

# Review of redshift values of bright AGNs with hard spectra in 4LAC catalog

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This work has been done to investigate the reliability of redshift values of bright AGNs with hard spectra present in the Fermi-LAT 4LAC catalog. A sample of bright, hard AGNs has been selected and a literature search has been performed to understand the origin and reliability of their redshift values. The sample has been selected with the following steps :

1) merge of the high and low latitude 4LAC catalogues available at `ftp://www.cenbg.in2p3.fr/astropart/Fermi/4LAC/tab1_4LAC.fits` and `ftp://www.cenbg.in2p3.fr/astropart/Fermi/4LAC/table_lowlat_sample.fits`.

2) cross correlation of the resulting catalogue with the 4FGL `https://fermi.gsfc.nasa.gov/ssc/data/access/lat/8yr_catalog/gll_psc_v20.fit`.

3) selection of all sources with  $\sqrt{\text{TS}}$  (30-300 GeV) greater than 5

The resulting sample contains 542 sources. The redshift review has been made searching for evidence of spectroscopic redshifts for the selected sources in:

1) published spectra (e.g. `https://web.oapd.inaf.it/zbllac/`)

2) public databases (e.g. SDSS, 6dF)

3) plots of published spectra

The table has been then compiled on the basis of the evidence found in 1), 2) and 3). It contains 7 columns:

4FGL name = Source Name in the 4FGL and 4LAC catalog

counterpart name = Name of the counterpart in the 4FGL and 4LAC catalog

class = AGN class (bll, BLL, bcu, BCU, fsrq, FSRQ, rdg, RDG)

Redshift = Redshift in the 4LAC catalog

Redshift\_corr = Redshift from the review

Redshift\_LL = Spectroscopic Redshift Lower limit from the detection of an absorption system in the line of sight

Redshifts\_quality = Flag for redshift quality (see below)

The first four come directly from the 4LAC, the other three were filled after the check. In all the redshift columns “-999” means redshift unknown. The columns Redshift\_corr and Redshift\_LL contain respectively the spectroscopic redshift and the spectroscopic redshift lower limit considered the best for each source. The column Redshifts\_quality contains quality flag with the following meanings:

-1 = no redshift or lower limit (283 sources)

1 = reliable spectroscopic redshift, no lower limit (215 sources)

2 = uncertain spectroscopic redshift, no lower limit (44 sources)

(Note that  $-1 + 1 + 2 = 283 + 215 + 44 = 542$ )

0.1 = no redshift, reliable spectroscopic lower limit (43 sources)

0.2 = no redshift, uncertain spectroscopic lower limit (5 sources)

1.1 = reliable spectroscopic redshift and lower limit (7 sources)

1.2 = reliable spectroscopic redshift, uncertain lower limit (1 source)

2.1= uncertain spectroscopic redshift, reliable spectroscopic lower limit  
(1 source)

The value of the Redshift\_quality flag depends on the judgment of the author which results from the review of published results. This value therefore may change in the future when new results will be published. Updates of this table are planned.