

# Image List of Kiso Ultraviolet-Excess Galaxies

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## Abstract

Images of galaxies in the “Catalogue of Kiso Ultraviolet-Excess Galaxies” (abbreviated as KUGs) are clipped from the Sloan Digital Sky Survey (SDSS) SkyServer and from The STScI Digitized Sky Survey (DSS) database. All the images are shown in a web page as 0.8' x 0.8' or 1.0' x 1.0' figures, together with 3.4' x 3.4' figures for larger galaxies. The coordinates of the galaxies in the catalogue are revised to match the SDSS/DSS coordinates when the displacement is substantially large. Objects which seem to be single or multiple stars and not to be galaxies are examined carefully, and 25 out of 138 such suspect objects are confirmed as either stars or galaxies by other catalogues. The results are shown in the web-page of Kiso Observatory.

Key words: galaxies - KUGs, telescope - 105cm Kiso Schmidt, survey - Schmidt survey, catalogue - galaxy catalogue, images - galaxy images

## 1. Introduction

The Catalogue of KUGs is compiled as a result of the Kiso Schmidt survey of ultraviolet-excess galaxies, carried out from 1978 to 1998, listing 9908 galaxies. Details of the catalogue are described in Miyauchi-Isobe et al. (2010). The catalogue is available from the CDS (Centre de Données astronomiques de Strasbourg) catalogue service, as VII/262.

In the ultraviolet-excess galaxies, there are many peculiar galaxies or interacting ones. It should be highly useful to compile an image list of these galaxies.

Although many databases of images are available in various wavelengths these days, in this work we first compiled a list of visible images of these galaxies by retrieving the data from the STScI Digitized Sky Survey and Sloan Digital Sky Survey.

## 2. Visual Sky Survey Databases

### 2.1 Sloan Digital Sky Survey (SDSS)

SDSS began the sky survey in 2000, and released its 13th data release on August, 2016. It contains reprocessed images from the SDSS legacy survey in its web-page<sup>2</sup>. The sky survey is carried out at Apache Point Observatory, New Mexico, and the survey does not cover all the sky. We used the imaging data of the 9th data release (DR9), and some parts of our KUGs survey areas are not covered by the data.

For the details of the SDSS project, see Eisenstein et al. (2011).

### 2.2 The STScI Digitized Sky Survey (DSS)

The Digitized Sky Survey was produced at the Space Telescope Science Institute. The images of the survey are based on photographic data obtained using the Oschin Schmidt Telescope on Palomar Mountain and the UK Schmidt Telescope, and they cover all the sky.

It provides the image service in its web-page<sup>3</sup>. A mirror site of the service is provided at the National Astronomical Observatory Japan (NAOJ)<sup>4</sup>.

We used the DSS service for galaxies in the areas SDSS did not cover. For details of the DSS project, see Lasker (1995).

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<sup>2</sup> <http://www.sdss.org/dr13/>

<sup>3</sup> [https://archive.stsci.edu/cgi-bin/dss\\_form](https://archive.stsci.edu/cgi-bin/dss_form)

<sup>4</sup> <http://dss.nao.ac.jp/>

### 3. Clipping Galaxy Images

#### 3.1 SDSS

SDSS provides an image listing service in the web-page<sup>5</sup>. The web-page accepts a list of the right-ascensions and declinations of objects and it returns object images which span  $0.8' \times 0.8'$  each. A large part of the KUGs are totally included inside this image. We made our image list from these small images.

Galaxies larger than this image clip are retrieved from a different SDSS web service<sup>6</sup> called “Finding Chart” in “Visual Tools.” Through this service we obtained  $3.4' \times 3.4'$  images for these larger galaxies.

We used the SDSS DR9 service, and clipped 8882 images

#### 3.2 DSS

DSS provides a sky image service in the web-page<sup>3</sup>. In this service, it does not provide an image listing service such as SDSS does, and only one sky image is retrieved per query.

On the other hand, a mirrored DSS service in NAOJ provides a list service<sup>7</sup>. So we used this service for the remaining 1028 galaxies not covered by SDSS DR9.

In this service, the minimum size of the retrieved image is  $1' \times 1'$ , and we clipped  $1' \times 1'$  images for our image list.

Thus in our image list, the images of  $0.8' \times 0.8'$  size with color are from SDSS, and the  $1' \times 1'$  monochrome images are from DSS.

### 4. The Results

The resulting image list is shown in a web-page provided by Kiso Observatory<sup>8</sup>.

A sample of the web-page is shown in Figure 1.

In the figure, larger images are clipped from DSS and smaller ones from SDSS. The size of the larger ones is  $1' \times 1'$ , and that of the smaller ones is  $0.8' \times 0.8'$ .

Those images with a small link character w on their lower-right sides have wider images of  $3.4' \times 3.4'$  available. For example, we show a larger image of 0134+317.jpg in Figure 2.

We have corrected the positions of those galaxies which were not situated in the image center when we used our KUG catalogue positions. The list of revised positions, which are the right-ascensions and declinations of the clipped image centers, are also shown in the same web-page<sup>9</sup>, according to the coordinate system of each image service.

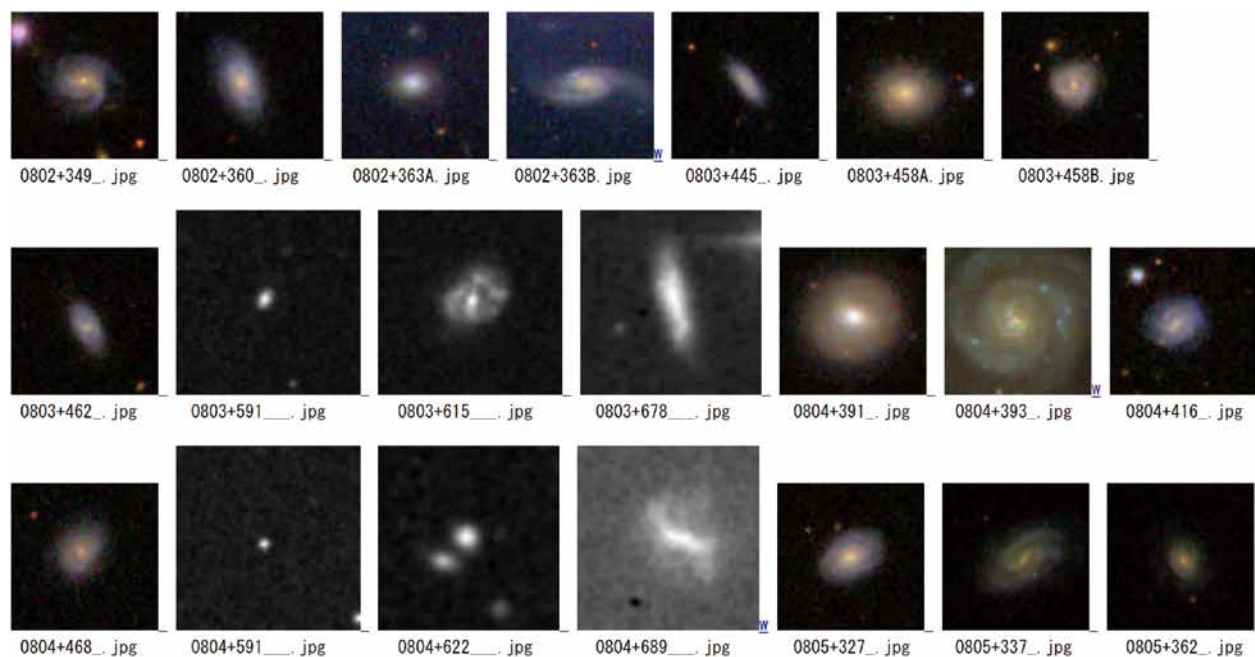


Figure 1: A sample page of the image list.

<sup>5</sup> <http://skyserver.sdss.org/dr9/en/tools/chart/list.asp>

<sup>6</sup> <http://skyserver.sdss.org/dr9/en/tools/chart/chart.asp>

<sup>7</sup> <http://dss.nao.ac.jp/cgi-bin/list.cgi>

<sup>8</sup> [http://www.ioa.s.u-tokyo.ac.jp/kisohp/RESEARCH/KUGimages/](http://www.ioa.s.u-tokyo.ac.jp/kisohp/RESEARCH/KUGimages/AllImages/)

<sup>9</sup> <http://www.ioa.s.u-tokyo.ac.jp/kisohp/RESEARCH/KUGimages/Positions9910.csv>

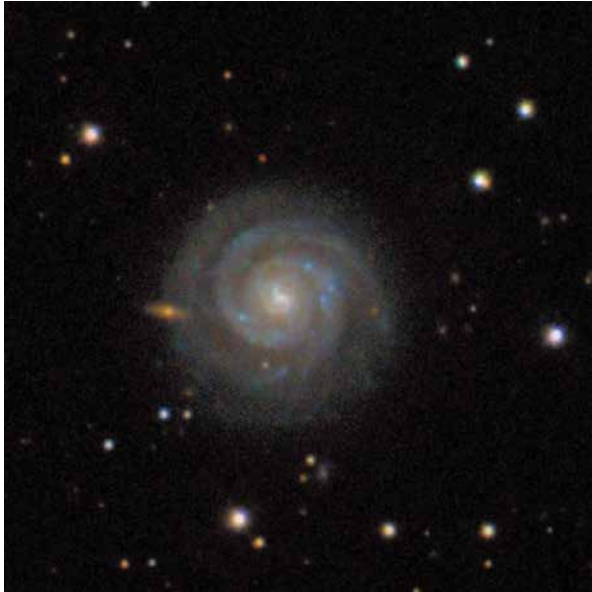


Figure 2: An example of a 3.4' x 3.4' image.

## 5. Star-like Objects

Investigating these images, we have found some objects which seem to be stellar objects misidentified as galaxies. For example, those stars of double or multiple systems could be identified as diffuse objects.

We found 91 such candidates, and we show ten examples of them in Figure 3.

Also we found 47 misidentified candidates whose images seem to be only a single star.

To investigate these objects, we first made a cross identification check of the KUG catalogue with the Markarian galaxy catalogue (Petrosian et al. 2007), and found 17 KUG objects which were listed in the Markarian catalogue.

Next we used the SIMBAD service<sup>10</sup> for finding corresponding objects in other catalogues, and could find 8 objects.

Table 1: Single star objects, identified by the Markarian Catalogue, or SIMBAD service.

KUG name	Mrk number
0710+741	377
0749+583	381
0921+354	396
0953+574	—
1101+390	1278
1138+341	—
1153+176	643
1211+370	436
1213+411	437
1259+303	448
2317+268	320

As a result, 11 objects are identified as stars (9 from Markarian Catalogue, and 2 by SIMBAD), and 14 objects as galaxies or QSO's (8 from Markarian Catalogue, and 6 by SIMBAD).

In figure 4, we show ten examples from the 14 objects which are identified as galaxies or QSO's. In Table 1, we show those 11 objects which are identified as stars.

We attached another table of these 138 star-like objects to the web-page shown above<sup>11</sup>. The 113 star-like objects which we could not identify as either stars or galaxies are noted by “★ ★?” or “★?” in the table.

<sup>10</sup> <http://simbad.u-strasbg.fr/simbad/>

<sup>11</sup> <http://www.ioa.s.u-tokyo.ac.jp/kiso/RESEARCH/KUGimages/SLOtable.csv>

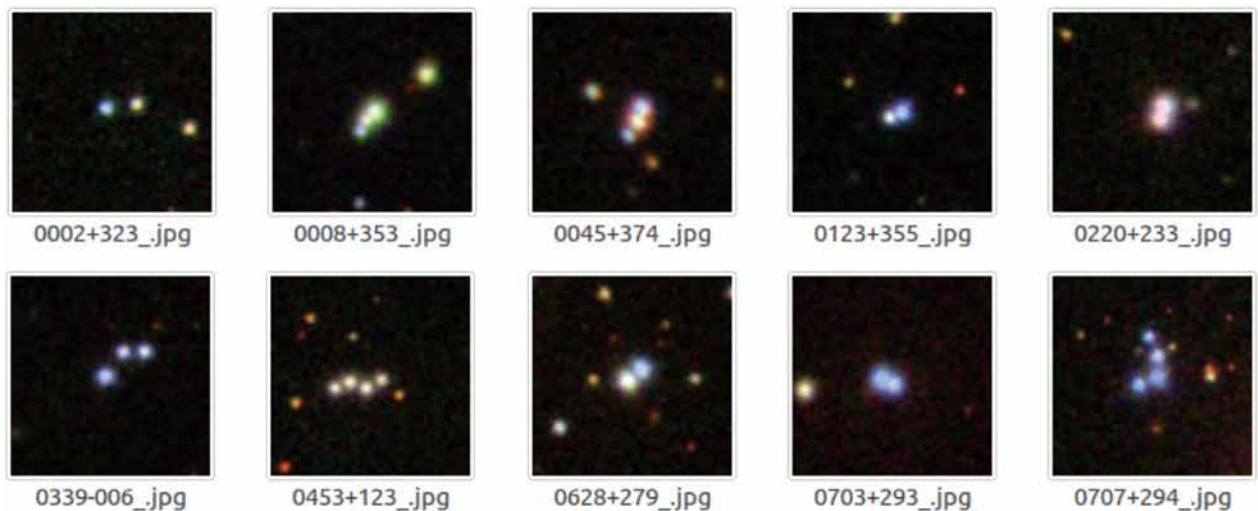


Figure 3: Double or multiple star systems.



Figure 4: Seyfert and QSO galaxies.

## 6. Conclusions and Discussions

We have clipped images of all KUG galaxies from the SDSS and DSS sky image data services. They are shown in a web-page of Kiso Observatory.

Also the positions of the galaxies are corrected so that the galaxy image comes to almost the center of the clipped frame, according to the coordinate system of each sky image service.

The number of galaxies in the new catalogue is revised to 9910 from the previous 9908, because we have separated two pairs of interacting galaxies into four independent ones.

138 objects whose images seem to be stars and not galaxies are picked out and investigated. 11 of them are identified as stars and 14 are confirmed as galaxies or QSO's by other catalogues. 113 remain suspect. The result is shown as a table in the same web-page<sup>11</sup> of Kiso Observatory.

In this work we show a KUG catalogue revised only for the corrected positions. It is necessary to re-investigate the morphological types of KUGs referring to our image list.

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we used the service provided by the Astronomical Data Archive Center, National Astronomical Observatory of Japan.

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