PRIME Telescope Scripting Language

The PRIME telescope software can be programmed to move the telescope, configure the detector, set the filter wheels and acquire images using a plain text scripting language.

# Script Commands

Each line of a script starts with a command and is followed by parameters. All text is case insensitive.

|  |  |
| --- | --- |
| Command Name | Parameters |
| DefineObject | Name, Type, PositionType, DEC, RA, muRA, muDEC, Epoch, xi, eta, dRA, dDEC |
| DefineExposure | Name, Mode, Integration Time |
| DefineDithering | Type, Name, (offsetX, offsetY), … |
| AcquireImage | Object Name, Exposure Name, DitheringName |
| MoveFilterWheel | Filter Wheel, Filter |
| HomeFilterWheel | Filter Wheel |
| TelescopeFocusMove | Position |
| TelescopeFocusHome | No parameters |
| AutoFocus | Motor, Start, Stop, Step, Box, Algorithm |
| Macro | “Script Name” |
| Ask | “Text to show operator” |
| Pause | Seconds to wait |
| Log | “Text to record in log” |

## Creating Scripts

Scripts can be created in the LabVIEW interface or written by hand. Loading a script written by hand into the LabVIEW interface will identify syntax errors in the script.

# Command Details

The principle behind the scripts is to define the parameters to an image acquisition then command the acquisition. For instance, the Declination and Right Ascension of galaxy “NGC 5128” could be defined then used several times later in the script or not at all. All definitions, not just target objects, can be named such that the top of a script can define several commonly used targets, exposures, etc.

To accommodate the large number of parameters, the parameter name and value appear in the commands. For instance,

DefineObject “NGC 5128” Type=Standard, RA=123.1, DEC=325.6

If a required parameter is missing, a syntax error will be reported. Optional parameters will use default values if missing in the command.

Floating point numbers can be entered with any number of digits to the left and right of the decimal point, though actual precision depends on the way the parameter is used. For instance, the precision of Right Ascension depends on the telescope’s precision.

## DefineObject

Syntax:

DefineObject “Name” RA=nn.nn, DEC=nn.nn, muRA=nn.nn, muDEC=nn.nn, Epoch=nn.nn, xi=nn.nn, eta=nn.nn, dRA=nn.nn, dDEC=nn.nn

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Units** | **Purpose** |
| RA | degrees | Right Ascension of target object |
| DEC | degrees | Declination of target object |
| muRA |  |  |
| muDEC |  |  |
| Epoch |  |  |
| xi |  |  |
| Eta |  |  |
| dRA |  |  |
| dDEC |  |  |

## DefineExposure

Syntax:

DefineExposure “Name” Mode=”xxx”, IntegrationTime=n.nn

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Units** | **Purpose** |
| Mode | Enum | One of “SSR”, “CDS”, “MEAN”, “MEDIAN”, “MODE”, “MIN”, “MAX” |
| Integration Time | Seconds |  |

## DefineDithering

Syntax:

DefineDithering Type, “Name” (RA.nn,DEC.nn),(RA.nn,DEC.nn)…

This command can contain any number of RA,DEC offset pairs.

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Units** | **Purpose** |
| Type | enum | “Random” or “Offsets” |
| RA.nn | arcsec | Right Ascension offset position |
| DEC.nn | arcsec | Declination offset position |

## DefineRandomDithering

Syntax:

DefineRandomDithering “Name” Count=n,Radius=n.nn

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Units** | **Purpose** |
| Count | count | Number of random dithering points |
| Radius | arcsec | Max distance from center point |

## MoveFilterWheel

Syntax:

MoveFilterWheel Wheel=X,Filter=f

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Units** | **Purpose** |
| X |  | Wheel Index (0 to n-1) where n is number of filter wheels |
| f |  | Index of filter (0 to m-1) where m is the number of filters on the wheel |

## HomeFilterWheel

Syntax:

HomeFilterWheel Wheel=X

This command rotates the filter wheel until the home notch is found. If successful, the filter is in position 0 (first filter) after the home completes.

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Units** | **Purpose** |
| X |  | Wheel Index (0 to n-1) where n is number of filter wheels |

## AcquireImage

Syntax:

AcquireImage Object=”ObjectName”,Exposure=”ExposureName”,DitherPattern=”DitherName”

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Units** | **Purpose** |
| Object | string | Name of previously defined object |
| Exposure | string | Name of previously defined exposure |
| DitherPattern | string | Name of previously defined dither pattern |

## TelescopeFocusHome

Syntax:

TelescopeFocusHome

This command tells the telescope to search for the origin location. It sends the “L” command. There are no parameters to this command

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Units** | **Purpose** |

## TelescopeFocusMove

Syntax:

TelescopeFocusMove Position=n.nn

Position is in mm. Commands the telescope focus to move to position p. This uses the telescope “K” command.

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Units** | **Purpose** |
| p | Counts | Position to move to |

## Macro

Syntax:

Macro Script=“Script Name”

This allows a script to call another script. The target script should be in the same directory as the script that is calling it.

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Units** | **Purpose** |
| Script |  | Name of script |

## Ask

Syntax:

Ask “Text to Prompt User”

This command will pause execution of the script until the operator clicks a command to continue.

## Pause

Syntax:

Pause n.n

This command pauses execution of the script for the given number of seconds.

# Example Script

DefineObject “NGC 5128” Type=Standard, RA=123.1, DEC=325.6

DefineExposure “Exposure 4” Number=4, ReadoutGroups=2, ReadoutsPerGroup=4

DefineRandomDithering “9 Random” Number=9, Radius=2

Ask “Click OK To Acquire Images”

MovefilterWheel Wheel=1,Filter=2

Pause 10

AcquireImage “NGC 5128”, “Exposure 4”, “9 Random”

MoveFilterWheel Wheel=1,Filter=4

AcquireImage “NGC 5128”, “Exposure 4”, “9 Random”

MoveFilterWheel Wheel=2,Filter=1

AcquireImage “NGC 5128”, “Exposure 4”, “9 Random”

MoveFilterWheel Wheel=3,Filter=2

AcquireImage “NGC 5128”, “Exposure 4”, “9 Random”