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| APS Stimulus Prototype Application Programming Interface  TMT.CTR.ICD.17.006.DRF01 |

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Introduction

## Introduction

This document describes the Assembly OMA component API for the APS Stimulus prototype.

## Purpose

This document serves as an internal reference for the prototype.

## Scope

This document describes the API that will be supported for the following stage assemblies: DM Stage, Source Stage, Pupil Stage and Insertion Stage.

## Applicable Document

Applicable documents are containing information that shall be applied in the current document.

1. TBD

## Reference Documents

Reference documents contain information complementing, explaining, detailing, or otherwise supporting the information included in the current document.

1. TBD

## Change Record

|  |  |  |  |
| --- | --- | --- | --- |
| Revision | Date | Who | Modifications |
| DRF01 | 2/10/2017 | SM | Initial Draft |
|  |  |  |  |
|  |  |  |  |

## Abbreviations and Definitions

**AO** Adaptive Optics

**CSW** Common Software

**DRD** Design Requirements Document

**OSW** Observatory Software

**TBC** To Be Confirmed

**TBD** To Be Determined

**TMT** Thirty Meter Telescope

# Stimulus DM Stage API

## Commands

### reset Command

**Description:** sets axis to stage home position

**Input Arguments:** None

**Return values(s):** Completed.

### selectOptic Command

**Description:** Moves the stage to select the desired Optic: DM or Flat.

**Input Arguments:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Argument | Data Format | Units | Range | Comments |
| desiredOptic | enum | N/A | DM, Flat |  |

**Return values(s):** Completed.

### positionPhysical Command

**Description:** Moves the stage to an absolute position in stage coordinates.

**Input Arguments:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Argument | Data Format | Units | Range | Comments |
| position | float | m | TBD | Stage coordinates |

**Return values(s):** Completed.

### setSelectionPoints Command

**Description:** Sets the DM Optic and Flat Optic stage positions. Updates the assembly configuration values used in selectOptic command.

**Input Arguments:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Argument | Data Format | Units | Range | Comments |
| dmStagePos | float | m | TBD | Stage coordinates |
| flatStagePos | float | m | TBD | Stage coordinates |

**Return values(s):** Completed.

## Events

### Stimulus Optic Event

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Event: aps.ics.stimulusOptic | | | | Rate: 1 Hz | |
| **Attribute** | **Type** | **Units** | **Range/values** | | **Comment** |
| currentOptic | enum | - | DM, Flat, in-transit | |  |

### Stimulus Optic Event – Debug Mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Event: aps.ics.stimulusOptic | | | | Rate: TBD Hz | |
| **Attribute** | **Type** | **Units** | **Range/values** | | **Comment** |
| currentOptic | enum | - | DM, Flat, in-transit | |  |
| stagePosition | float | m | TBD | | Stage coordinates |

# Stimulus Source Stage API

## Commands

### reset Command

**Description:** reset one or more axes to its home position

**Input Arguments:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Argument | Data Format | Units | Range | Comments |
| resetX | boolean | N/A |  | True if x axis will be reset |
| resetY | boolean | N/A |  | True if y axis will be reset |
| resetZ | boolean | N/A |  | True if z axis will be reset |

**Return values(s):** Completed.

### offset Command

**Description:** Moves one or more axes of the stage to a delta offset position from its current position.

**Input Arguments:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Argument | Data Format | Units | Range | Comments |
| commandX | boolean | N/A |  | True if x axis will be offset |
| offsetX | float | rad | TBD | x rad on sky |
| commandY | boolean | N/A |  | True if y axis will be offset |
| offsetY | float | rad | TBD | y rad on sky |
| commandZ | boolean | N/A |  | True if z axis will be offset |
| offsetZ | float | m | TBD | z in m of focus at APS focal plane (f/15 focus) |

### position Command

**Description:** Moves one or more axes of the stage to a delta position from its reference point.

**Input Arguments:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Argument | Data Format | Units | Range | Comments |
| commandX | boolean | N/A |  | True if x axis will be moved |
| deltaX | float | rad | TBD | x rad on sky |
| commandY | boolean | N/A |  | True if y axis will be offset |
| deltaY | float | rad | TBD | y rad on sky |
| commandZ | boolean | N/A |  | True if z axis will be offset |
| deltaZ | float | m | TBD | z in m of focus at APS focal plane (f/15 focus) |

**Return values(s):** Completed.

### positionPhysical Command

**Description:** Moves the stage to an absolute position in stage coordinates.

**Input Arguments:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Argument | Data Format | Units | Range | Comments |
| commandX | boolean | N/A |  | True if x axis will be moved |
| moveX | float | m | TBD | Stage coordinates |
| commandY | boolean | N/A |  | True if y axis will be moved |
| moveY | float | m | TBD | Stage coordinates |
| commandZ | boolean | N/A |  | True if z axis will be moved |
| moveZ | float | m | TBD | Stage coordinates |

**Return values(s):** Completed.

### setReferencePoint Command

**Description:** Sets the default “zero” point of all axes, used by “move” command. This updates the configuration values that are loaded at startup.

**Input Arguments:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Argument | Data Format | Units | Range | Comments |
| setX | boolean | N/A |  | True if x axis reference point will be set |
| referencePointX | float | m | TBD | Stage coordinates |
| setY | boolean | N/A |  | True if y axis reference point will be set |
| referencePointY | float | m | TBD | Stage coordinates |
| setZ | boolean | N/A |  | True if z axis reference point will be set |
| referencePointZ | float | m | TBD | Stage coordinates |

**Return values(s):** Completed.

## Events

### StimulusSourcePosition Event

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Event: aps.ics.stimulusSourcePosition | | | Rate: 1 Hz | |
| **Attribute** | **Type** | **Units** | **Range/values** | **Comment** |
| offsetsFromReference | Array[3] float | rad, rad, m | TBD | X,Y rad on sky, Z in m of focus at APS focal plane (f/15 focus) |

### StimulusSourcePosition Event – Debug Mode

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Event: aps.ics.stimulusSourcePosition | | | Rate: TBD Hz | |
| **Attribute** | **Type** | **Units** | **Range/values** | **Comment** |
| offsetsFromReference | Array[3] float | rad, rad, m | TBD | X,Y rad on sky, Z in m of focus at APS focal plane (f/15 focus) |
| stagePositions | Array[3] float | m, m, m | TBD | x,y,z position in stage coordinates |

# Stimulus Pupil Stage API

## Commands

### reset Command

**Description:** reset one or more axes to its home position

**Input Arguments:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Argument | Data Format | Units | Range | Comments |
| resetX | boolean | N/A |  | True if x axis will be reset |
| resetY | boolean | N/A |  | True if y axis will be reset |
| resetZ | boolean | N/A |  | True if z axis will be reset |

**Return values(s):** Completed.

### offset Command

**Description:** Moves one or more axes of the stage to a delta offset position from its current position.

**Input Arguments:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Argument | Data Format | Units | Range | Comments |
| commandX | boolean | N/A |  | True if x axis will be offset |
| offsetX | float | m | TBD | m at M1 |
| commandY | boolean | N/A |  | True if y axis will be offset |
| offsetY | float | m | TBD | m at M1 |
| commandPhi | boolean | N/A |  | True if phi axis will be offset |
| offsetPhi | float | rad | TBD |  |

### position Command

**Description:** Moves one or more axes of the stage to a delta position from its reference point.

**Input Arguments:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Argument | Data Format | Units | Range | Comments |
| commandX | boolean | N/A |  | True if x axis will be moved |
| deltaX | float | M | TBD | m at M1 |
| commandY | boolean | N/A |  | True if y axis will be offset |
| deltaY | float | m | TBD | m at M1 |
| commandPhi | boolean | N/A |  | True if phi axis will be offset |
| deltaPhi | float | rad | TBD |  |

**Return values(s):** Completed.

### positionPhysical Command

**Description:** Moves the stage to an absolute position in stage coordinates.

**Input Arguments:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Argument | Data Format | Units | Range | Comments |
| commandX | boolean | N/A |  | True if x axis will be moved |
| moveX | float | m | TBD | Stage coordinates |
| commandY | boolean | N/A |  | True if y axis will be moved |
| moveY | float | m | TBD | Stage coordinates |
| commandPhi | boolean | N/A |  | True if phi axis will be moved |
| movePhi | float | m | TBD | Stage coordinates |

**Return values(s):** Completed.

### setReferencePoint Command

**Description:** Sets the default “zero” point of all axes, used by “move” command. This updates the configuration values that are loaded at startup.

**Input Arguments:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Argument | Data Format | Units | Range | Comments |
| setX | boolean | N/A |  | True if x axis reference point will be set |
| referencePointX | float | m | TBD | Stage coordinates |
| setY | boolean | N/A |  | True if y axis reference point will be set |
| referencePointY | float | m | TBD | Stage coordinates |
| setPhi | boolean | N/A |  | True if phi axis reference point will be set |
| referencePointPhi | float | m | TBD | Stage coordinates |

**Return values(s):** Completed.

## Events

### StimulusPupilPosition Event

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Event: aps.ics.stimulusPupilPosition | | | Rate: 1 Hz | |
| **Attribute** | **Type** | **Units** | **Range/values** | **Comment** |
| offsetsFromReference | Array[3] float | m, m, rad | TBD | X,Y (m at M1), PHI (rad) |

### StimulusPupilPosition Event – Debug Mode

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Event: aps.ics.stimulusPupilPosition | | | Rate: TBD Hz | |
| **Attribute** | **Type** | **Units** | **Range/values** | **Comment** |
| offsetsFromReference | Array[3] float | m, m, rad | TBD | X,Y (m at M1), PHI (rad) |
| stagePositions | Array[3] float | m, m, rad | TBD | x,y,phi position in stage coordinates |

# Stimulus Insertion Stage API

## Commands

### home Command

**Description:** sets axis to stage home position

**Input Arguments:** None

**Return values(s):** Completed.

### selectSource Command

**Description:** Moves the stage to select the desired light source: telescope or stimulus.

**Input Arguments:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Argument | Data Format | Units | Range | Comments |
| desiredSource | enum | N/A | telescope, stimulus |  |

**Return values(s):** Completed.

### positionPhysical Command

**Description:** Moves the stage to an absolute position in stage coordinates.

**Input Arguments:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Argument | Data Format | Units | Range | Comments |
| position | float | m | TBD | Stage coordinates |

**Return values(s):** Completed.

### setSelectionPoints Command

**Description:** Sets the Telescope Source and Stimulus Source stage positions. Updates the assembly configuration values used in selectSource command.

**Input Arguments:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Argument | Data Format | Units | Range | Comments |
| telescopeSourceStagePos | float | m | TBD | Stage coordinates |
| stimulusSourceStagePos | float | m | TBD | Stage coordinates |

**Return values(s):** Completed.

## Events

### Stimulus Insertion Selection Event

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Event: aps.ics.stimulusInsertionLightSource | | | | Rate: 1 Hz | |
| **Attribute** | **Type** | **Units** | **Range/values** | | **Comment** |
| currentSelection | enum | - | telescope, stimulus, in-transit | |  |

### Stimulus Insertion Selection Event – Debug Mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Event: aps.ics.stimulusInsertionSelection | | | | Rate: TBD Hz | |
| **Attribute** | **Type** | **Units** | **Range/values** | | **Comment** |
| currentSelection | enum | - | telescope, stimulus, in-transit | |  |
| stagePosition | float | m | TBD | | Stage coordinates |