The FITS Green Bank Keyword Convention

This FITS keyword convention was developed at a meeting in October 1989 at Green Bank, West Virginia to discuss standard FITS formats for interchange of single dish radio astronomy data. This convention was originally developed to specifically address the issue of how to represent World Coordinate System (WCS) information for images that are stored within a vector column of a FITS binary table (or what was then called a FITS '3-D' table), but the concept has since been generalized to have wider applications.

1 Original Green Bank Keyword Convention

This keyword convention originally applied to cases where a FITS binary table contains only a single multidimensional array field, or where the table contains several array fields, but they all have the same dimensions. The dimensions of each array column are defined by the TDIMn keyword, which has the form:

`TDIMn = '(i,j,k,...)'`

where n is the column number of the multidimensional array in the binary table, and i, j, k, ... are the integer dimensions of the array, expressed in the same order as in arrays in the Fortran programming language. Since the WCS parameters for the images (e.g., `CTYPE`i, `CRPIX`i, `CRVAL`i, etc.) may have different values in each row of the table, in general it is necessary to expand these keywords into table columns, where the column names are the same as the keyword name. Thus,

- `TTYPEn = 'CTYPEi'` means that the name of the physical coordinate of the axis i in the array contained in the table is given in column n of the table.
- `TTYPEn = 'CRPIXi'` means that the value of the reference point for axis i in the array contained in the table is given in column n of the table.
- `TTYPEn = 'CRVALi'` means that the value of the physical coordinate for axis i at the reference point in the array contained in the table is given in column n of the table.

Similarly, any other needed WCS parameters are represented as additional columns in the table.

In the special case where a WCS parameter has the same value in every row of the table, it is not necessary to expand the standard WCS keyword into a column. For example, if every image in the multidimensional array column has `CRPIX1 = 256`, then it is more efficient to represent this with a single `CRPIX1` header keyword, instead of defining a `CRPIX1` column, with the same value of 256 in every row.

It should be noted that this convention pre-dates the development of the special forms for the WCS keywords that are specifically designed for use with images stored in multidimensional array columns in a binary table (e.g. '`iCTYPn`' instead of '`CTYPEn`'). Refer to the WCS section of the FITS Standard for more information about these keywords.

2 Generalized Green Bank Keyword Convention

The same principle that is used to expand a WCS keyword into a table column can be applied to any parameter whose value is different in each row of the binary table. For example, if the information given in each row of the table correspond to a different date, then instead of having a single DATE-OBS keyword in the header of the table, one could add a column to the table that has TTYPEn = 'DATE-OBS' to store the specific date value for each row. This concept of expanding a keyword into a table column (or conversely, collapsing a column of identical values into a single header keyword) is now generally known as the Green Bank keyword convention.