Hi-C observations of an active region corona, and investigation of the underlying magnetic structure

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Absract:

The solar corona is much hotter ($\geq 10^6$ K) than its surface (~6000 K), puzzling astrophysicists for several decades. Active region (AR) corona is again hotter than the quiet Sun (QS) corona by a factor of 4-10. The most widely accepted mechanism that could heat the active region corona is the energy release by current dissipation via reconnection of braided magnetic field structure, first proposed by E. N. Parker three decades ago. The first observational evidence for this mechanism has only recently been presented by Cirtain et al. (2013, Nature) by using High-resolution Coronal Imager (*Hi-C*) observations of an AR corona at a spatial resolution of 0.2 arcsec, which is required to resolve the coronal loops, and was not available before the rocket flight of *Hi-C* in July 2012. The *Hi-C* project is led by NASA/MSFC.

In the case of the QS, work done by convection/granulation on the inter-granular feet of the coronal field lines translates into the heat observed in the corona. In the case of the AR, as here, there could be flux emergence, cancellation/submergence, or shear flows generating large stress and tension in coronal field loops which is released as heat in the corona. We are currently investigating the changes taking place in photospheric feet of the magnetic field involved with brightenings in the Hi-C AR corona. For this purpose, we are also using SDO/AIA data of +/- 2 hours around the 5 minutes Hi-C flight.

In the present talk, I will first summarize some of the results of the Hi-C observations and then present some results from our recent analysis on what photospheric processes feed the magnetic energy that dissipates into heat in coronal loops.