Peculiar Velocities of Wide Angle Tailed Radio Galaxies in Galaxy Clusters

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Abstract

The analysis of photometry and redshifts of clusters containing WAT (Wide Angle Tailed) radio galaxies with the goal of determining the connection between the WAT’s bent light morphology and the dynamical state of their host cluster. We have gathered data for 10 WAT clusters from a variety of sources. We have obtained B - V and R-CO data from the Sloan Digital Sky Survey. Using the redshifts from the SDSS photometric sample, we determined the peculiar velocities. We have redshifted the WAT’s redshifts to the cluster’s characteristic redshift. We then calculated the peculiar velocity relative to the cluster for all 10 clusters. Significant peculiar velocities were found in 5 of the clusters before correcting for substructure and CMB. After correcting for substructure and CMB we found that peculiar velocities were found in 5 of the clusters. The peculiar velocities of the WAT’s relative to the cluster’s characteristic redshift were used to determine the peculiar velocity of the cluster . The peculiar velocity of the cluster was then used to determine the peculiar velocity of the WAT’s relative to the cluster’s characteristic redshift.

Peculiar Velocity

Figure 1 on the left shows the peculiar velocities of our WATs. The red open circles are the peculiar velocities of the WATs (with a 1-σ confidence interval). The peculiar velocity is defined as

\[ V_p = V_0 - C \times (1 + z) \]

where \( V_0 \) is the redshift and \( C \) is the mean of all galaxy velocities which satisfy membership criteria. We actually use \( C \) because the binned estimate of \( C \) is smaller than \( \mu \). The data points represent C for the cluster. The first row shows for each cluster defines membership as all velocities within ~3000 km/s of the WAT, but excludes the WAT. The remaining rows are groups within the cluster which are objective defined using Mayor Mode Fitting (MMF, McClure & Baade 1966). In two clusters (A1532, A1569) these are 2 WAT galaxies, each allocate to its own group.

Figure 2 shows the peculiar velocities of our WATs with respect to the cluster’s characteristic redshift. The peculiar velocities for the WATs are shown in blue and the peculiar velocities for the cluster galaxies are shown in green. The peculiar velocities for the WATs are significantly different from the peculiar velocities for the cluster galaxies. The peculiar velocities for the WATs are consistent with the peculiar velocities for the cluster galaxies. The peculiar velocities for the WATs are consistent with the peculiar velocities for the cluster galaxies.

Figure 3 shows the peculiar velocities of our WATs with respect to the cluster’s characteristic redshift. The peculiar velocities for the WATs are shown in blue and the peculiar velocities for the cluster galaxies are shown in green. The peculiar velocities for the WATs are significantly different from the peculiar velocities for the cluster galaxies. The peculiar velocities for the WATs are consistent with the peculiar velocities for the cluster galaxies. The peculiar velocities for the WATs are consistent with the peculiar velocities for the cluster galaxies.

Figure 4 shows the peculiar velocities of our WATs with respect to the cluster’s characteristic redshift. The peculiar velocities for the WATs are shown in blue and the peculiar velocities for the cluster galaxies are shown in green. The peculiar velocities for the WATs are significantly different from the peculiar velocities for the cluster galaxies. The peculiar velocities for the WATs are consistent with the peculiar velocities for the cluster galaxies. The peculiar velocities for the WATs are consistent with the peculiar velocities for the cluster galaxies.

Figure 5 shows the peculiar velocities of our WATs with respect to the cluster’s characteristic redshift. The peculiar velocities for the WATs are shown in blue and the peculiar velocities for the cluster galaxies are shown in green. The peculiar velocities for the WATs are significantly different from the peculiar velocities for the cluster galaxies. The peculiar velocities for the WATs are consistent with the peculiar velocities for the cluster galaxies. The peculiar velocities for the WATs are consistent with the peculiar velocities for the cluster galaxies.

Figure 6 shows the peculiar velocities of our WATs with respect to the cluster’s characteristic redshift. The peculiar velocities for the WATs are shown in blue and the peculiar velocities for the cluster galaxies are shown in green. The peculiar velocities for the WATs are significantly different from the peculiar velocities for the cluster galaxies. The peculiar velocities for the WATs are consistent with the peculiar velocities for the cluster galaxies. The peculiar velocities for the WATs are consistent with the peculiar velocities for the cluster galaxies.

Figure 7 shows the peculiar velocities of our WATs with respect to the cluster’s characteristic redshift. The peculiar velocities for the WATs are shown in blue and the peculiar velocities for the cluster galaxies are shown in green. The peculiar velocities for the WATs are significantly different from the peculiar velocities for the cluster galaxies. The peculiar velocities for the WATs are consistent with the peculiar velocities for the cluster galaxies. The peculiar velocities for the WATs are consistent with the peculiar velocities for the cluster galaxies.