# Conversion of .spe-files to FITS format

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The software used for data acquisition with the VersArray camera is WinSpec32. It saves the images in a proprietary format, the corresponding files are of type *.spe or *.SPE.

## 1 Actions during the observations (Acquiring the .spe-files)

1. Start WinSpec/32 by a mouse click on the WinSpec/32-icon. DON'T click on a .spe-file to start WinSpec/32.
2. After an image is obtained the user may go to the menu "File–Information", and fill in the first four comment lines following data:
   (a) Name_of_Filter, Spaces are not allowed.
   (b) Name_of_Object, Spaces are not allowed.
   (c) Right ascension, three numbers, hh mm ss.
   (d) Declination, three numbers, dd arcmin arcsec.

   **Remark:** You can fill all four lines, or only some of them. The software described in the next section makes it possible to take information not present in the comment lines from an other, already processed, file, which contains this information. See below how the different cases are treated when converting .spe-files to FITS format.
3. In order to save the information entered in the comment lines save the file with "File–Save as".

## 2 Transformation of .spe-files to FITS format

Without filling the comment lines when creating the .spe-files the corresponding FITS files will contain the FITS keywords (in addition to the obligatory FITS keywords) given below with example values:

| | | | |
|---|---|---|---|
| DATE | = | '2002-12-20' | /Creation date (CCYY-MM-DD) of FITS header |
| DATE-OBS | = | '2002- 9-23' | /DATE OF OBSERVATION |
| LT-START | = | '16:53:00' | /LOCAL (COMPUTER) TIME (LT) |
| UT-START | = | '14:53:00' | /UNIVERSAL (LT - TIME-ZONE) TIME |
| EXP-TIME | = | 1.00000 | /EXPOSURE IN SECONDS |
| GAIN | = | 0 | / |

**REMARK: If the computer time is set to UT then the time zone should be set = 0. If the computer time is set to the local time then the corresponding time zone should be used. See the keywords LT-START and UT-START above.**

With the comment lines filled the list of the FITS keywords will be extended with following 5 items:

| | | | |
|---|---|---|---|
| OBJECT | = | 'TEST OBJECT' | /OBSERVED OBJECT |
| FILTER | = | 'TEST FILTER' | /FILTER USED IN OBSERVATION |
| POSTN-RA | = | 12.2205555556 | /12 13 14 , hh mm ss, RIGHT ASCENSION |
| POSTN-DE | = | -1.03416666667 | /-1 2 3 , dd arcmin arcsec, DECLINATION |
| AIRMASS | = | 13.2257061541 | /AIRMASS |

The programs used for conversion of .spe-files to FITS format are written in IDL. They should be placed in a subdirectory which exists in the IDL_PATH. If this is not the case, it can be configured from the File menu: File-¿Preferences¿-Path.

The conversion of **only one .spe-file** to FITS format is performed with the program **"spe2fits"**. The program can be called with one, two or three parameters.

1. Call with one parameter, the name of the .spe-file. The resulting FITS file will have the same name as the spe-file but with the name extension changed from .spe to ".fit".

2. Call with two parameters, the name of the .spe-file and the name of the FITS-file.

3. Call with three parameters, the name of the .spe-file, the name of the FITS-file, and the name of an other FITS-file, created in advance with "spe2fits". This latter file serves as a source for information for the FITS-header, if this information is absent in the currently processed .spe-file. If the comment lines in the current .spe-file are empty, and if no third parameter is entered, then the corresponding FITS keywords are omitted.

The conversion of **a sequence of .spe-files** to FITS format is performed with the program **"s2fshell"**. This program is called with only one parameter, a string array containing the names of the .spe-files. This string array is easily created, e.g. with the command:

names = findfile('root_of_name*').

The created FITS-files inherit the names of the .spe-files but with name extensions changed from ".spe" to ".fit". When a .spe-file with no entries in one or more of the comment lines is processed, the relevant data are extracted from the FITS-file given as a third parameter in the call to "spe2fits". In the case of "s2fshell" the third parameter is always the file processed immediately before the current file.

The main purpose of "s2fshell" is to give an example how to use "spe2fits" in a loop. Trivial modifications of the "s2fshell" should allow the transformation of any sequence of .spe-files to FITS format.

The command "findfile" sorts the filenames in alphabetical order. In a realistic situation the information in the comment lines will be updated chronologically. This means that for a given .spe-image, if some of the comment files are not filled, the relevant information can be extracted from the image obtained immediately before the current one. The program **"s2f_sort"** transforms a series of .spe-image into FITS format in the chronological order this images have been obtained. The program is called with one parameter, a string array containing the names of the .spe-files. The ordering of the files according to their UT-START-values is performed inside "s2f_sort", so there is no matter how the input vector with the filenames is created.

"s2f_sort" uses "spe_juld" to calculate the Julian day of an image stored in a .spe-file.

Programs:

- spe2fits
- s2fshell
- s2f_sort
- spe_juld
- airmass0