

Abstract Submitted
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Weak Hard X-ray Emission from Broad Absorption Line Quasars Observed with NuSTAR: Evidence for Intrinsic X-ray Weakness BIN LUO, NIEL BRANDT, Pennsylvania State Univ, NUSTAR TEAM — We report NuSTAR observations of a sample of six X-ray weak broad absorption line (BAL) quasars. These targets, at $z=0.148-1.223$, are among the optically brightest and most luminous BAL quasars known at $z<1.3$. However, their rest-frame 2 keV luminosities are 14 to >330 times weaker than expected for typical quasars. Our results from a pilot NuSTAR study of two low-redshift BAL quasars, a Chandra stacking analysis of a sample of high-redshift BAL quasars, and a NuSTAR spectral analysis of the local BAL quasar Mrk 231 have already suggested the existence of intrinsically X-ray weak BAL quasars, i.e., quasars not emitting X-rays at the level expected from their optical/UV emission. The aim of the current program is to extend the search for such extraordinary objects. Three of the six new targets are weakly detected by NuSTAR with <45 counts in the 3-24 keV band, and the other three are not detected. The hard X-ray (8-24 keV) weakness observed by NuSTAR requires Compton-thick absorption if these objects have nominal underlying X-ray emission. However, a soft stacked effective photon index ($\Gamma \sim 1.8$) for this sample disfavors Compton-thick absorption in general. The uniform hard X-ray weakness observed by NuSTAR for this and the pilot samples selected with <10 keV weakness also suggests that the X-ray weakness is intrinsic in at least some of the targets. We conclude that the NuSTAR observations have likely discovered a significant population ($>33\%$) of intrinsically X-ray weak objects among the BAL quasars with significantly weak <10 keV emission.

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