

## **FIBRE Fabry-Perot operation principles - April 2001**

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**FP\_control.vi** configures and controls the FIBRE Fabry-Perot. The front panel of this VI gives access to all commands and software parameters that can be configured by the instrument team. The VI can also receive these commands via TCP/IP.

In addition, the front panel allows the configuration of Fabry-Perot hardware dependent parameters (ranges, sync signals) and file path for the configuration files.

Computer dependent parameters (interface board types, TTL interface timing) are set as default values into the global variable `FP_global.vi`, communication dependent parameters are set as default values into the global variable `FP_Com_global.vi`.

Operating the Fabry-Perot consists in :

- 1- Setting parameters for the segment
- 2- Issuing a start command : the FP motion will start at a subsequent falling edge of the `FPNEXT` bit. `FPM` status bit is set to 1 when scan begins and will be reset to 0 a few tens of ms after the last command of the segment is sent. A "sync out" TTL pulse is generated by the computer in sync with the `FPNEXT` bit or by an internal clock (`SYNC` int mode).

**FP\_acquisition.vi** is in charge of the acquisition of the analog status generated by the FP control electronics, 3 motor currents and 3 motor errors. The digitized signals are visualized on the VI front panel and can be sent via TCP/IP to a client. Under LabView, `FP_acquisition.vi` can be configured as a client (remote mode on the front panel). `FP_acquisition` can be set to write the digitised data in a file (*not* in current version).

### **TCP/IP Command scheme**

Commands are sent through TCP/IP, `mac_address`, TCP port `command_port` (2055 default).

Mac is set to listener mode, waiting for connection on port `command_port`.

When a connection is made, Mac issues a TCP read command (4 bytes read) to get `num_bytes_read` to read, followed by a second TCP read command (`num_bytes_read` bytes read).

Mac processes the command and issues a TCP write command (4 bytes written) to send `num_bytes_write` to write, followed by a second TCP write command (`num_bytes_write` written).

The connection is closed and Mac set back to listener mode.

### **Power ON sequence**

- 1- set 3 motors on "test mode" on the FP electronic board (3 switches on green side)
- 2- turn power ON on housekeeping box
- 3- on the mac connected to FP control electronics :
  - A- Launch `FP_control.vi` (1st April 2001 version is V0.50)
  - B- Send a header command (set the command of the FP to default (decent) value)
  - C- Launch `FP_acquisition.vi` in local mode. TCP port used is `status_port` (2056 default) (motor currents should be about +/-18 mA, error hundreds of mV)
- 4- set 3 motors on "normal (=servo) mode" on the FP electronic board (3 switches on white side)

(motor currents go to values depending on command and temperature of the FP. Motor errors go to zero if the command is in the servo range with a noise between 10 and 50 mV typ. - see "FP typical values memo")

To turn power OFF : set 3 motors to "test mode" and turn power OFF on housekeeping box

### **Remote control via Labview**

On remote computer :

A- Send command with Send\_command vi (included in TCP\_IP\_commands.llb)

B- Launch FP\_acquisition.vi in remote mode

## Header format - April 2001

Item 1 to 9 are padded with spaces to 79 bytes and followed by <CR> Items 10 and above are in binary representation (representation column)

SGL = real\*4

DBL = real\*8

I8, I16 or I32 are signed integers

|    | HEADER                                 | bytes | total       | representation | Comments  |
|----|--|-------|-------------|----------------|---|
| 1  | Header version                         | 80    | 80          | ASCII          | FIBRE HEADER VERSION 0.5  |
| 2  | Comment                                | 80    | 160         | ASCII          |   |
| 3  | Date                                   | 80    | 240         | ASCII          | YYYYMMDD_HHMMSS   |
| 4  | Parallelism table file name            | 80    | 320         | ASCII          |   |
| 5  | Parallelism table file path            | 80    | 400         | ASCII          | truncated to 80 characters  |
| 6  | Wavelength calibration table file name | 80    | 480         | ASCII          |   |
| 7  | Wavelength calibration table file path | 80    | 560         | ASCII          | truncated to 80 characters  |
| 8  | reserved                               | 80    | 640         | ASCII          |   |
| 9  | reserved                               | 80    | 720         | ASCII          |   |
| 10 | Wavelength_Min                         | 4     | 724         | SGL            |   |
| 11 | Wavelength_Max                         | 4     | 728         | SGL            |   |
| 12 | Command_Start                          | 2     | 730         | I16            | Initial command on Motor 1 (0-4095)   |
| 13 | Command_Step                           | 2     | 732         | I16            | Command step increment on Motor 1   |
| 14 | Chops_per_Int                          | 2     | 734         | I16            | Number of chop cycles for each integration (FP step)  |
| 15 | Int_per_Seg                            | 2     | 736         | I16            | Number of integrations (FP steps) during segment  |
| 16 | Whole_Scan                             | 1     | 737         | I8             | N=1 for TRUE and N=0 for FALSE  |
| 17 | Ramp                                   | 1     | 738         | I8             | N=0 not Ramp, N=1 for UP and N=2 for DOWN   |
| 18 | Triangle                               | 2     | 740         | I16            | N=0 not Triangle, N#0 for Number_of_Triangles   |
| 19 | Still                                  | 2     | 742         | I16            | N=0 not Still, N#0 for num. of Still (=Int_per_Seg)   |
| 20 | Calibration_law parameters             | 80    | 822         | 10DBL          | Calibration law parameters in the order p0...p9<br>$e(\mu\text{m})=p_0+p_1*c+p_2*c^2+p_3*c^3+p_4*c^4$<br>$c(\text{count/motor1})=p_5+p_6*e+p_7*e^2+p_8*e^3+p_9*e^4$   |
| 21 | Commands_per_Seg                       | 4     | 826         | I32            | Commands_per_Seg=Int_per_Seg*Chops_per_Int+1.<br>Last command of the segment is redunded to wait for last chop cycle end. FPM status bit is set to 1 when scan begins and will be reset to 0 a few tens of ms after the last command of the segment |
| 22 | Offset motor 2                         | 2     | 828         | I16            | Offset applied to motor 2 command read in parallelism table. Offset is taken into account in Command table  |
| 23 | Offset motor 3                         | 2     | 830         | I16            | Offset applied to motor 2 command read in parallelism table. Offset is taken into account in Command table  |
| 24 | Command table                          | 6N    | 830<br>+ 6N | 3N I16         | N = Commands_per_Seg<br>Array of commands sent to FP electronics. 2 bytes per motor for 3 motors per command.   |

## FIBRE Fabry Perot commands - April 2001

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General syntax : **command** [parameter1] [parameter2]

Delimiter is space.

A string is returned, beginning with **ok** or **warning**, padded to 10 bytes with spaces, followed by the `segment_length` (number of chop cycles for the segment) in integer I5 format padded with spaces to 10 bytes, followed by a stream of bytes depending on **command** (ascii formatted values or strings separated by commas, or otherwise specified in table). Else, **error** is returned followed by an error message

**ok** : command and parameters are within range

**warning** : parameters are out of range, and were coerced in-range

**error** : command is unrecognized or out of context

Reference version is 0.50 : return string is not implemented (simplified). All commands taken into account.