We present on-line, interactive interface to the whole \textit{I}-band photometry data set obtained in the second phase of the OGLE project (OGLE-II). The raw photometric database is accessed through an additional database using MySQL engine, allowing to select objects fulfilling any set of criteria including RA/Dec coordinates, mean brightness, error etc. The results of the queries can be browsed on-line, the light curves can be plotted interactively, the photometric data can be downloaded for the total of over $10^{10}$ measurements of more than 40 million objects in the Galactic bulge and the Magellanic Clouds collected during OGLE-II. The MySQL database of parameters also includes the complete data set of the previously published photometric $BVI$ maps of OGLE-II targets, allowing to interactively select objects from these maps.

1. Introduction

The data collected during the second phase of the Optical Gravitational Lensing Experiment (OGLE-II, Udalski, Kubiak and Szymański 1997) constitute a unique, extremely rich source of accurate, long baseline, standard ($BVI$) photometry, suitable for many astronomical projects, not only related to microlensing. The long-standing policy of the OGLE project has been to make the data available to the wide astronomical community. Following the publication of the $BVI$ photometry maps of the OGLE-II fields (Udalski et al. 1998, 2000, 2002, hereinafter referred to as papers Ia, Ib, Ic) containing the mean values and errors of the magnitude of all observed stars and their astrometry, we decided to release the whole photometry data set, including all \textit{I}-band epochs (HJD, magnitude and its error) of over 40 million OGLE-II objects. To make the data usable for the community, we created an additional database interface, using the MySQL database engine, allowing to make selections of interesting objects based on any set of criteria on the object parameters such as equatorial coordinates, mean and median magnitude, mean and median error and the number of “good” points. The photometry is available in two sets: the original Point Spread Function (PSF) photometry used during OGLE-I.
and OGLE-II and the Difference Image Analysis (DIA) photometry which is being used routinely in OGLE-III phase (Udalski 2003) and was used to recalculate the photometry of the whole image set of OGLE-II. The database system also includes the complete data set of the aforementioned BVI maps, so the selection of the objects can also be based on the parameters given in the maps.

The details of the structure of databases and the user interface to these data is explained in the following sections of this paper. The project is still under development. We plan to include the data obtained during OGLE-I phase as well as data from the other, less frequently observed fields and filters.

2. Observations

The data being released come from the observations collected during the second phase of the OGLE microlensing search conducted with the 1.3-m Warsaw telescope at Las Campanas Observatory, Chile. The observatory is operated by the Carnegie Institution of Washington. The telescope was equipped with the camera built on a SITE 2048 × 2048 CCD detector. The pixel size was 24 µm giving the 0.417 arcsec/pixel scale. Observations were performed in the drift-scan mode, using the “medium” reading mode of the CCD detector (gain 7.1 e−/ADU, readout noise ≈ 6.3 e−) in the Galactic bulge fields and the “slow” mode (gain 3.8 e−/ADU, readout noise ≈ 5.4 e−) in the Magellanic Clouds. Details of the instrumentation setup can be found in Udalski, Kubiak and Szymański (1997).

The use of the drift-scan mode allowed to enlarge a single image to 2048 × 8192 pixels covering 14.2 × 57 arcmin on the sky. Positions of some adjacent fields overlap by about one arcmin to allow the calibration tests. The effective exposure time in the I-band in the Galactic Bulge was 87 sec, increased to 99.3 sec after HJD = 2451040 (Aug 14, 1998) and 125 sec in the Magellanic Clouds.

| Target    | No. of fields | Sky coverage sq. deg. | No. of objects | No. of measurements |
|-----------|---------------|-----------------------|----------------|---------------------|
| Gal. bulge | 49            | 11                    | 30.5×10⁶      | 9.4×10⁹             |
| LMC       | 21            | 4.5                   | 6.8×10⁶       | 2.7×10⁹             |
| SMC       | 11            | 2.4                   | 2.2×10⁶       | 0.7×10⁹             |

Table 1 shows the number of fields, sky coverage, number of objects detected and the total number of I-band measurements obtained by PSF photometry in each of the main OGLE-II targets: Galactic bulge (GB) and the Magellanic Clouds.
(LMC and SMC). The details regarding all these fields observed can be found in Papers Ia,b,c.

3. Data Reduction and Calibration

All the images taken from the telescope were reduced using the standard OGLE data pipeline, described in detail in Paper Ia. The PSF photometry of the de-biased and flat-fielded frames was obtained using the modified DoPHOT photometry program (Schechter, Saha and Mateo 1993) running in the fixed position mode on sixty four 512 × 512 pixel subframes. Each frame was matched against the template image, obtained at very good seeing conditions. Photometry of each subframe was tied to the photometry of the template subframe by computing the mean shift derived from several hundreds bright stars. Therefore, the photometry of the template image defines the instrumental system for the PSF (DoPHOT) photometry. The transformation of the instrumental photometry to the standard system was calculated using several Landolt (1992) fields of standard stars observed during about 250 photometric nights in the OGLE-II phase. For the technical details and discussion of the transformation accuracy, refer to Paper Ic.

The end of the OGLE-II phase coincided with the development of the Difference Image Analysis (DIA) method of retrieving photometry, using an image subtraction algorithm, especially useful in the dense stellar fields (Alard and Lupton 1998 and Alard 2000). It was then implemented for the OGLE-II Galactic bulge data by Woźniak (2000) and the Magellanic Clouds data (Żebruń, Soszyński and Woźniak 2001). The adopted DIA method was used to create the catalog of OGLE-II microlensing events (Woźniak et al. 2001) and the general catalogs of candidate variable objects in the Galactic bulge (Woźniak et al. 2002) and the Magellanic Clouds (Żebruń et al. 2001). The technical details of the DIA method and its OGLE implementation are beyond the scope of this paper. The reader is referred to the papers mentioned in this paragraph.

The successful introduction of the DIA method, yielding more accurate and possibly deeper photometry of the OGLE-II data, convinced us to use this method as the basic photometry tool in the third phase of the experiment, OGLE-III. Further modifications to the DIA method allowed to measure not only the variable objects but all the objects detected in the reference image. This resulted in significant improving of the detection effectiveness for faint objects (e.g., RR Lyr stars in SMC, Soszyński et al. 2002) as well as low amplitude variables (e.g., red giants in the Magellanic Clouds, Soszyński et al. 2004). This new approach, allowing to retrieve the photometry of all objects, both variable and constant, prompted us to apply the DIA method to recalculate the whole photometry of OGLE-II fields using the standard OGLE-III pipeline (Udalski 2003). These data are now being released to the public domain.

The DIA photometry provides only the difference of fluxes between the current
image and the reference image. To obtain absolute values, standard PSF (DOPHOT) photometry of the DIA reference images was performed and then tied to the well calibrated original OGLE-II photometry using mean shifts computed on selected cross-identified objects.

Equatorial coordinates of all objects were calculated using third-order transformation obtained by identification of several thousand bright stars detected in OGLE fields in the Digitized Sky Survey images. The internal accuracy of the determined equatorial coordinates, as measured in the overlapping regions of neighboring fields is about 0″.15–0″.20. It is worth noting, however, that the systematic error of the DSS coordinate system may reach 0″.7 and in the extreme cases of objects close to the edges of the DSS images may even exceed 1″.

4. Photometry Database

This section briefly describes the core of the system – the database containing all photometric measurements of objects detected in the OGLE fields, hereinafter referred to as PHOTDB. For each field, the PHOTDB consists of four files:

1. frame index (DBI file), containing OGLE frame number, Heliocentric Julian Date, exposure time, airmass, average FWHM in pixels and average sky level, photometric grade of the frame, total of 40 bytes per frame.
2. object catalog (CAT), containing $X$, $Y$ coordinates on the template frame, number of good measurements, as well as some internally used flags and values, total of 36 bytes per object.
3. time index of frames (TI file), containing index allowing easy chronological sorting of frames (which can be added to the database in any order) without need of examining HJD of all frames, total of 2 bytes per frame.
4. photometric data (previously DB or IDB, now SDB file, see below for the explanation of formats), containing magnitude and its error value as well as a packed flags byte, total of 5 (IDB, SDB) or 9 bytes (DB) per measurement. The magnitudes values of all OGLE-II objects are corrected for a small systematic error, caused by non-perfect flat-fielding at the edges of the field (see Paper Ic).

The structure of PHOTDB is a modified version of the first photometry database used in OGLE-I (Szymański and Udalski 1993). The main changes include new formats of the biggest file of each field database, containing the photometric data. In order to cope with the huge increase of the number of measurements coming from the dedicated telescope on which the OGLE-II phase was started (compared to OGLE-I) we had to make the databases smaller by changing the format of the object magnitude and its error from 4-byte float (DB files) to 2-byte short integer (IDB files) representing the values in millimagnitudes. With the typical photometry error of 0.01 mag, the retained accuracy was sufficient and we could compress
the databases by 40%. Even then, however, we could not keep all the sizes of the database files below 2 GB limit. Luckily, the new versions of operating systems used (SOLARIS, LINUX) raised the maximum file size above this threshold. Adopting the database software for the Large File Support (LFS) was another important change.

The original formats of the photometry database files (both DB and IDB) were designed to allow quick and easy adding new data coming from the pipeline without complete rebuilding of the database. Thus, the new data were simply appended to the database. As a result, the photometric measurements of any given object were distributed sparsely all over the database file. In order to make data retrieving more efficient the software included an extensive system of memory buffers which significantly speeded up the retrieval of the photometry of objects located close to each other in the field catalog. However, for a single object or many objects selected randomly, the access time was not negligible, especially as the databases grew to the gigabyte sizes. For this reason another format was developed for the databases which were already completed, or closed, after a season of observations or the whole OGLE phase was ended. These databases contain the photometry of all objects rewritten to form sequential, continuous data chunks (SDB files). Now the retrieval of the photometric data of any given object requires only one seek into the file and one read operation. The time spent on these operations is insignificant compared to any reasonable numerical analysis of the data.

4.1. Good Photometric Points

The idea of a “good” and “bad” photometric measurement has been evolving since the beginning of the OGLE project, even though a BAD_PHOTO flag was always present in the PHOTDB files. Unfortunately, the original definition was too simple to be useful. Therefore in many OGLE publications the authors introduced slightly different definitions. The new SDB photometry files introduce a new, hopefully adequate method of estimating the quality of a given measurement. The BAD_PHOTO flag is now set if the individual magnitude error is bigger than 1.6 times “typical” error for a given magnitude level (computed in 0.1 mag bins) for a given field and filter. The “absurd” cases of negative or zero values of the magnitude and/or error are also flagged.

4.2. PSF vs. DIA Photometry Databases

The DIA databases for the OGLE-II fields have a special status. They were created well after the OGLE-II phase ended. The “primary” set of photometric data for these fields has always been the PSF (DOPHOT) photometry and the DIA photometry had to be cataloged consistently with the existing PSF photometry databases. The most important result of this approach is that although the DIA catalogs contain significantly more objects than PSF catalogs, some of these additional objects may be spurious detections or duplicate objects identified to more than one PSF object.
Some PSF objects have not been identified with any DIA object but their (empty) entries remain in the catalog and the photometry files. All these “strange” objects are properly flagged in the catalogs. The recommended approach for a typical user of our databases is to make selections of objects based on $BVI$ maps or PSF photometry databases and then to extract possibly more precise DIA photometry for these objects. If, however, the user decides to query the DIA database directly, we recommend to use “no catalog flag” option for the selection.

There is one particularly useful flag describing the individual measurements in the DIA database, back-ported from the OGLE-III system. It is set if the object is detected (independently of the information taken from the reference image) in the subtracted frame. The presence of this flag means that the object really did vary in that frame. The overall number of measurements that are flagged this way is stored (as $N_{\text{detect}}$) in the catalog entry of every object. The selection criteria of database objects may include a lower limit for the number of measurements flagged, thus reducing significantly the possibility of selecting artificial variables.

The low-level details of the structure of a DIA photometry catalog is described in the Appendix.

5. Parameters Database

To allow efficient retrieval of the photometric data we had to create an interfacing database containing basic parameters of all objects and a set of tools to select objects fulfilling any set of criteria on these parameters. We will hereinafter refer to this database as PARAMDB. In order to create PARAMDB we have installed a MYSQl relational database server which makes the tasks of creation, maintaining, updating and searching the databases easy and efficient. There is a separate PARAMDB for each main OGLE target (Galactic bulge, LMC, SMC) both for PSF (DOPHOT) and DIA photometry. For each object in the database, the following parameters are provided:

- **Field** name (e.g., BUL_SC1)
- **StarID** – object number in the PHOTDB of the Field
- **X,Y** – coordinates of the Object on the template frame (in pixels)
- **StarCat** – catalog designation: a string composed of $RA/Dec$ in the form of HHMMSS.SS $\pm$ DDMMSS.S
- **RA, Decl** – equatorial coordinates in hours, degrees
- **Ngood** – number of good photometric points
- **Pgood** – percentage of good photometric points
  - All following parameters are calculated from the good points only.
- **Imean** – mean $I$ magnitude
- **Imed** – median $I$ magnitude
• \textbf{Isig} – standard deviation of \textit{I} magnitude
• \textbf{Imederr} – median \textit{I} magnitude error
• \textbf{Imin} – minimum \textit{I} magnitude
• \textbf{Imax} – maximum \textit{I} magnitude
• \textbf{Ndetect} (DIA only) – the number of independent detections in the subtracted images (cf. Section 4.2).

Please note that the OGLE fields overlap slightly, so on the edges one can find duplicate entries for the same objects.

The SQL database concept allows easy reconstruction of the databases. It is quite possible that in the future we will add some new parameters to facilitate selection of astronomically interesting objects. Feedback from the database users will be appreciated.

6. \textit{BVI} Maps Parameters Database

To facilitate selection of objects we have added to the MYSQL databases the whole set of data released in previously published OGLE-II \textit{BVI} maps of the Magellanic Clouds and \textit{VI} maps of the Galactic bulge. The detailed description of the data set can be found in Papers Ia,b,c. Here we only summarize the parameters included in this database, hereinafter referred to as BVI-DB.

1. \textbf{Field} name (\textit{e.g.}, BUL\_SC1)
2. \textbf{StarID} – object number in the PHOTDB of the Field
3. \textbf{RA}, \textbf{Decl} – equatorial coordinates in hours, degrees
4. \textbf{X}, \textbf{Y} – coordinates of the Object on the template frame (in pixels)
5. \textbf{V} – mean \textit{V} magnitude
6. \textbf{V}–\textbf{I} – mean \textit{V}–\textit{I} color index
7. \textbf{I} – mean \textit{I} magnitude
8. \textbf{Vgood} – number of good photometric points in \textit{V}
9. \textbf{Vbad} – number of bad photometric points in \textit{V}
10. \textbf{Vsig} – standard deviation of \textit{V} magnitude
11. \textbf{Igood} – number of good photometric points in \textit{I}
12. \textbf{Ibad} – number of bad photometric points in \textit{I}
13. \textbf{Isig} – standard deviation of \textit{I} magnitude
   – Following parameters are available only for the Magellanic Clouds data
14. \textbf{B}–\textbf{V} – mean \textit{B}–\textit{V} color index
15. \textbf{B} – mean \textit{B} magnitude
16. \textbf{Bgood} – number of good photometric points in \textit{B}
17. \textbf{Bbad} – number of bad photometric points in \textit{B}
18. \( B_{\text{sig}} \) – standard deviation of \( B \) magnitude

The BVI-DB database can be used not only to select objects to retrieve the full photometry but also independently, as a useful tool to perform statistical analysis of the OGLE-II \( BVI \) photometric maps.

7. User Interface

The on-line access to the OGLE databases is provided through a simple WWW interface available directly at \( \text{http://ogledb.astrouw.edu.pl/ogle/photdb} \) or through a hyperlink from the main OGLE WWW page \( \text{http://ogle.astrouw.edu.pl} \) or its US mirror \( \text{http://bulge.princeton.edu/ogle} \). The underlying software consists of several PHP scripts using the low-level PHOTDB utilities. The main, overview page contains the most important information regarding the use of the interface. In the left panel, under “Database Queries”, the user should choose which database parameter space (“Photometric data” or “\( BVI \) maps”) to use for selections. The appropriate Query Page is then loaded into the main panel.

7.1. Making a Selection

To make a selection of objects one should formulate a query using either the Photometry (PARAMDB, cf. Section 5) or the \( BVI \) maps parameters (BVI-DB, cf. Section 6) database. In both cases one has to choose the target (Galactic bulge, LMC or SMC). The PARAMDB query requires also selection of the photometry set (PSF or DIA). Each page (PARAMDB, BVI) is a HTML form to be filled and submitted to the server (Figs. 1 and 2). A selection of parameters can be done in two possible ways:

1. By filling the input fields marked by relevant parameters names with the minimum and maximum value of the parameter and checking the “Use” box. Leaving any of the limit values empty means no lower or upper limit for the parameter value. All the used parameters limits are combined with logical AND when formulating the query. The “Query” check box must be unchecked.

Special rules work for coordinates \( (RA/Dec, X/Y) \): the range may be specified in three ways: (a) Normal min/max range values; (b) A circle around the point specified by “left” values. The circle radius (in arc seconds for \( RA/Dec \), in pixels for \( X/Y \)) should be given in one (and only one) “right” value by prefixing it with letter ‘r’; (c) A rectangle centered on the point specified by “left” values. Both “right” values should be given prefixed with ‘r’ with the meaning of the rectangle half width/height.

2. If this simple logic is insufficient, one can manually enter the WHERE part of SQL query to be submitted. An explanation of SQL syntax is beyond the scope of this paper but it is an easy task. One can use the parameter names,
**OGLE Photometry Database Query Page**

Select OGLE target:
- Galactic Bulge
- LMC
- SMC

Select parameters database:
- OGLE-II I-band PSF (DoPHOT) photometry
- OGLE-II I-band DIA photometry

Enter values or ranges of parameters, check appropriate Use boxes (Uncheck Query box below):

| Show | Sort | Parameter | Use | Value/Range | Description |
|------|------|-----------|-----|-------------|-------------|
| ☑    |      | Field     |     |             | OGLE field name |
| ☑    |      | StarID    |     |             | Star no. in field catalog |
| ☑    |      | X         |     |             | X pixel coord¹ |
| ☑    |      | Y         |     |             | Y pixel coord¹ |
| ☑    |      | StarCat   |     |             | Catalog designation |
| ☑    |      | RA        |     |             | Right Ascension (J2000)¹ |
| ☑    |      | Decl      |     |             | Declination (J2000)¹ |
|      |      | Ngood     |     |             | No. of good points |
|      |      | Pgood     |     |             | Percentage of good points |
| ☑    |      | Imean     |     |             | Mean I-magnitude² |
| ☑    |      | Imed      |     |             | Median I-magnitude² |
| ☑    |      | Isig      |     |             | Mean error of I-magnitude² |
| ☑    |      | Imederr   |     |             | Median error of I-magnitude² |
| ☑    |      | Ndetect   |     |             | No. of detections on subtracted image (DIA only) |

¹ RA/Dec, X/Y may also specify a circle or rectangle centered on a point, see Query Help for details.
² of good points (if Ngood>0)

Enter SQL query using the above parameter names (Check Query box below):

```
Query: SELECT objects FROM db WHERE
```

Sort ☑ ascending ☑ descending ☑ No flag only objects with no catalog flag

Check Show boxes above for the parameters to display, [ ] objects per page, max of [ ] objects

Submit Query  Note: Depending on the query it make take a while to complete.

Fig. 1. Photometry database query page.

Parentheses and relational operators (note for C programmers: the equality operator is a single ‘=’). It is also worth noting that the parameter name for object declination is Decl, not Dec (the latter form is a reserved SQL word). Short explanation and a few examples are included on the Query Help page. The “Query” check box must be checked.

Other input fields, boxes and buttons include:

- **Show** check boxes located next to individual parameter names control whether the values of these parameters are displayed in the result.
- **Sort** check boxes control which parameter will serve as the sorting key. The sort order can be chosen by checking “ascending” or “descending” box at the bottom of page. Note that the “Field” and “StarID” parameters constitute a single sorting key.
## OGLE BVI Maps Query Page

Select OGLE target:
- Galactic Bulge
- LMC
- SMC

Enter values or ranges of parameters, check appropriate **Use** boxes (Uncheck **Query** box below):

| Field | Use | Value/Range | Description |
|-------|-----|-------------|-------------|
| OGLE field name |  |  |  |
| Star no. in field catalog |  |  |  |
| Right Ascension (J2000) |  |  |  |
| Declination (J2000) |  |  |  |
| X pixel coord |  |  |  |
| Y pixel coord |  |  |  |
| Mean V-band magnitude |  |  |  |
| Mean V-I color index |  |  |  |
| Mean I-band magnitude |  |  |  |
| Mean I band magnitude |  |  |  |
| No. of V-band good points |  |  |  |
| No. of V-band bad points |  |  |  |
| V mag standard deviation |  |  |  |
| No. of I-band good points |  |  |  |
| No. of I-band bad points |  |  |  |
| I mag standard deviation |  |  |  |
| Mean B-V color index (LMC/SMC only) |  |  |  |
| Mean B band magnitude (LMC/SMC only) |  |  |  |
| No. of B-band good points (LMC/SMC only) |  |  |  |
| No. of B-band bad points (LMC/SMC only) |  |  |  |
| B mag standard deviation (LMC/SMC only) |  |  |  |

Enter SQL query using the above parameter names (Check **Query** box below):

- Query: SELECT objects FROM db WHERE

Sort: ascending/descending

Check **Show** boxes above for the parameters to display, objects per page, max of objects

**Submit Query** button sends the query to the server for retrieval of the list of objects fulfilling the given criteria.

---

Fig. 2. *BVI* maps database query page.

- **No flag** check box: if set, only the objects having no catalog flag set will be retrieved (excluded multiple identifications etc., see the Appendix)
- **Query** check box: if set, the SQL query manually inserted to the adjacent input field will be used for the selection instead of parameter value limits
- **Objects per page** input field sets the number of objects to be displayed in one page of results.
- **Max objects** input field sets the maximum number of objects to be selected.
- **Submit Query** button sends the query to the server for retrieval of the list of objects fulfilling the given criteria.
### 7.2. Reviewing the Results

If the query succeeds, the first page of results is displayed, containing all the parameters chosen to be shown. Also, the total number of objects found is shown and the hyperlinks to other pages if the result does not fit into one page (see example in Fig. 3). Please note that the term “page” used here refers to the chunk of objects shown together and has nothing to do with the actual browser window size.

---

**Query:** "SELECT FROM buldia2 WHERE field='bul_sc1' and imean>13 and imean<15 and isig>0.5"

**Displaying Page 1: objects 1-15 of 25**

| No | Field   | StarID | RA       | Dec     | StarCat | Ngood | Imean   | Imed    | Isig   | Imederr |
|----|---------|--------|----------|---------|---------|-------|---------|---------|--------|----------|
| 1  | BUL_SC1 | 377067 | 18.04656 | -30.3763 | 180247.61-302234.7 | 82  | 13.023  | 13.093  | 0.610  | 0.003    |
| 2  | BUL_SC1 | 69050  | 18.039629 | -30.05162 | 180208.27-300305.8 | 272 | 13.080  | 13.234  | 0.821  | 0.003    |
| 3  | BUL_SC1 | 74766  | 18.037295 | -29.94740 | 180014.26-295650.7 | 103 | 13.115  | 13.100  | 0.525  | 0.003    |
| 4  | BUL_SC1 | 730852 | 18.036840 | -30.37638 | 180212.62-302235.0 | 125 | 13.195  | 13.173  | 0.694  | 0.003    |
| 5  | BUL_SC1 | 638649 | 18.050940 | -29.95829 | 180303.38-295729.8 | 72  | 13.383  | 13.374  | 0.734  | 0.003    |
| 6  | BUL_SC1 | 565716 | 18.039017 | -29.54036 | 180220.46-293225.3 | 266 | 13.405  | 13.489  | 0.627  | 0.003    |
| 7  | BUL_SC1 | 624442 | 18.038863 | -29.98777 | 180219.19-295916.0 | 277 | 13.480  | 13.461  | 0.707  | 0.003    |
| 8  | BUL_SC1 | 565030 | 18.048211 | -30.32286 | 180253.56-301922.3 | 267 | 13.620  | 13.635  | 0.817  | 0.003    |
| 9  | BUL_SC1 | 811345 | 18.045444 | -29.70426 | 180243.60-294215.3 | 96  | 13.761  | 13.673  | 0.633  | 0.003    |
| 10 | BUL_SC1 | 839858 | 18.050896 | -29.95827 | 180303.22-295729.8 | 84  | 13.984  | 13.876  | 0.758  | 0.003    |
| 11 | BUL_SC1 | 806102 | 18.044455 | -29.90092 | 180240.04-295403.3 | 98  | 14.114  | 14.127  | 0.681  | 0.003    |
| 12 | BUL_SC1 | 729955 | 18.035974 | -29.77431 | 180209.51-294627.5 | 263 | 14.153  | 14.254  | 0.787  | 0.003    |
| 13 | BUL_SC1 | 66265  | 18.038667 | -30.37619 | 180212.72-302234.3 | 58  | 14.194  | 14.070  | 0.757  | 0.004    |
| 14 | BUL_SC1 | 783060 | 18.040920 | -29.56191 | 180227.31-293340.3 | 48  | 14.276  | 13.873  | 1.342  | 0.004    |
| 15 | BUL_SC1 | 783063 | 18.040949 | -29.56123 | 180227.42-293340.4 | 70  | 14.284  | 14.040  | 0.875  | 0.004    |

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**Fig. 3. Query results page example.**

Individual objects data can be displayed on a separate page by clicking on the “StarID” number in the results table. The new page shows the photometric parameters of the selected object, its light curve plot and the photometric data (see example in Fig. 4). Both the light curve and the photometry table can be downloaded by clicking appropriate hyperlink. The next subsection describes the columns of the photometric data table.

The photometry set used to retrieve the data (PSF or DIA) can be selected by checking a box atop of any results table page. One can also choose to include all points or the good points only.
OGLE-II Galactic Bulge I-band DIA photometry

Field: BUL_SC1 StarID: 365716
Download: object photometry  PS light curve
180220.46-293225.3

| HJD       | Magnitude | Error | Flag | Grade |
|-----------|-----------|-------|------|-------|
| 2450551.89871 | 13.693 | 0.003 | 40   | A     |
| 2450552.80702 | 13.705 | 0.003 | 40   | B     |
| 2450553.81648 | 13.767 | 0.003 | 40   | B     |
| 2450554.74012 | 13.767 | 0.003 | 40   | C     |
| 2450555.72466 | 13.807 | 0.003 | 40   | C     |
| 2450556.69599 | 13.814 | 0.003 | 40   | C     |
| 2450557.77623 | 13.836 | 0.003 | 40   | C     |
| 2450558.71522 | 13.844 | 0.003 | 40   | A     |
| 2450559.73819 | 13.874 | 0.003 | 40   | A     |
| 2450560.83025 | 13.879 | 0.003 | 40   | A     |
| 2450561.78933 | 13.908 | 0.003 | 40   | A     |
| 2450562.73780 | 13.911 | 0.003 | 40   | A     |
| 2450563.73636 | 13.913 | 0.003 | 40   | B     |
| 2450564.68933 | 13.908 | 0.003 | 40   | A     |
| 2450565.69910 | 13.914 | 0.003 | 40   | C     |
| 2450566.91286 | 13.923 | 0.003 | 40   | C     |
| 2450567.76380 | 13.935 | 0.003 | 40   | D     |
| 2450568.79912 | 13.950 | 0.003 | 40   | A     |
| 2450569.69640 | 13.966 | 0.003 | 40   | A     |
| 2450570.71892 | 13.967 | 0.003 | 40   | D     |

Fig. 4. Individual object page example (only a sample of data points shown).

7.3. Downloading the Photometry

The entire set of photometric data for all the objects selected by the query can be downloaded by choosing the PSF (DOPHOT) or DIA data set and clicking “Download photometry” link on the results page. The data are delivered in the form of a gzipped tar file containing individual photometric data files (named as Field_StarID.dat) containing 5 columns: HJD, magnitude, magnitude error, photometry flag (hexadecimal) and the frame grade (A–F, best to worst). The flag contains combined catalog flag for the object and the actual photometry flag of each measurement. For the list of flags, their meaning and values, see the Appendix.

There is a limit of the number of objects for which the photometry can be downloaded in a single query. It is currently set to 100 000 but this number may be changed in the future depending on the average data flow from the server. Any query, however, will return the number of objects found. The user can set a smaller limit for the query.
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Appendix: Technical Details of the DIA Photometry Catalogs

Every DIA catalog (CAT) file has a following sequence of objects:

(a) objects cross-identified with $I$-band PSF (DOPHOT) catalog
(b) all the remaining DIA objects (flagged in the catalog with CAT_DIA_NEW flag)

The cross-identification here means “the closest object within 1.2 pixel (0\arcsec5), if any”. This approach has the following consequences:

1. The DIA catalog is always larger than the PSF (DOPHOT) catalog.
2. Some of the PSF objects (part (a) of the DIA catalog) have no DIA object identified – these objects are flagged in the catalog with CAT_DIA_NO_PHOT flag but both the catalog and (empty) photometry entries are present to keep object numbers consistent.
3. Some DIA objects have been cross-identified with more than one PSF DB objects. Entries for those objects are flagged with CAT_DIA_MULT_DOPH flag in the catalog and the corresponding photometry entries are duplicated. The number of these “multiplicities” is placed in nsame field of catalog structure while same field links all such multiples (first $\rightarrow$ second $\rightarrow$ ... $\rightarrow$ last $\rightarrow$ first)
4. For some of PSF DB objects more than one DIA object has been found within 1.2 pixel distance. These objects are flagged with CAT_DIA_MULT_DIA in the catalog. If (and only if) they are not also in category 3 above, nsame field contains the number of DIA objects within 1.2 pixel from a given PSF object and same field contains the number of the second closest object.

The following additional notes further explain the details:

- all DIA catalog $X,Y$ coordinates are taken from DIA photometry. The only obvious exception are the "empty" entries (category 2 above) for which the original PSF (DOPHOT) coordinates have been kept.
- the above given categories 3 and 4 are NOT the same. In (3) the 1.2 pixel distance is counted from a PSF object position while in (4) – from a DIA object position. Even for cross-identified objects, PSF and DIA $X,Y$ coordinates may be slightly different.
- all frames photometred by DIA have been included in the OGLE-II DIA PHOTDB. Their grades (A–F, best to worst) are “inherited” from the PSF (DOPHOT) PHOTDB. For those frames that were absent there, grade ‘F’ is applied.
when the photometry is retrieved from the database for a given object, the catalog flag for that object is combined with the flags of each individual measurement. The following is a complete list of values and meaning of the flags. The value listed in the downloaded photometry files is a bitwise or-ed sum of the individual flags. Please note that some of the flags were used in OGLE-I phase only (for which the photometry is not yet available on-line) but they are given here for completeness.

| Flag          | Value | Description                                                  |
|---------------|-------|--------------------------------------------------------------|
| CAT_SUBF_MULT | 0x01  | multiple detection on subframe (OGLE-I only)                |
| CAT_EDGE_OBJ  | 0x02  | object close to the frame edge (OGLE-I only)                 |
| DIA_MULT      | 0x10  | DIA database object has any of the above described multiplicity flag set |
| BAD_PHOT      | 0x20  | the measurement was classified as bad                        |
|               |       | (cf. Section 4.1)                                           |
| DIA_DETECTED  | 0x40  | DIA database object was independently measured on the subtracted image (cf. Section 4.2) |