Classification of GALEX UV sources from cross-matched GUVcat X SDSS and Gaia databases (GUVmatch)

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ABSTRACT: We have matched the ~83 million ultraviolet (UV) GALEX sources from GUVcat_AIS (Bianchi et al. 2017) with Gaia data release 2 (DR2), yielding 31,925,294 Gaia DR2 counterparts to 30,024,791 GUVcat_AIS unique sources (18,588,140 matches have a parallax measurement with error less than 30") and with SDSS DR14 yielding 23,310,532 SDSS counterparts to 22,207,563 unique GUVcat_AIS sources, 10,167,460 of which are pointlike. Gaia DR2 covers the whole GUVcat_AIS footprint, while GUVcat X SDSS has a total overlap area of >11,100 square degrees (Bianchi et al. 2019: AREAcat). The UV-optical colors of sources in the GUVmatch databases are used to identify classes of astrophysical objects that are prominent in UV, such as stars in different evolutionary stages, low-redshift QSOs and galaxies.

Relevant information:

- Match radius: 3".
- The positions agree to <1.5" for the majority of pointlike matched sources, a 3" match radius is used to identify sources with possible multiple matches whose UV flux could be scattered in GUVmatch imaging but involved in Gaia and SDSS. The catalog can be trimmed to a smaller match radius using tag DISTANCES.
- Multiple matches: tags are provided to identify multiple matches who have opposite signs at 3" similar to secondary matches.
- Other useful tags: PHOTGAL, PHOTGAL2, PHOTGAIA (tag Gaia sources in extended objects such as nearby galaxies or clusters).

Where to find GUVmatch catalogs:


UVsky website: http://dolomiti.pha.jhu.edu/uvsky (fits and .csv files, more info)

GALEX_Catalogs: [http://dolomiti.pha.jhu.edu/uvsky/GUVmatch_AISxSDSSdr14.html](http://dolomiti.pha.jhu.edu/uvsky/GUVmatch_AISxSDSSdr14.html)

GALEX does not have specific tags to classify source shape. We used a p-value approach to classify GALEX sources into single pointlike (S), pointlike with extended components (EP), sources with extended components (L), and extended sources (X). These are marked in green loops and pointlike counterparts for extended galaxies. Blue dots mark source positions with positional error <10%. Many GALEX sources have a good position, so fast counter sources have been verified UV magnitudes, we estimate that only the nearby area is seen by GALEX.

The Catalogs

GUVmatch_AISxSDSSdr14

The matching yielded 23,310,532 counterparts to 22,207,563 unique GUVcat_AIS sources, 10,167,460 of which are pointlike, over a total overlap area of >11,100 square degrees (Bianchi et al. 2019: AREAcat).

SDSS adds five optical magnitudes (u, g, r, i, z) to the GALEX FUV, NUV photometry and optical spectra of 860,224 matched sources.

All original magnitudes are in the ABmag system.

GUVmatch_AISxGaiaDR2

Of the ~83 million GUVcat_AIS sources, we found: 31,925,294 Gaia DR2 counterparts to 30,024,791 GUVcat_AIS unique sources, they add to the GALEX FUV and NUV measurements photometry in the Gaia G band, often also in Gaia BP and RP bands.

26,275,572 matches have a parallax measurement: of these, 21,084,628, 18,588,140, and 16,357,505 have a parallax error less than 50", 30", and 20", respectively.

The area coverage is the same as GALEX_AIS (see Bianchi et al. 2019, AREAcat).

Note: GALEX mags are ABmag, Gaia are kept in Vegamag (to keep original data; AREAcat)

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