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Constraining the Redshift Evolution of FIRST Radio Sources in RCS1 Galaxy Clusters

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We conduct a statistical analysis of the radio source population in galaxy clusters as a function of redshift by matching radio sources from the Faint Images of the Radio Sky at Twenty-Centimeters (FIRST) catalog with 618 optically-selected galaxy clusters from the first Red-Sequence Cluster Survey (RCS1). The number of excess radio sources (above the background level) per cluster is 0.14 +/- 0.02 for clusters with 0.35 < z < 0.65 and is 0.10 +/- 0.02 for clusters with 0.65 < z < 0.95. The richest clusters in the sample have more radio sources than clusters with low or intermediate richness. When we divide our sample into bins according to cluster richness, we do not observe any significant difference (> 1.5 sigma) in the number of radio sources per unit of cluster mass for the galaxy clusters with 0.35 < z < 0.65 as compared to the galaxy clusters with 0.65 < z < 0.95. Thus the entire sample can be characterized by the number of (L(1.4 GHz) > 4.1 X 10^ (24) W/Hz) radio sources per unit (10^14 solar masses) mass, which we measure to be 0.031 +/- 0.004. We further characterize the population of galaxy cluster-related radio sources through visual inspection of the RCS1 images, finding that although the radio activity of brightest cluster galaxies (BCGs) also does not strongly evolve between our high and low redshift samples, the lower-redshift, richest clusters are more likely to host radio-loud BCGs than the higher-redshift, richest clusters or poorer clusters at the 2-sigma level.

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