \( \sim 1 \) keV, the non-equipartition model surface brightness can be higher than that of the equipartition model in the cluster outer regions.
- Future X-ray observations extending to \( \sim R_{200} \) or even close to the shock radius should be able to detect these non-equipartition signatures (see, e.g., Fig. 2).

Impact of Non-equipartition on SZ Integrated \( Y \) functions:
- For our model in the \( \Lambda \)CDM Universe, the integrated SZ bias, \( Y_{\text{non-eq}}/Y_{\text{eq}} \), evolves slightly (at a percentage level) with redshift, which is in contrast to the self-similar model in the Einstein-de Sitter Universe. This may introduce biases in cosmological studies using the \( \ell_{\text{rms}} \) technique.

REFERENCES
Wong, K. W., et al., 2009, in preparation