



# bstools

January 27, 2025

## Abstract

Collection of tools to support boresight misalignment calibration

## 1 Instruments/Modes

| Instrument  | Mode |
|-------------|------|
| EMOS1/EMOS2 | n/a  |
| EPN         | n/a  |
| RGS         | n/a  |
| OM          | n/a  |

## 2 Use

|                      |     |
|----------------------|-----|
| pipeline processing  | no  |
| interactive analysis | no  |
| CCF maintenance      | yes |

## 3 Description

The **bstools** package contains a small set of programs to support boresight misalignment calibration activities. The following tools are available:

### 3.1 strbs: Star Tracker BoreSight calculation

- SYNOPSIS

```
strbs instrument=<instr> ra=<ra> dec=<dec> apos=<apos> odffixout=true|false  
bstoolout=true|false
```

- DESCRIPTION

Given the prime instrument **instr** and its viewing direction in terms of Right Ascension and



Declination of the boresight + astronomical position angle **strbs** computes the viewing direction of the star tracker and associated position angle - result is written to **stdout** in verbose form (default) or as an **odffix** command line if **odffixout=true** or as an **insbs** command line if **bstoolsout=true**. The Right Ascension/Declination of the instrument boresight can be entered in either of the forms

23h59m48.12s / 45°38'14.55"

or decimal degrees:

123.23445 / 45.238474

Position angles have to be entered in decimal degrees.

- REFERENCE

See task **epicbscalgen** and **cal** documentation for definition of boresight related coordinate frames.

### 3.2 insbs: INStrument BoreSight calculation

- SYNOPSIS

```
insbs instrument=<instr> ra=<ra> dec=<dec> apos=<apos> bstoolsout=true|false
```

- DESCRIPTION

Given the viewing direction of the star tracker in terms of Right Ascension and Declination of the boresight + astronomical position angle **insbs** computes the viewing direction of the instrument specified via the **instrument** parameter - result is written to **stdout** in verbose form (default) or as a **strbs** (see Sect. 3.1) command line if **bstoolsout=true**.

The Right Ascension/Declination of the star tracker boresight can be entered in either of the forms

23h59m48.12s / 45°38'14.55"

or decimal degrees:

123.23445 / 45.238474

Position angles have to be entered in decimal degrees.

- REFERENCE

See task **epicbscalgen** and **cal** documentation for definition of boresight related coordinate frames.

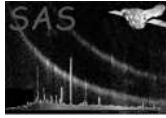
### 3.3 srcinfov: compute position of SouRCe in Field Of View

- SYNOPSIS

```
srcinfov strra=<ra> strdec=<dec> apos=<apos> withsrccoord=true|false  
srcra=<ra> srcdec=<dec>
```

- DESCRIPTION

**srcinfov** computes for each instrument the position of a given celestial source in the field of view (in TELCOORD coordinates). Input is the satellite attitude in terms of Right Ascension/Declination of the star tracker viewing direction and astronomical position angle [deg]. The boolean parameter **withsrccoord** determines whether the J2000 equatorial coordinates of the celestial source are explicitly provided through the parameters **srcra** and **srcdec** or taken as the star tracker viewing direction. Right Ascension/Declination of the star tracker boresight and the celestial source can be entered in either of the forms



23h59m48.12s / 45°38'14.55"

or decimal degrees:

123.23445 / 45.238474

- **REFERENCE**

See task **epicbscalgen** and **cal** documentation for definition of boresight related coordinate frames.

### 3.4 **opticsxy: compute optical axis/focal plane intersection point**

- **SYNOPSIS**

`opticsxy`

- **DESCRIPTION**

`opticsxy` computes for each instrument the intersection point of the optical axis of the respective telescope and the focal plane. The result is given in CHIPCOORD coordinates of the CCD containing the intersection point. The numbers can be used as CCD MiscData attributes **OPTICS\_X/OPTICS\_Y** (+**OPTICS\_CCD**).

- **REFERENCE**

See task **epicbscalgen** and **cal** documentation for definition of boresight related coordinate frames.

## 4 **Comments**

none.

## 5 **Future developments**

add more tools

## References