

AGN Properties and Host Galaxy Star Formation Rate in Palomar-Green Quasars

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Every galaxy is predicted to host a black hole, but only those actively accreting matter, with luminous accretion disks, are considered active galactic nuclei (AGNs) or quasars. Recent models of galaxy evolution include the co-evolution of galaxies and their AGNs resulting from events like galactic mergers and interactions. However, limited definitive evidence exists for such a correlation in activity. By gathering data on AGN emission properties and host galaxy star formation rate in the set of low redshift, unobscured Palomar-green (PG) quasars, I investigated this kind of co-evolution. I hypothesized that a correlation would be found between star formation rate (SFR) and luminosity of the quasar, an indicator of specific accretion rate to the AGN. I set a correlation matrix to the data and performed principal component analyses using MINITAB statistical software. I found a strong correlation between SFR and luminosity, and other correlations of interest among emission features of the quasars and SFR. These results provide strong evidence linking host galaxy and AGN activity in the PG set. Also, I obtained images from the Hubble Legacy Archive (HLA) for 34 of the 87 PG quasars; basic morphological analysis of this group revealed not only an expected distribution of spiral and elliptical galaxies with regard to SFR, luminosity, and radio loudness, but also retained distinction between galaxy types within the SFR-luminosity correlation plot. In conclusion, the hypothesized correlation seems to hold, and the distribution of host galaxy types fits well with the co-evolutionary model supported by this study.

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