

What Makes Red Quasars Red?: Observational Evidence for Dust Extinction

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Red quasars are very red in optical through NIR (e.g., $r'-K > 5$ mag and $J-K > 1.3$ mag in Urrutia et al. 2009). The red colors are possibly due to the dust extinction in their host galaxies, and which are expected in a scenario where red quasars are an intermediate population between merger-driven star-forming galaxies and normal unobscured type 1 quasars. However, the red colors can be explained by alternative mechanisms of (i) an intrinsically red continuum, (ii) an unusual high covering factor of the hot dust component (CF_{HD}), and (iii) a moderate viewing angle, somewhere between type 1 and type 2 quasars. In order to study the origin of the red colors of red quasars, we use optical to NIR spectra of 20 red quasars at $z \sim 0.3$ and 0.7. The LPb/LHb ratios of red quasars are ~ 10 times higher than unobscured type 1 quasars. Moreover, the LPb/LHb ratios of $\sim 55\%$ red quasars cannot be matched by any physical conditions without adopting the concept of the dust extinction. The CF_{HD} of red quasars are similar to that of unobscured type 1 quasars. Furthermore, we find that the Eddington ratios of red quasars are significantly higher than those of unobscured type 1 quasars. Consequently, these results strongly suggest the red colors of red quasars arise from the dust extinction in their host galaxies, as suggested in the merger-driven galaxy evolution scenario.