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Discover high- z BL Lacs by *Swift* and SARA observations with the dropout technique

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Abstract

The spectroscopic redshift measurement of BL Lac, a class of blazar, is challenging because its spectrum has no or weak emission lines ($\leq 5\text{\AA}$). We estimate the redshift by the photometric dropout technique for a sample of 64 blazars (59 BL Lacs and five blazar candidates of uncertainty type). Two telescopes are utilized to observe the sample: the *Swift* space telescope observes sources in *uvw2*, *uvm2*, *uvw1*, *u*, *b*, *v* filters, while the ground-based telescopes SARA-CT/RM observed sources in *g'*, *r'*, *i'*, *z'* filters. The photometric data are obtained using the *photozpy* package. We fit the photometric data by the *LePhare* package and report four new high-*z* ($z > 1.3$) BL Lacs at $2.03^{+0.07}_{-0.05}$, $1.84^{+0.10}_{-0.03}$, $2.04^{+0.16}_{-0.14}$, $2.93^{+0.01}_{-0.04}$ as well as upper limits for 50 sources. The work increased the number of high-*z* BL Lacs found by this method up to 23. The high-*z* sources are discussed in the context of the cosmic gamma-ray horizon, blazar sequence, Fermi blazar divide, and masquerading BL Lacs.

