

The magnetic brane solution to five-dimensional Einstein-Maxwell-Chern-Simons theory provides a holographic description of the RG flow from four-dimensional Yang-Mills theory in the presence of a constant magnetic field to a two-dimensional low energy CFT. We compute two-point correlators involving the U(1) current and the stress tensor, and use their leading IR behavior to confirm the existence of a single chiral current algebra, and of left- and right-moving Virasoro algebras in the low energy CFT. The common central charge of the Virasoro algebras is found to match the Brown-Henneaux formula, while the level of the current algebra is related to the Chern-Simons coupling. The coordinate reparametrizations produced by the Virasoro algebras on the  $AdS_3$  near-horizon geometry arise from physical non-pure gauge modes in the asymptotic  $AdS_5$  region, thereby providing a concrete example for the emergence of IR symmetries. Finally, we interpret the infinite series of sub-leading IR contributions to the correlators in terms of certain double-trace interactions generated by the RG flow in the low energy CFT.