



KEPLER

Dorothy Fraquelli



Kepler involves a number of branches and personnel at STScI. No one at STScI works full time on Kepler. Some work is done under contract with the Kepler project (i.e., the DMC) while other work is done under the MAST contract.

❑ Staffing for Kepler (2.5 FTE in FY 2011, 2.0 FTE in FY 2012):

+ from ASB: Randy Thompson, Shui-Tseng, Tim Kimball, Karen Levay and Myron Smith

+ from DPAS: Forrest Hamilton, Dorothy Fraquelli, Alexis Truitt, Faith Abney (lead) (Tracy Ellis, Tatjana Tomovic are backups for Hamilton)

+ from DSB: Christine Heller-Boyer

+ from ITSD: Tom Walker, Pat Taylor, David Unger

❑ The archive holds light curves, target pixel files and FFIs for quarters 0 through 8.

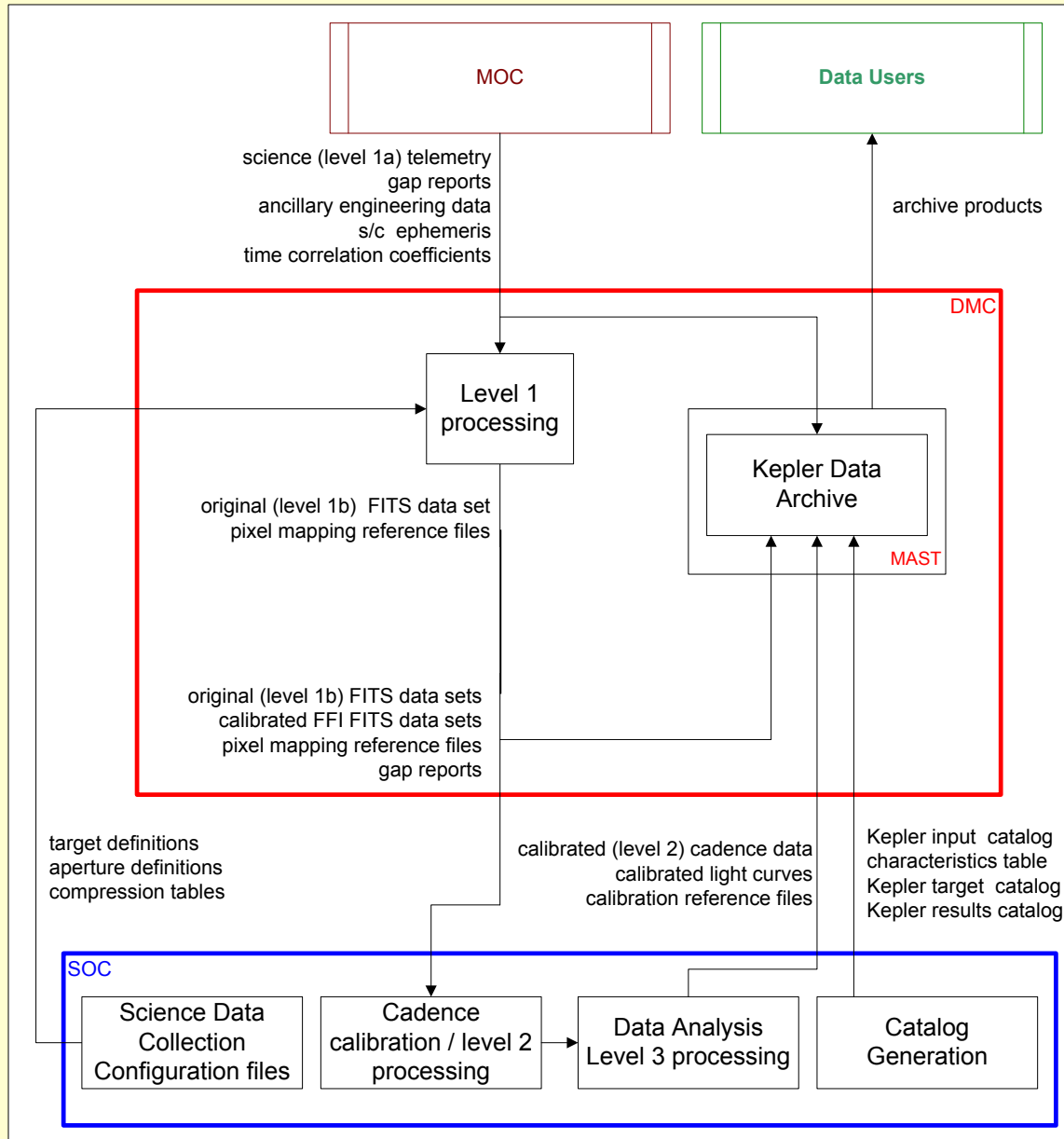
+ Q0-Q2 data are public, as are all FFIs.

+ Q3 exo-planet key project data go public today (September 23rd).

+ Q9 data are expected to arrive at the archive in early November (slight delay for a software update at the SOC).

+ Q11 observations begin on the spacecraft at the end of September 2011.

Data flow from Kepler → MOC → DMC (at STScI) → SOC (at Ames) → DMC → MAST



The MOC receives data from Kepler and forwards them to the DMC. The DMC formats the data (FITS), archives the level 1 data and forwards them to the SOC. These are done monthly.

The SOC processes the data, producing light curves, target pixel files and FFIs, which are sent to the DMC quarterly for archiving.

The Kepler project sends other files to the DMC for archiving, DMC use and/or MAST use. These include the KIC, KTC (quarterly), lists of dropped or published targets, aperture definitions, data release notes, and others documents.



- ❑ MAST provides the archive user interface for Kepler data, which consist of light curves, target pixel files, full frame images (FFI), a variety of support files and documentation.
 - + Standard MAST search forms for Target Searches, Data Searches, FFI Searches and the Kepler Input Catalog (KIC).
 - + Direct download of CBV files

- ❑ MAST also provides a number of value added interfaces and services.
 - + Display and direct download of FFIs and public light curves
 - + Direct download of tar files containing data based on investigation id, and public data by quarter.
 - + Kepler/GALEX cross match catalog via a standard interface and via Casjobs
 - + Several VO services
 - + Casjobs (direct query of the database) and more

- ❑ MAST will house the Kepler archive after end of mission.

MAST Kepler - Mozilla Firefox

MAST Kepler

Kepler

MAST STScI Tools Mission_Search Tutorial Site Search

Kepler Home About Kepler Getting Started Registration Kepler Data Search Kepler Target Search FFI Search

Data Search

FAQ

GO Program

Search & Retrieval

MAST Services

Data Release Notes

Data Reduction & Analysis

Documentation

Related Sites

Images

Publications/News

Data Use Policy

Acknowledgments

Latest News

- 8/25/11 - An updated version of the [Data Characteristics Handbook](#) is now available.
- 7/28/11 - [Cotrending Basis Vectors](#), used to correct individual light curves, are now available. These basis vectors contain information about trends common to most light curves on a given target. They were calculated for each channel based on the properties of many correlated light curves. These vectors are fit and subtracted from individual light curves to remove instrumental systematics.
- 7/27/11 - [Release Notes 11](#) are now available.
- 7/27/11 - [Kepler Archive Manual](#), containing a description of the new file format, is now available. The archive contains the first light curves for quarters 0, 1, 2, 3, 4, and 8. The new format light curves for quarters 5, 6, and 7 will be available on August 11, 2011. The tar files, which contain the investigation and public data by quarter, are available on August 3, 2011. The README files will describe the current status of the tarfiles. Until ingest of the new data is complete, some of the online data will be in the old format. During this time, the light curves (in units of e-/cadence) will be available as having the new units of e-/sec.
- 6/20/11 - Updated light curves files will start being available June 22, 2011. The new files include more information, provide consistency with the recently released target pixel file column

NEWS

August 04, 2011:
New format Kepler lightcurves now available online

June 20, 2011:
Archiving of Reformatted Kepler Light Curves about to begin

April 29, 2011:
Updated List of Kepler Planetary Candidates

March 23, 2011:
USNO-Kepler Catalog

March 15, 2011:
Catalogs of GALEX UV unique sources and of UV-optical matched sources

RSS 2.0

Missions

Hubble

Hubble Legacy Archive

HSTonline

DSS

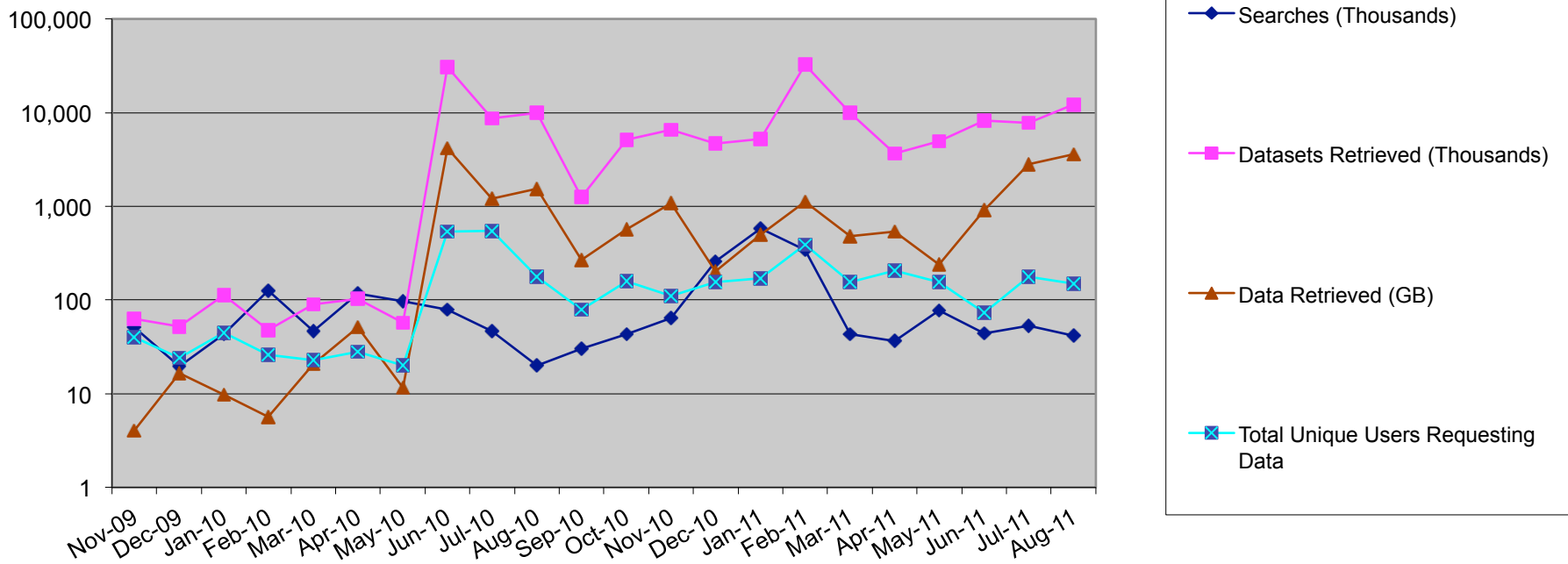
GALEX

JWST



Exo-planet Data Releases: Q0-Q1 - Jun 15, 2010 Q1 – Feb 2, 2011 Q2 – Sept 23, 2011

Kepler Archive Retrieval Statistics





In the past year the archive has received:

- Updated light curves for Q0-Q7 (new format)
- target pixel files for existing light curves
- FFIs
- Co-trending Bias Vectors (CBV)
- An updated Characteristics Table (CT) (new columns)
- Updated list of released Kepler Planetary Candidates (KOI)
- USNO/Kepler Catalog (a HLSP from Karen Kinemuchi)
- Data Release Notes and updated documentation
- HLSP for KOI-126 (KPLR005897826)

The DMC has improved ingest speeds by a factor of 2.

Kepler CBV Files - Mozilla Firefox

Kepler CBV Files

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Kepler CBV Files

Below is the current list of available Cotrending Basis Vector (CBV) files. These data products can be used to remove instrumental systematics from the Kepler light curves. There is one FITS file per quarter. Each file contains 84 extension, one for each CCD channel, and 16 basis vectors per channel. These basis vectors can be fit to the Kepler SAP flux vector and the best fit vectors subtracted to significantly reduce systematic trends in the time series.

To download a particular file, click on the appropriate File Name below. Alternatively, ftp to archive.stsci.edu and cd to /pub/kepler/cbv/ to see and/or download the complete list.

See [Data Release Notes 11](#) for more information on how to use them.

For a tool to fit and apply CBVs to your Kepler light curve, see keplergo.arc.nasa.gov/ContributedSoftwareKepcotrend.shtml

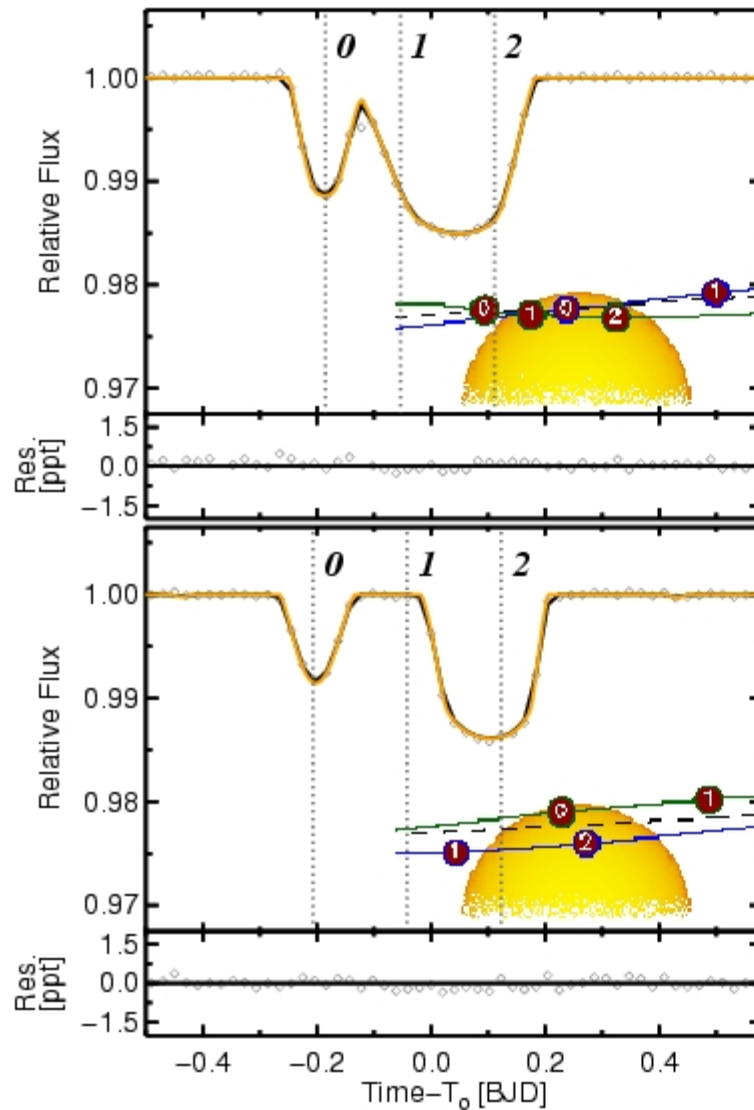
CBV Files

File Name	Quarter	Data Release	Delivery Date
kplr2009131105131-g00-d05_lcbv.fits	0	5	July 27, 2011
kplr2009166043257-g01-d05_lcbv.fits	1	5	July 27, 2011
kplr2009259160929-g02-d07_lcbv.fits	2	7	July 27, 2011
kplr2009350155506-g03-d04_lcbv.fits	3	4	July 27, 2011
kplr2010078095331-g04-d06_lcbv.fits	4	6	July 27, 2011
kplr2010174085026-g05-d08_lcbv.fits	5	8	July 27, 2011
kplr2010265121752-g06-d09_lcbv.fits	6	9	July 27, 2011
kplr2010355172524-g07-d10_lcbv.fits	7	10	July 27, 2011
kplr2011073133259-g08-d11_lcbv.fits	8	11	July 27, 2011

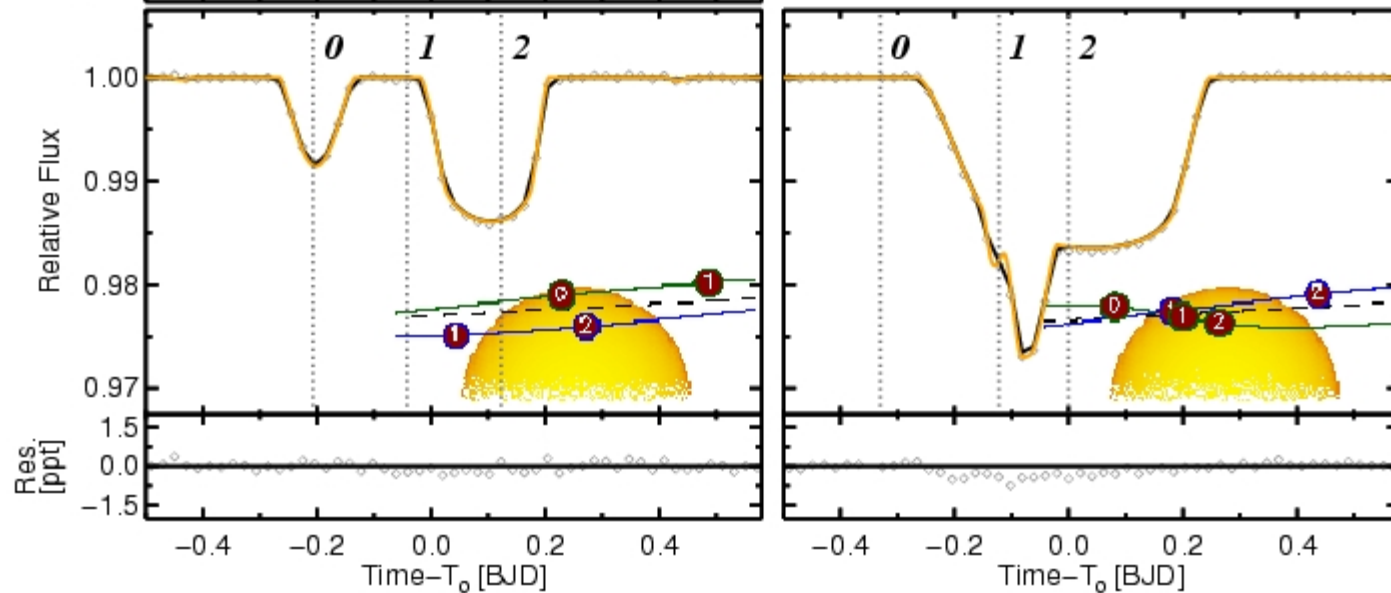
CBV files allow the user to correct for systematic trends in their data. The project applies a correction, appropriate for its exo-planet search, which may remove astrophysically interesting features from the data. With the CBV files, users can start with the SAP and do their own correction.



KOI-126 (KPLR005897826) - A multi-eclipsing triple star system



System consists of three stars, all of whose orbits are nearly edge-on in our line of sight. The stellar masses and radii may be determined from the photometry alone. Carter et al. (2011), *Science*, 331 (6017): 562-565





In progress or expected

- Additional High Level Science Products
- Kepler Colors Table (see later slides)
- Interfaces for the SPICE Kernals (aka ephemeris), Ancillary Engineering Data and Reverse Clock data
- Pixel Response Function files and a CBV-like interface for retrieval
- Reprocessed Qo-Q8 data
- Support for Kepler Senior Review Proposal
- Another CT
- Operations is moving from Solaris/SyBase to linux/sqlserver; expect to see improved performance.
- Continued receipt of monthly and quarterly data transmissions, and quarterly KTCs
- Transfer of target pixel files to the KASC group



Kepler Legacy Archive

We expect to be involved in the planning of the Kepler Legacy Archive.



Kepler Acronyms

ASB – Archive Sciences Branch

CBV – Co-trending Bias Vectors

CT – Characteristics Table

DPAS – Data Processing and Services

DSB – Data Software Branch

DMC – Data Management Center located at STScI

KASC – Kepler Asteroseismic Science Consortium

FFI – Full Frame Image

KIC - Kepler Input Catalog

KTC - Kepler Target Catalog

MOC - Mission Operations Center located at LASP in Boulder

Q# - quarter, as in Q1 is Quarter 1

SOC – Science Operations Center located at NASA Ames

TPF – Target Pixel File



KEPLER

Myron Smith



New mags. & colors for our Kepler Colors Table

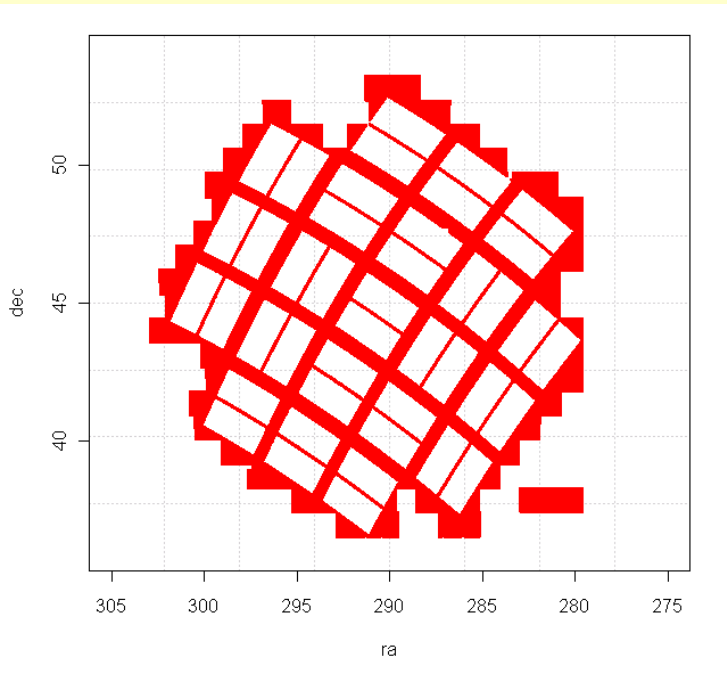
- ✓ 2MASS (JHK mags)
- ✓ UK_IRT (J' mags)
- ✓ New GALEX (NUV only in last delivery)

To be delivered (dates uncertain):

- INT - *Ugr*, $H\alpha$
- Howell-Everett - UB V
- panSTARRS - *griz,y, W*



UKIRT J'-band catalog (Phil Lucas):



Internal white areas show coverage of the entire Kepler FOV by the UKIRT J'- mag catalog.

Progress: \approx completed



Promissory #1:



Isaac Newton Telescope

“INT” consortium led by P. Groot to deliver colors for a “significant chunk of FOV” in November.

Bands include U^* , g, r, i, $H\alpha$.

The U and $H\alpha$ will be major additions.

*U is “RGO U”.



Promissory #2:



KPNO-WIYN UBV photometry
S. Howell, M. Everett

- Johnson UBV mags provided for entire FOV
- Data analysis now proceeding.



Promissory #3:



PanSTARRS: but no progress yet on details or delivery date.

$(griz, y, \text{“W”})^*$

Issues:

- If >1 obsns, how many?
- Metric for variability?

*Wide Band “W” mag will be comparable to Kepler s/c “flux”.



The screenshot shows the MAST Kepler Colors Table form. At the top, there is a navigation bar with links like 'MAST Home', 'About Kepler', 'Getting Started', 'Registration', 'Kepler Data Search', 'Kepler Target Search', and 'FFI Search'. Below this, the form is titled 'Kepler Colors' and includes a '(Help) Field Descriptions' link. There are two tabs: 'Standard Form' (selected) and 'File Upload Form'. The form contains several sections: a search bar with 'Search', 'Reset', and 'Clear Form' buttons; a section for 'Target Name', 'Resolver' (with a dropdown set to 'NED'), 'Radius (arcmin)' (with a value of 0.02), 'Right Ascension', 'Declination', and 'Equinox' (with a dropdown set to 'J2000'); a section for 'Color 1' and 'Color 2' (both with 'FUVNUV' dropdowns) and 'Value1' and 'Value2' input fields; a section for four 'User-specified field' entries, each with a 'Kepler ID' dropdown and a 'Field Descriptions' link; an 'Output Columns' list with 'up', 'down', 'remove', and 'reset' buttons, and 'add' and 'add all' buttons; a 'Sort By' section with three dropdowns (all set to 'null') and three 'Reverse' checkboxes; an 'Output Coords' section with radio buttons for 'Sexagesimal' (selected), 'Degrees', and 'Hours'; an 'Output Format' dropdown set to 'HTML_Table'; checkboxes for 'Show Query' and 'Make Rows Distinct'; a 'Maximum Records' dropdown set to '1001'; and a 'Records per Page' dropdown set to '50'. At the bottom, there is another search bar with 'Search', 'Reset', and 'Clear Form' buttons.

Kepler Colors Table form:
A prototype for retrieval
on Search pages.

Filter by color cuts within
open boxes. If not found
there, retrieve them via
CasJobs tool.



(Scrap page – INT filter curves)

326 *P. J. Groot et al.*

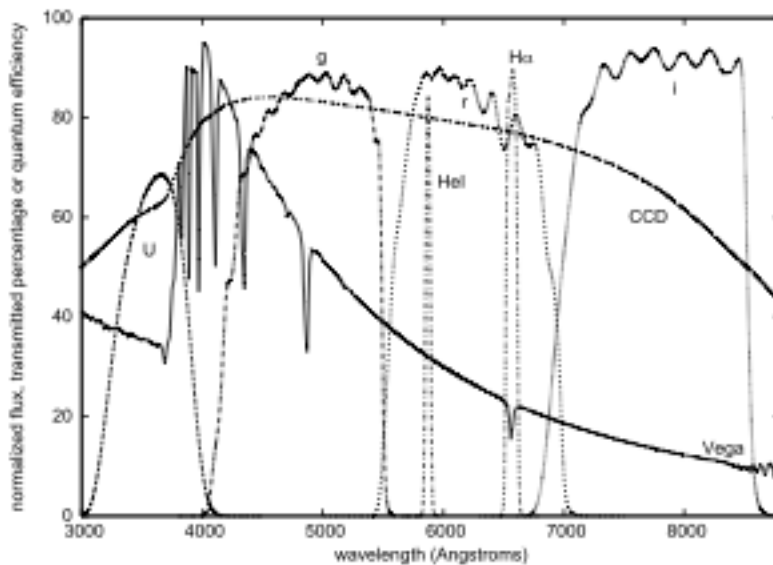


Figure 2. Filter efficiency curves of the *U*, *g*, *r*, HeI5875, H α and *i*-band filters used in the UVEX survey and IPHAS (dashed and dash-dotted curves), overplotted on to the spectrum of Vega (solid curve), together with the CCD-efficiency curve (dashed).