ESO Phase 3 HARPS Data Release Description

Document Content:
Data taken from 1st June 2026 ... Page 1
Data taken before 1st June 2026 ... Page 8

HARPS data products observed after 1st June 2026

Data Collection	HARPS
Data Provider	ESO La Silla Paranal Observatory Science Operations
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Abstract

This is the release of reduced spectra from the high-resolution visible spectrograph HARPS (High Accuracy Radial velocity Planet Searcher)[1] in operation at the ESO La Silla 3.6m telescope. The spectrograph offers a wavelength range from 378 to 691 nm. The spectral resolution depends on the instrument mode. The median resolving power is 115'000 in HAM (high accuracy mode) mode and 85'000 in EGGS (high efficiency mode) mode. The HAM mode, in addition to the non-polarimetric standard setup, also has a polarimetric option. The spectrograph is fed with two fibres. In the case of non-polarimetric observations, one fibre (fibre A) is placed on the object and the second one (fibre B) can be used to either measure the sky background or to simultaneously collect light from a reference calibration source. A Fabry-Perot (FP) cavity is nowadays the operationally used simultaneous reference which allows to measure the instrumental drift between the night-time observation and the daytime wavelength calibration. In the past, before the addition of a FP light source to the HARPS calibration unit, a Thorium-Argon lamp was used as reference. When using the polarimetric setup, the two fibers are illuminated by the object, but with different polarisation states than can be modified by the user. The reader is referred to the HARPS user manual[2] for details about the instrument and the data acquisition strategy.

This release is an open stream release. It is complete from the HARPS detector upgrade, on June 10 2026, up to today. Data content is not fixed but grows with time as new data is acquired and processed. The release covers all HARPS science data in both HAM and EGGS modes. All data have been reduced automatically using the HARPS Data Reduction Software (DRS) pipeline version 3.3.12 (based on the ESPRESSO DRS which has been optimized for HARPS), and which is publicly available to the community[3].

The reduction includes extraction of the spectrum, flat fielding, wavelength calibration and flux calibration. In addition, sky subtraction is performed if fibre B is placed on sky. A cross correlation with a stellar reference mask is executed in order to calculate the radial velocity (RV) of the observed object. Please note that systematic shifts of the RV values can occur between different versions of the pipeline. It is highly recommended to use only products from the same pipeline version for RV studies. The HARPS pipeline extracts a spectrum from each single exposure.

[1] https://www.eso.org/sci/facilities/lasilla/instruments/harps.html
[2] https://www.eso.org/sci/facilities/lasilla/instruments/harps/doc/manual/HARPS-UserManual2.4.pdf
[3] https://www.eso.org/sci/software/pipelines/harps

Release Content

The data frames are tagged "HARPS" in the ESO archive user interface[4]. The release contains science data from all HARPS instrument modes and setups since the replacement of the HARPS detector on June 10 2026.

To obtain a science observation, users have to first select between the high accuracy (HAM) and high efficiency (EGGS) modes which defines the resolution:

- HAM mode, high accuracy, resolution 115'000:
    - Selection of the non-polarimetric (standard) or polarimetric setup
    - In the non-polarimetric setup, it is possible to select the source illuminating the reference fibre (sky or simultaneous calibration sources)
    - In the polarimetric mode, the star will be injected in both fibers. The user can select the polarimetric state of both fibers.
- EGGS mode
    - No polarimetric setup available, the user can select the source illuminating the reference fibre (sky or simultaneous calibration sources). As the EGGS mode is optimised for faint target observations, it is advised to select the sky on the reference fibre as the drift of the instrument will be much smaller than photon-noise precision and possible sky contamination.

Data from all instrumental modes are processed. Processing of HARPS science data is based on single exposures: every science exposure is pipeline-processed and results in an extracted, flux-calibrated spectrum and a number of additional products described later.

Data contained in this release are selected based on the following rules:

- Instrument (INSTRUME)= HARPS
- Data product category (PRODCATG) = SCIENCE.SPECTRUM
- Technique for observation (OBSTECH) =
    - ECHELLE for standard non-polarimetric setup
    - ECHELLE,CIRPOL for circular polarization setup
    - ECHELLE,LINPOL for linear polarization setup
- Category of raw frame (PRO.REC1.RAW1.CATG) = OBJ_SKY or OBJ_FP.

Processing of the HARPS science data has a success rate of nearly 100%, only very few input raw files are rejected. No selection is made on the basis of the observing mode (visitor or service).

Normally, the data is subject to the standard one-year proprietary policy. In the case of HARPS data obtained within the NIRPS GTO, the extracted barycentric (BERV) corrected 1-dimension spectra will be delivered after the one-year exclusivity period with a random radial velocity shift drawn from a normal distribution with a sigma of 100 m/s (0.0004 nm @ 1.2 micron). The file name contains the string 'S1D_FINAL_TRUNCATED_WAVE_A.fits' and no additional associated files will be available. The extracted, BERV corrected 1-dimension spectra with precise wavelength (S1D_FINAL), together with the extracted 2-dimension spectra (S2D) and the Cross-Correlation (CCF) FITS files including the precise radial velocity will be provided after the two-year exclusivity period. Considering that the source code of the HARPS DRS is publicly available, the HARPS raw frames obtained with the NIRPS GTO (pixels and fits headers) are also protected for an exclusivity period of 2 years in order to protect radial velocities.

HELIOS (HARPS Experiment for Light Integrated Over the Sun) data are not part of the HARPS collection, but are offered via the dedicated HELIOS collection.

[4] https://archive.eso.org/scienceportal/home?data_collection=HARPS

Release Notes

Simultaneous observations with NIRPS

HARPS can be used alone or simultaneously with NIRPS. The FITS keyword INS.MODE (instrument mode) tells whether NIRPS was used in tendem with HARPS. In such a case, the keywords is equal to "HARPS+NIRPS", while it is "HARPS" only when NIRPS is not used. Associated NIRPS files to HARPS observations share the same OBS.ID (observation block ID) number.

Data Reduction and Calibration

A detailed description of the HARPS pipeline can be found in the pipeline user manual which is available from the ESO pipeline web pages[3]. The initially released data set was processed with version 3.3.12 of the pipeline. The actual version used for processing can be found in the header of any product in the keyword "PROCSOFT".

Data reduction includes preprocessing, dark current subtraction, spectrum extraction, flat fielding, correction for the Echelle blaze function, wavelength calibration, drift correction if FP on fibre B, merging of Echelle orders and flux calibration. Below the individual reduction steps are de- scribed in detail.

Wavelength calibrations. Wavelength calibration is achieved in two steps. The absolute wavelengths are determined by an exposure with a Thorium-Argon (THAR) hollow-cathode lamp. The emission spectrum from TH (AR lines are not stable in time) is however sparse in emission peaks, thus the absolute position of the TH lines is then used in combination with a Fabry-Perot (FP) light source, which provides a high number of evenly distributed lines with unknow wavelengths, to provide an accurate and precise wavelength calibration. HARPS is also equipped with a laser frequency comb (LFC), which can be used alternatively to the THAR and FP tandem. Although LFC calibrations are taken daily, and the pipelines reduces those frames to provide a LFC-based wavelength solutions, those calibrations are not yet fully validated. Wavelengths in the "WAVE" extension of the output products are expressed in vacuum ("WAVE_AIR" in the air).

Barycentric correction. The wavelengths in the science spectrum are corrected to the barycentre of the solar system. The Barycentric Earth Radial Velocity is computed using the target coordinates and proper motions from P2 and it is stored in the header keyword QC BERV. Users must take care to enter the precise coordinates, epoch, equinox and proper motions of their targets (1 arcsec error can introduce 10 cm/s offset).

Correction for instrumental drift. The HARPS spectrograph is fed with two fibres simultaneously. Fibre A is placed on the scientific object. Fibre B can be used to record the sky or the FP source during the science exposure. In the latter case the instrumental drift between the science observation and the daytime wavelength calibration is calculated and corrected for in the wavelength solution. We note that in case the FP light source is not available, it is possible to illuminate fibre B with the THAR lamp for drift measurement. When fibre B is on sky, no drift correction will be applied, however, sky contamination seen in fibre B will be subtracted from fiber A taking into account the relative efficiency between the two fibres.

Contamination induced by the FP or the THAR lamp. When fibre B is used to measure the FP or the THAR light source, for instrumental drift measurement, the strong THAR or FP lines could contaminate the pixels at the position of fibre A (8 pixels apart in cross-dispersion) where the science object is recorded. This effect is measured with dedicated calibration frames and has been monitored since the start of operation. Due to the large dynamical range of the THAR lamp emission peaks, we measure some contamination, and in such a case, we correct for it at the 2D science frame level, before extraction. In the case of the FP, no contamination is observed and thus the correction is not applied.

Cleaning of cosmic ray hits. Cosmic ray hits are cleaned from the 2D science frame using histogram thresholding.

Spectrum extraction. The spectra are extracted with an optimal extraction algorithm using cross-dispersion order profiles obtained from spectral flat field calibrations.

Flux calibration. Extracted spectra are always flux calibrated by the pipeline. According to the HARPS calibration plan, spectroscopic flux standards are observed during technical nights. Exact measurements of the actual atmospheric conditions on a specific night are, therefore, not available. For this release, sets of standard stars have been identified that are representative for a given time period. All science observations from such a period have then been calibrated with the same set.

Radial velocity calculation. The HARPS science recipe computes the cross-correlation function (CCF) of the extracted spectrum in wavelength-order space with respect to a binary template of a given spectral type. The radial velocity (RV) is then obtained from a Gaussian fit to the CCF. Template masks for G-, K-, and M-type stars are available within the pipeline. The results are written into the "HIERARCH ESO QC CCF *" header keywords of the output products; the measured RV value can be found in "HIERARCH ESO QC CCF RV", the corresponding error in "HIERARCH ESO QC CCF RV ERROR", and the used mask in "HIERARCH ESO QC CCF MASK". This information is available only in the header of the downloaded data, and not available via online header display services.

The value computed by the pipeline also depends on the accuracy of the parameters defined by the user who prepared the observations. In particular, the mask and the coordinates and proper motion. If in the archive there are two spectra of the same object by two different programs, different PIs might have entered different parameters which might give an RV offset. Therefore, when working with RV time series, one has to be sure all data are obtained with the same assumptions.

All these parameters are recorded in the FITS header under the following keywords:

HIERARCH ESO TEL TARG ALPHA (coordinate alpha)
HIERARCH ESO TEL TARG DELTA (coordinate delta)
HIERARCH ESO TEL TARG PMA (proper motion alpha)
HIERARCH ESO TEL TARG PMD (proper motion delta)
HIERARCH ESO TEL TARG RADVEL (target systemic RV, km/s precision)
HIERARCH ESO PRO REC1 PARAM8 VALUE (spectral type)
HIERARCH ESO TEL TARG COORDTYPE (mean or apparent coordinates)
HIERARCH ESO TEL TARG EPOCH (epoch 1950 or 2000)
HIERARCH ESO TEL TARG EPOCHSYSTEM (Julian or Besselian)
HIERARCH ESO TEL TARG EQUINOX (equinox)

Calibrations used for data reduction. Table 1 lists the required calibration types that are needed for the reduction of science data. Please check the pipeline user manual for further details.

Table 1. NIRPS calibrations

Type	Purpose
DARK	Hot pixel map and Master Dark (Static product)
LED	Detector flat-field for Bad pixel map (Static product)
Order definition flat	Defines the position of the orders on the detector
(Spectral) flat field	Orders profile, spectral flat field and blaze
Wavelength calibration (THAR + FP)	Wavelength solution. Calibrations with FP-FP, THAR-FP and FP-THAR are used for the product

Contamination	Measures the contamination from the THAR or FP sources on fibre B. THAR contamintaions used for data reduction in this release, but not the FP ones.
Sky-Sky flat	Give the relative efficiency of fibre B with respect to fibre A. Used for providing sky corrected (SKYSUB) products.
Standard Photometric stars	Absolute flux calibration for generating flux calibrated (FLUXCAL) products

All calibrations used in this release have been processed with pipeline version 3.2.6 or higher. Calibration and science data for NIRPS are always processed with the same pipeline version. The pipeline will always use the calibrations closest in time which passed quality control (QC) and acquired before the science spectra.

Data Quality

Static calibrations. All used static calibrations have been quality-reviewed and certified at the time of acquisition.

QC flag. Each pipeline product is quality checked during the reduction porocess and contains QC flag (e.g. QC.SCIRED.CHECK for science exposures) indicating good quality (1) or bad quality (0). Only the products with QC=1 should be used for reduction.

Known Features and Issues

Dependency of RV values on pipeline version. Changes of the algorithms in various parts of the pipeline can result in shifts of the calculated RV values from one pipeline version to another. It must be checked that all observations that are used have been reduced with the same pipeline version. All science products that are provided in this release have been processed with the same pipeline version as the master calibrations. This ensures internal consistency of the release. For future additions to this release, different pipeline versions than in the initial release may be used. The consistency between science products and master calibrations will, however, be kept. The user is advised to check the actual pipeline version, that is recorded in the "PRO.REC1.PIPE.ID" header keyword, before comparing RV values.

Data Format

File Types

The data set for each observation consists of one primary product file (S1D_FINAL) and several ancillary fits files. The number of ancillary files depends on the source for fibre B (FP or sky). The primary NIRPS science data product is a 1D spectrum with merged Echelle orders. The file has one FITS table extension. The table columns contain the wavelength array, the extracted flux, the error of the flux, and some additional quantities listed in Table 2.

Table 2. Table columns of primary product file S1D_FINAL

Column	Unit	Description
WAVE	Å	Wavelength (in vacuum)
FLUX	erg/cm2/s/Å	Extracted flux including all the corrections available
ERR	erg/cm2/s/Å	Corresponding error
QUAL	None	Quality. Values above 0 may indicate issues with the data, e.g. saturation
SNR	None	Signal-to-noise ratio of the extracted spectrum
WAVE_AIR	Å	Wavelength (in air)
FLUX_EL	Count	Extracted electrons per wavelength bin, not sky-subtracted
ERR_EL	Count	Corresponding error
QUAL_EL	None	Corresponding quality

FLUX_CAL	erg/cm2/s/Å	Extracted flux, not sky-subtracted
ERR_CAL	erg/cm2/s/Å	Corresponding error
QUAL_CAL	None	Corresponding quality
FLUX_CAL_SKYSUB	erg/cm2/s/Å	Extracted flux, sky-subtracted; only present if fibre B is on sky
ERR_CAL_SKYSUB	erg/cm2/s/Å	Corresponding error
QUAL_CAL_SKYSUB	None	Corresponding quality
FLUX_EL_SKYSUB	Count	Extracted electrons per wavelength bin, sky-subtracted; only present if fibre B is on sky
ERR_EL_SKYSUB	Count	Corresponding error
QUAL_EL_SKYSUB	None	Corresponding quality

There are several additional files which are associated to the primary product as described in the following table:

1) the extracted spectrum of fibre B (sky spectrum, THAR or FP);
2) the cross-correlation function of fibre A for the computation of the radial velocity;
3) The drift matrix, only in case fibre B is on THAR or FP
4) a TAR file with additional pipeline products: the telluric spectra derived from the telluric correction in S2D format.

Table 3: Primary, ancillary and associated products of NIRPS spectra.

Product category PRO.CATG	Number	Primary / Ancillary / Ass. tar	Description
S1D_FINAL_A	1	Primary	Flux-calibrated co-added 1-D spectrum of the target (fibre A)
S1D_FINAL_B	1	Ancillary	Extracted co-added 1-D spectrum of fibre B
CCF_A	1	Ancillary	Cross-correlation function of fibre A
DRIFT_MATRIX_B	0/1	Ancillary	Drift between science exposure and wavelength-calibration, only in case of OBJ_THAR or OBJ_FP
S2D_A	1	Ass. tar	Extracted spectra for each order of fibreA, not flux-calibrated, deflatted, divided by blaze function
S2D_SKYSUB_A	0/1	Ass.tar	Extracted spectra for each order, sky-subtracted, not flux-calibrated, deflatted, divided by the blaze function. Not present if tpl.name = HARPS_ech_obs_objA or HARPS_ech_obs_wavesimult
S2D_BLAZE_A	1	Ass. tar	Extracted spectra for each order of fibre A, not flux-calibrated, deflatted, not divided by blaze function
BLAZE_A	1	Ass.tar	Blaze function

Acknowledgements

Publications based on data obtained with the HARPS instrument should quote the following reference paper: Mayor, M., Pepe, F., Queloz, D. et al., 2003, The Messenger, 114, 20.
All users are kindly reminded to notify ESO (esodata@eso.org) upon acceptance or publication of a paper based on ESO data, including bibliographic references (title, authors, journal, volume, year, and page numbers) and the program ID(s) of the data used in the paper.

According to the Data Access Policy for ESO Data held in the ESO Science Archive Facility, all us- ers are required to acknowledge the source of the data with an appropriate citation in their pub- lications.

Since processed data downloaded from the ESO Archive are assigned a Digital Object Identifier (DOI), the following statement must be included in any publications making use of them: *Based on data obtained from the ESO Science Archive Facility with DOI(s):* https://doi.eso.org/10.18727/archive/92.

HARPS data products observed before June 2026

Data Collection	HARPS
Release Number	1
Data Provider	ESO La Silla Paranal Observatory Science Operations
Document Date	23.01.2023

Abstract

This is the release of reduced 1-D spectra from the HARPS[1] (High Accuracy Radial velocity Planet Searcher) at the ESO La Silla 3.6m telescope. The release covers practically all HARPS science data in High RV Accuracy Mode (HAM) and High Efficiency Mode (EGGS).

All data were reduced automatically using the Data Reduction Software (DRS) pipeline developed by the HARPS Consortium. Data obtained before 29 May 2015 were processed with version 3.5 of the pipeline. Data obtained after that date with version 3.8 of the pipeline, configured in a way that the results are compatible with the results from version 3.5.

The products come in the standard ESO 1-D FITS binary table format[2] along with a TAR file containing all output files generated by the pipeline.

Release Content

The release covers practically all HARPS science data in HAM/EGGS modes since the beginning of the instrument operations (October 2003); the release does not contain HARPS data taken in the polarimetry mode.

This release supersedes the release of HARPS HAM/EGGS data that used to be available with the "FEROS/HARPS pipeline processed data" service.[3] The differences with respect to this service are:

- Provision of the full combined and rebinned spectrum in the 1-D standard FITS binary table format.
- The TAR file containing all pipeline påroducts is renamed to explicitly provide the pipeline version identifier.
- Possibility of simultaneous queries with data products from other Phase 3 releases.

The data were processed with two versions of the DRS pipeline:

- Version 3.5, installed at the Observatory on 7 October 2010.
- Version 3.8, installed at the Observatory on 29 May 2015; the pipeline is configured in a way that the results are compatible with the results from version 3.5.

Because of that, there are three batches of data in this release:

- Data obtained prior to 7 October 2010 were retrieved from the ESO Archive and re-processed in Garching with the version 3.5.
- Data obtained between 8 October 2010 and 29 May 2015 were processed with version 3.5 at the Observatory.
- Data obtained after 30 May 2015 were processed with version 3.8 (again, configured so that the results are comparable with data processed with version 3.5).

The pipeline generates TAR files with several products (see "File structure" below). The pipeline-processed 1-D spectra are extracted from the TAR files, converted to the ESO standard spectroscopic format and then made available to the users via the ESO Archive user interface.[4]

As the "HARPS" collection includes the data stream of new products generated at the observatory, its content grows as new data are acquired and processed. The archive ingestion of new HARPS data normally takes place the day following the observation so that the new files appear in the ESO

archive no later than 48 hours after acquisition. This timing is indicative. It may vary or need to be adjusted according to operations requirements.

Release Notes

HARPS uses three operating modes:

- HAM: High Accuracy Mode (narrow fibre: ~1.0" on the sky, R~110000); data obtained in this mode have INS.MODE='HARPS';
- EGGS: high efficiency mode (wider fibre: ~1.4" on the sky, R~85000); INS.MODE='EGGS';
- HARPSPOL: polarimetry.

As mentioned above, polarimetric data are not part of this release, and will not be described here.

The HAM and the EGGS modes can be configured in the same manner, depending on the source of light available on the second fibre (fibre B). The pipeline has identical set of recipes for the two modes, and their extension explicitly recalls the mode name (e.g. obj_ONE_harps, obj_ONE_eggs).

For scientific observations the acquisition template name, fibre configuration, and reduction recipes are:

Acquisition name	Fibre A	Fibre B	Reduction recipe
obs_objA	STAR	DARK	obj_ONE
obs_objAB	STAR	SKY	obj_TWO
obs_thosimult	STAR	THAR	obj_TH
obs_wavesimult	STAR	WAVE	obj_WAVE

The last template and last recipes (obs_wavesimult and obj_WAVE) are used when the Fabry-Perot or the laser frequency comb illuminate fibre B.

Each one of these recipes performs:

- bias subtraction (via the overscan region), masking of bad columns and dark subtraction (via values stored in a database)
- order extraction (Horne optimal extraction + order geometry calibration) and generation of the 2D extracted spectra (e2ds)
- flat fielding (using the spectroscopic flats calibrations)
- wavelength calibration (using the latest valid ThAr spectra)
- order matching and generation of the one-dimensional (s1d) spectra
- cross correlation for RV computation and generations of the "ccf" and bisector (bis) files, unless prevented by the user by specifying RADVEL=-99999 in the acquisition template
- correction for the instrumental drift if fibre "B" was illuminated either by the ThAr hollow cathode lamp (recipe obj_TH) or by the FP or LFC (obj_WAVE recipe).

Data Reduction and Calibration

To achieve the best radial velocity precision all HARPS data must be calibrated using afternoon calibrations, acquired few hours before the science observations.

Whenever a calibration has passed the pipeline quality control criteria, it is stored in a local "calibration database". The pipeline will always use the calibrations closest in time and acquired before the science spectra from this database.

Data Quality

The pipeline performs basic quality control on the calibration and on the science data, both order by order and on the overall spectra.

In general, quality control criteria are based on the capability to model the data (flat fielding, wavelength solution), or on the comparison with reference data (instrumental drift, spectral envelope of the calibration sources).

Quality control information (PASSED/FAILED) is stored in the keywords "HIERARCH ESO DRS CAL QC" for calibrations and "HIERARCH ESO DRS DRIFT QC" for science data.

Calibration data that did not pass the quality control will not be stored in the local calibration database and therefore will not be used by the pipeline.

Known issues

As mentioned above, the data obtained prior to the October 2010 installation of DRS v.3.5 at the observatory were retrieved from the ESO Archive and reprocessed offline. The setup for this processing was slightly different from the observatory setup, and as a result the file directory structure (but not the content!) inside the TAR files for the data pre-October 2010 and post-October 2010 is different. The former have data in the root directory of the TAR file (i.e. "./") while the latter have the data in the "./data/reduced/<YYYY-MM-DD>/" directory, with the date string showing the night of the observation.

Data Format

File Types

The primary product is a rebinned, combined 1-D spectrum in FITS binary spectroscopic data format. It is accompanied by a TAR file, containing the products of the original pipeline processing.

The original file names of the products utilise the following scheme:

Primary: HARPS.<date-obs>_DRS_<PipelineVersion>_ESOSDP.fits
TAR file: HARPS.<date-obs>_DRS_<PipelineVersion>.tar

where:

<date-obs> is the exposure start of the observation, in the ISO8601 restricted form (for example: 2010-04-01T22:33:44.555);
<PipelineVersion> is the value of the HIERARCH ESO DRS VERSION keyword (for example: HARPS_3.5).

I.e. the complete file names would be:

HARPS.2010-04-01T22:33:44.555_DRS_HARPS_3.5_ESOSDP.fits
HARPS.2010-04-01T22:33:44.555_DRS_HARPS_3.5.tar

The user may want to read the ORIGFILE header key in the spectrum file and rename the archive-delivered files.

File structure

Primary file

The primary file comes as a binary FITS table in multi-column format. The columns are labelled as:

WAVE: Wavelength in Å.
FLUX: The starting unit is ADUs, however the flux is scaled to match all the orders, and at the end it should be considered an "arbitrary unit". If flux normalization is important, one should use the files with the "e2ds" extension and analyse the data order by order.
ERR: Dummy.[5]

TAR file

HARPS pipeline generates separate products for both HARPS fibres (labelled A and B), cross-correlating the observed spectra with template stellar spectra for various spectral types.

The TAR files contain several types of files, both FITS and non-FITS. Their content can be identified from their filenames. The root file name is "HARPS.<date-obs>", where <date-obs> is the start of the observation in the "restricted ISO8601" format. This root name is appended with:

- "_s1d_<fibre>.fits" for 1-D extracted full spectrum, wavelength calibrated, in the solar system barycentric frame (the primary file of the release is the fibre A s1d file converted to the binary table format);
- "_e2ds_<fibre>.fits" for 2-D extracted spectrum, one row per order;
- "_bis_<sptype>_<fibre>.fits" for bisector from the cross correlation computed with the <sptype> mask;
- "_ccf_<sptype>_<fibre>.fits" for cross correlation function matrix for mask for <sptype>;
- "_ccf_<sptype>_<fibre>.tbl" for cross correlation function summary table (ASCII) with extracted radial velocity per each order;
- "_INT_GUIDE.fits" for integrated guiding image from the guide camera, used to confirm the correct centring of the star on the fibre. The image is integrated over the whole length of the scientific exposure.

where:

- <fibre> is either "A" or "B"; in science observations the A fibre is used for the object, while the B fibre is used for ThAr lamp, dark or sky exposure, depending on the observation setup.
- <sptype> is either one of "G2", "K5" or "M2", depending on which spectral mask was used in cross-correlation with the spectrum. The pipeline automatically selects one of the masks based on the object's spectral type, as recorded in the "HIERARCH ESO DPR TYPE" keyword. The "G2" mask is used if the spectral type is G9 or earlier or no spectral type is recorded, the "K5" mask is used for all Kn spectral types, and the "M2" mask is used for spectral types of M0 or later.

For example, the filename of the cross-correlation function for the G2 mask would be:

HARPS.2010-04-01T22:33:44.555_ccf_G2_A.fits

etc.

Acknowledgements

Publications based on data obtained with the HARPS instrument should quote the following reference paper: Mayor, M., et al. 2003, The Messenger 114, 20.

According to the Data Access Policy for ESO data held in the ESO Science Archive Facility, all users are required to acknowledge the source of the data with appropriate citation in their publications.

Since processed data downloaded from the ESO Archive are assigned Digital Object Identifiers (DOIs), the following statement must be included in all publications making use of them:

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Please use the following statement in your articles when using these data:

Based on data products from observations made with ESO Telescopes at the La Silla Paranal Observatory under programme ID PPP.C-NNNN(R).

Programme ID is shown in keyword "PROG_ID" in the primary file or in keyword "HIERARCH ESO OBS PROG ID" in any of the FITS files contained in the TAR file.

All users are kindly reminded to notify Mrs. Uta Grothkopf (esodata at eso.org) upon acceptance or publication of a paper based on ESO data, including bibliographic references (title, authors, journal, volume, year, page-numbers) and the programme ID(s) of the data used in the paper.