

Erste Tests mit Astrid

(ASTRo Imaging Device)



4. SOTAS Occultation-Meeting
der Fachgruppe Sternbedeckungen der SAG/SAS
vom 1.2.2025, Sternwarte Bülach

Stefan Meister und Andreas Schweizer

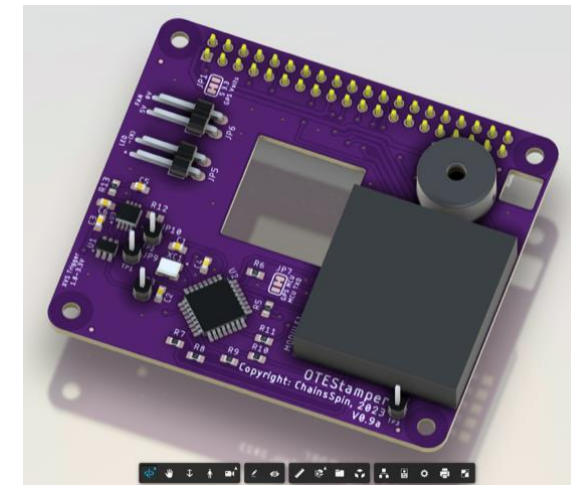


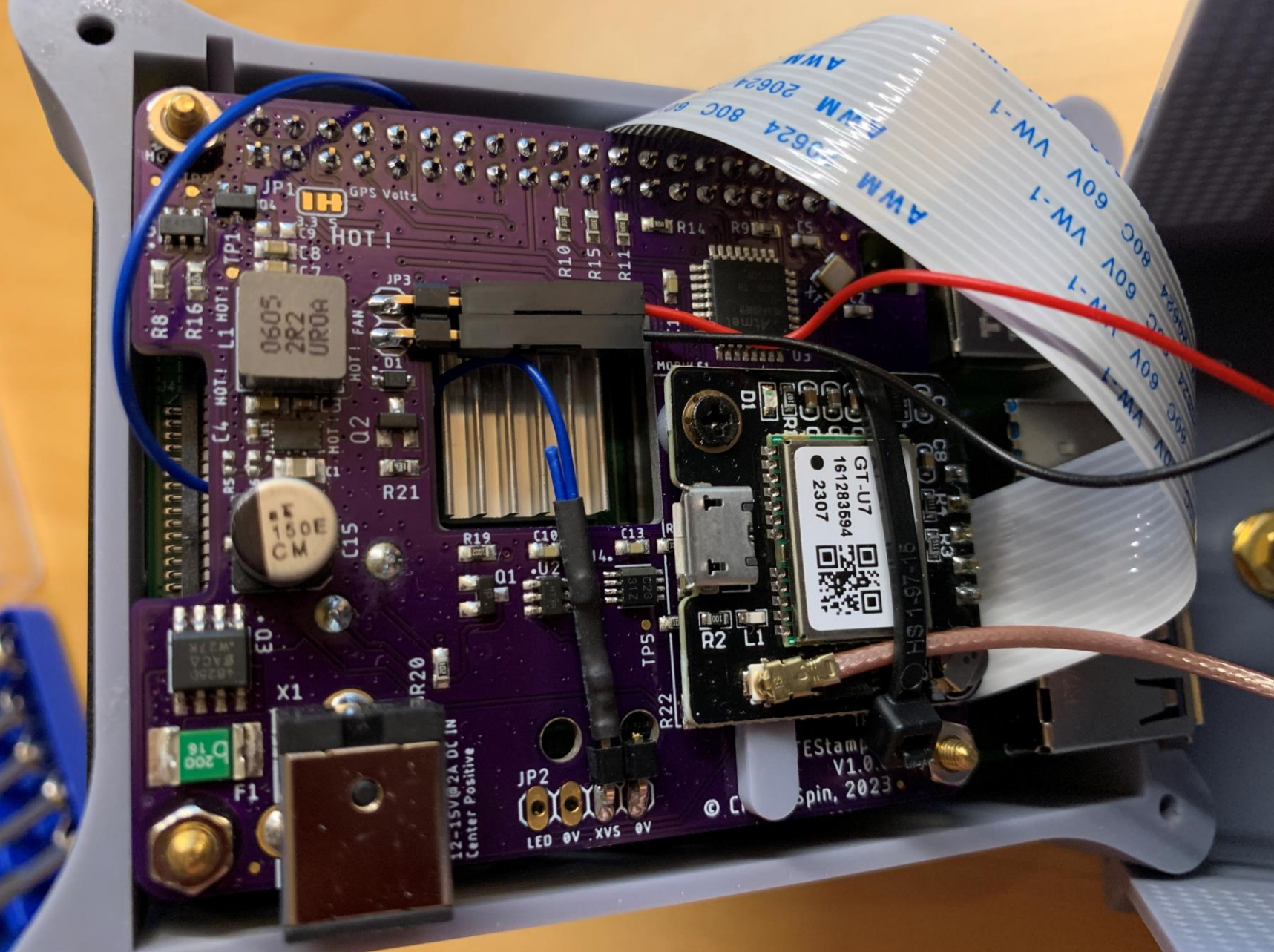


Astrid Hardware

```
pi@astrid-0103: ~  
File Edit Tabs Help  
pi@astrid-0103:~ $ uname -a  
Linux astrid-0103 6.1.21-v7l+ #1642 SMP Mon Apr 3 17:22:30 BST 2023 armv7l GNU/  
Linux  
pi@astrid-0103:~ $ cat /sys/firmware/devicetree/base/model  
Raspberry Pi 4 Model B Rev 1.5pi@astrid-0103:~ $
```

- Sony IMX296 Sensor (Pregius Gen 2). 1456 x 1088 p60, 3.45 μm x 3.45 μm , 6.3 mm diagonal (5.023 x 3.754 mm) Mono-Version, also nicht das offizielle GSC Modul zum RPi
- Raspberry Pi 4, Modell B mit einem Linux Betriebssystem
- OTEStamper mit dem GPS Modul GT-U7
https://groups.io/g/IOTAoccultations/topic/oterecorder_stamper_for/98146989
- Stromversorgung: 12-15 Volt mit mind. 2A, 2.1 x 5.5 mm DC Input Jack
- Gehäuse: 3D Druck
- Astrid on GitHub: <https://github.com/ChasinSpin/Astrid> und die Dokumentation unter <https://github.com/ChasinSpin/astrid/blob/main/docs/README.md>







Home → Raspberry Pi Global Shutter Camera



Raspberry Pi Global Shutter Camera

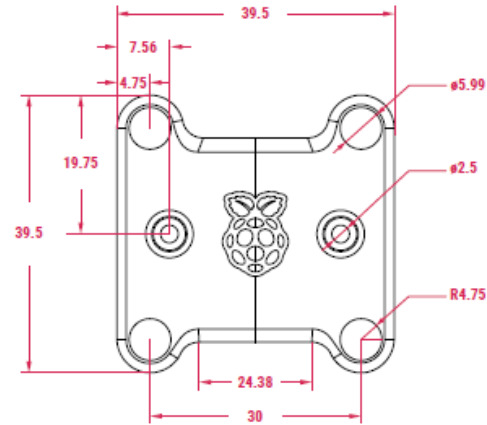
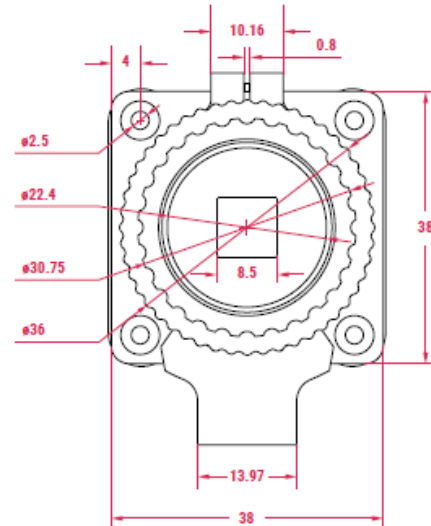
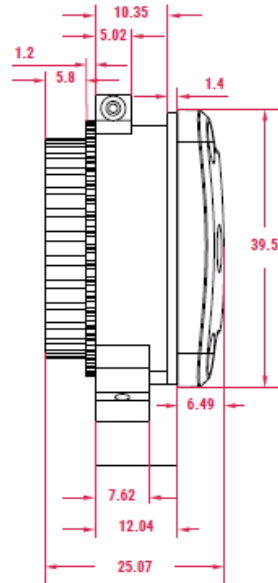
The Raspberry Pi Global Shutter Camera is the latest addition to our line of camera modules, and is offered in the same form factor as the existing Raspberry Pi High Quality Camera CS Mount.

Artikelnummer: 12059

CHF 60.00 Verfügbarkeit: Sofort-Versand ab Lager

In den Warenkorb Menge 1

CS Mount



Note: all dimensions in mm



Raspberry Pi Global Shutter Camera

Published March 2023



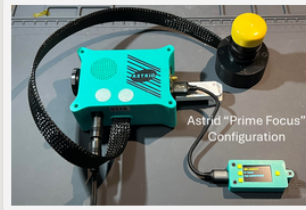
COMPLETE 'ASTRID REFRACTOR' OCCULTATION RECORDING SYSTEM

Complete Astrid Occultation Recording System. Includes mini-display, USB storage drive, GPS antenna and 0.5X focal reducer.

Domestic US shipping and handling will be added in shopping cart. For Canada, Mexico or Overseas shipping please add one of the extra shipping items at right.

\$695.00

Add to Cart (appears below)



COMPLETE 'ASTRID PRIME FOCUS' OCCULTATION RECORDING SYSTEM

Complete Astrid Occultation Recording System in Prime Focus configuration, for Hyperstar and similar. Includes mini-display, USB storage drive, GPS antenna and 0.5X focal reducer.

Domestic US shipping and handling will be added in shopping cart. For Canada, Mexico or Overseas shipping please add one of the extra shipping items at right.

\$745.00

Add to Cart (appears below)



ADDITIONAL SHIPPING - CANADA AND MEXICO (PRIORITY INTERNATIONAL SHIPPING)

For addresses in Canada or Mexico only, please add just this item to your cart to cover additional shipping costs. Any excess shipping costs paid will be refunded.

\$40.00

Add to Cart (appears below)



ADDITIONAL SHIPPING - OVERSEAS (PRIORITY INTERNATIONAL SHIPPING)

For International orders other than in Canada or Mexico, please add just this item to your cart to cover additional shipping costs. Any excess shipping costs paid will be refunded.

\$85.00

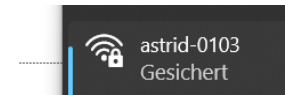
Add to Cart (appears below)

Start und Verbindungsaufbau

- 12V Stromversorgung anschliessen, Astrid bootet sofort
- Direkte Verbindung zum Astrid Wi-Fi aufbauen (Alternative: Ethernet Kabelverbindung)

Falls nicht erfolgreich kann auch das Minidisplay angeschlossen werden, welches die aktuelle IP Adresse und den Hostnamen zeigt.

- VNC Verbindung zu `astrid-0103.local` (10.0.0.5) aufbauen, Login **pi**, Passwort **iotaiota**
- Speicher auf der microSD Card (Linux Betriebssystem) und dem USB Stick mit ca. 250 GB (Daten)

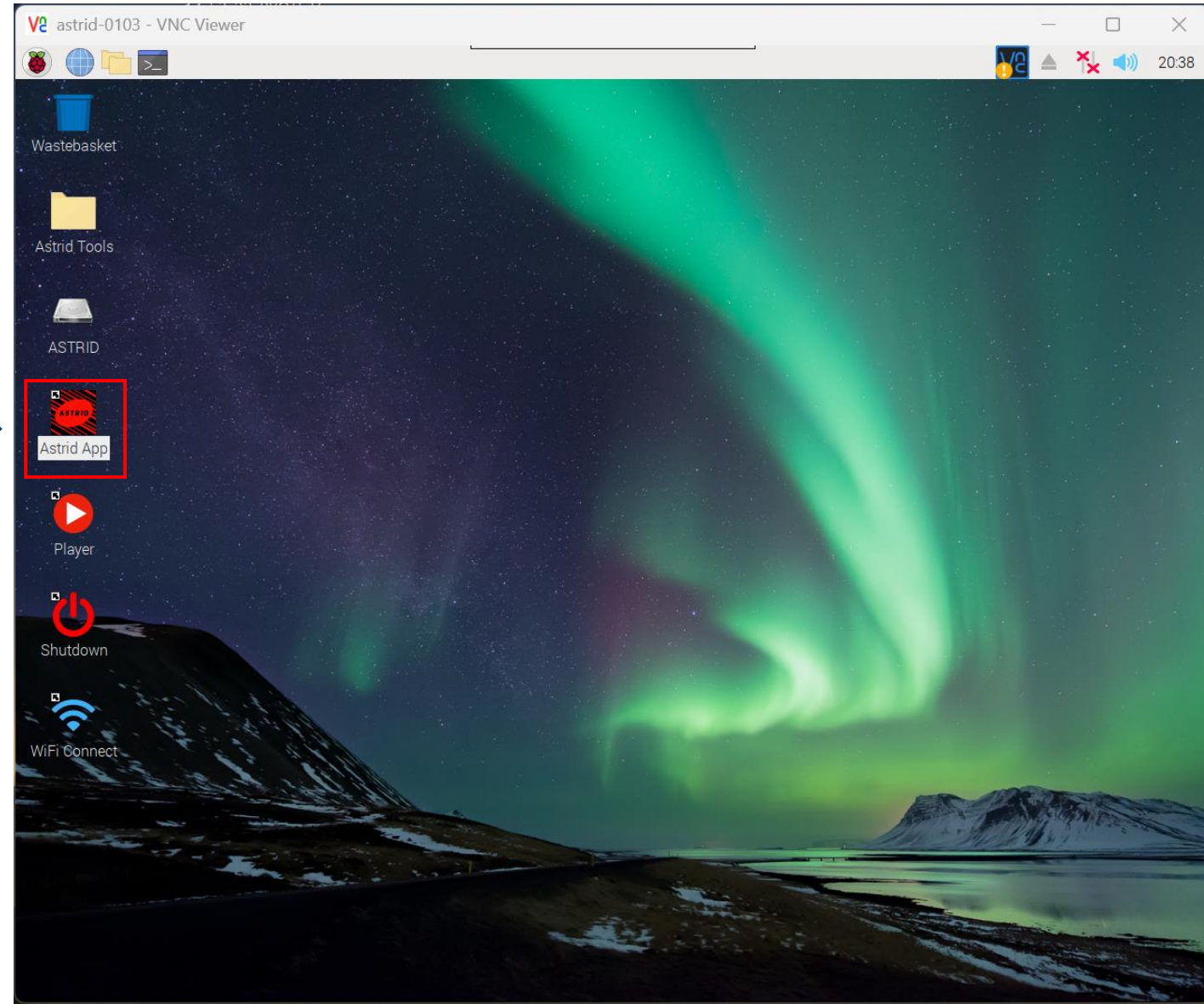


Setting	Value
Wi-Fi SSID	AstridHotspot
Wi-Fi Password	iotaiota
Hostname	astrid.local (or 10.0.0.5)

```
pi@astrid-0103: ~  
File Edit Tabs Help  
pi@astrid-0103:~$ df -h  
Filesystem      Size  Used Avail Use% Mounted on  
/dev/root        59G   7.0G   50G  13% /  
devtmpfs         3.8G   0   3.8G   0% /dev  
tmpfs            3.8G   0   3.8G   0% /dev/shm  
tmpfs            1.6G   1.4M   1.6G   1% /run  
tmpfs            5.0M   4.0K   5.0M   1% /run/lock  
/dev/mmcblk0p1  255M   53M   203M  21% /boot  
tmpfs            778M   28K   778M   1% /run/user/1000  
/dev/sda1        239G   17G   222G   8% /media/pi/ASTRID  
/dev/sdb1        2.3M   78K   2.3M   4% /media/pi/CIRCUITPY  
pi@astrid-0103:~$
```


Desktop von Astrid (RPi) nach dem Booten

Astrid über
die App
starten



Choose Config - Astrid v1.0.045

Config **SternwarteBuelach**

Telescope TEC-140

Mount 10micron

Focal Reducers 0.5

Color Scheme **Astro**

Start Astrid

Settings

Cancel



Failed to connect to mount

Troubleshooting:

1. Verify USB cable is connected from ASTRID to the mount
2. Check mount is powered on
3. Try the next USB device (below)

Try Next USB Device

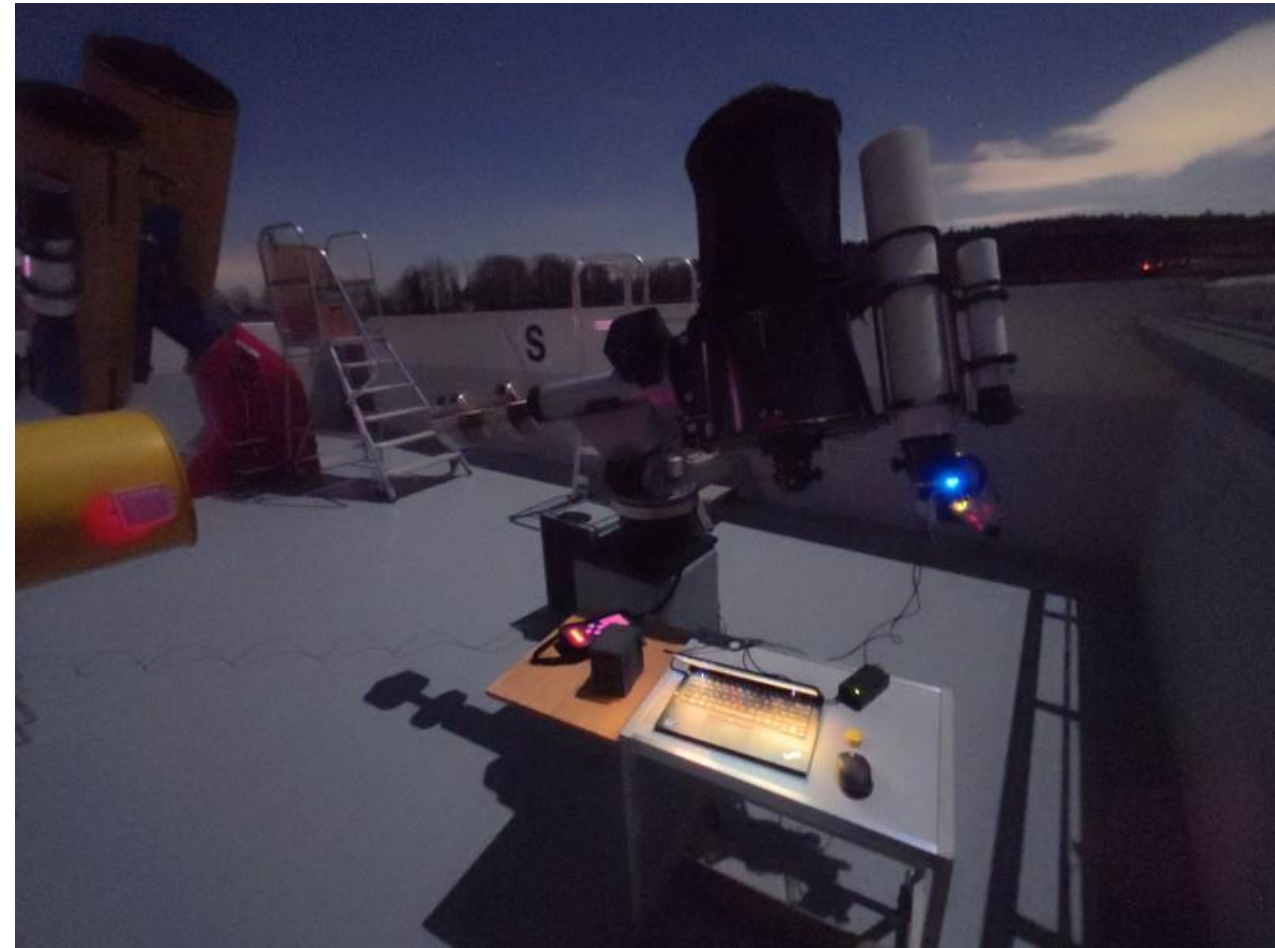
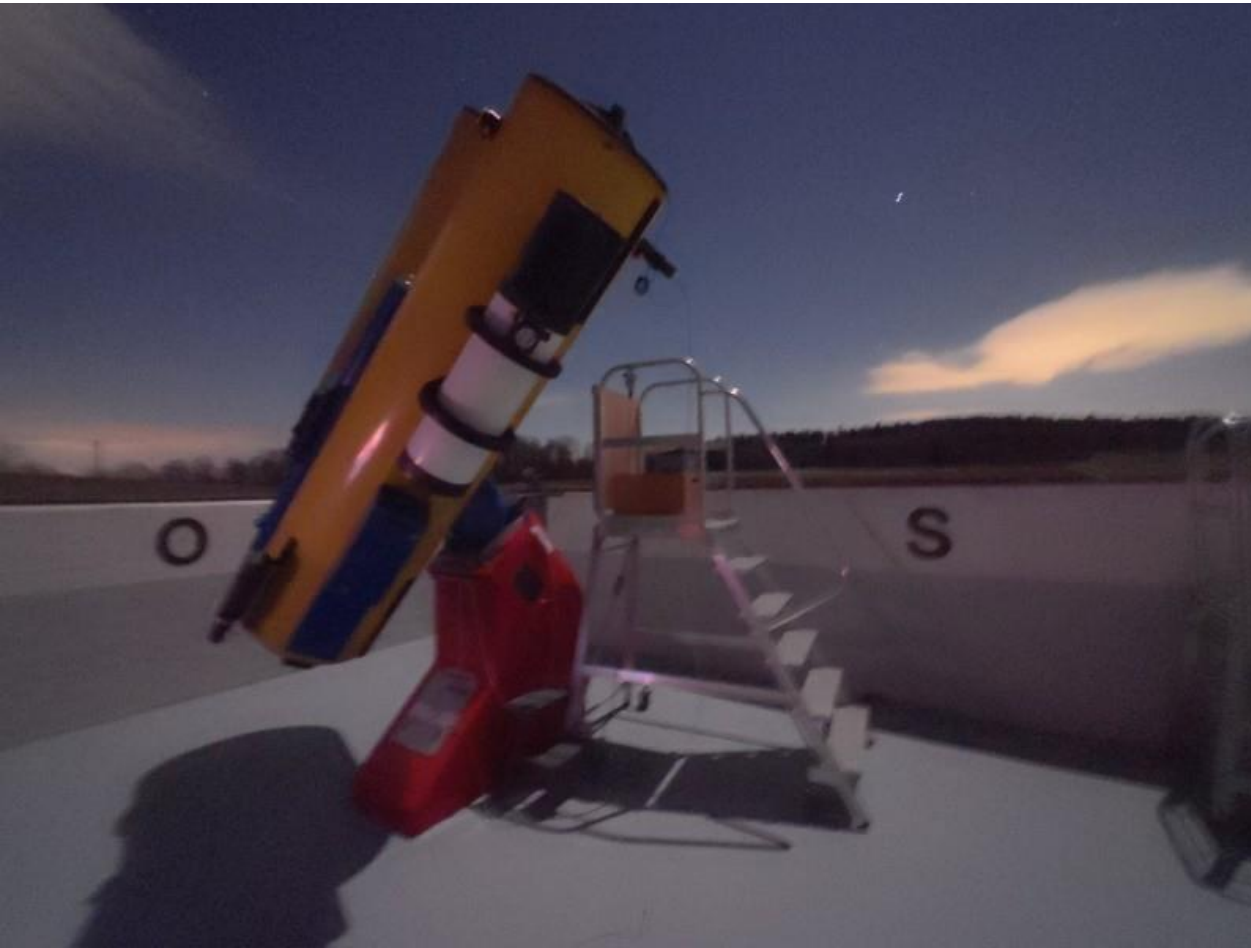
Try Again

Simulate Mount

Cancel

Aufnahmen am Himmel

mit dem TEC 140 der Sternwarte Bülach



Task

Task **Photo**

Exposure(s) 1.000000

Gain 2.0

Subs 1

Job Name None

Dither Full Sky Solve

Plate Solve



Display 1

Stretch **MinMax (15,30)**Zebras Object Target Star Detect ≤ 0.5 fps

Display 2

Exposure Analysis

Mount (JNOW)

Name 10micron

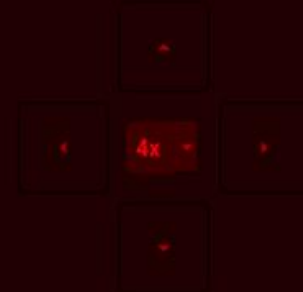
Park

Tracking

Position RA 0h01m49.42061

Position DEC 0d00m00.0004

Meridian

Tracking Rate **sidereal**

STOP

Object (ICRS)

Database **Occultations**

Search

RA

DEC

Event Time

Chord Dist

Add

List

Status

Site

CPS

Timing

Acquisition

UTC Time 22:10:06 - Jan 11

Status

Site

GPS

Timing

Acquisition

UTC Time 23:39:03 - Jan 11



Site Information

Site Name	Local
Site Latitude	47.519596°
Site Longitude	8.570603°
Site Altitude	545.50m
GPS Latitude	47.519624°
GPS Longitude	8.570604°
GPS Altitude	547.60m
GPS Acc. (PDOP)	5.9
GPS Acc. (HDOP)	3.04
GPS Acc. (VDOP)	5.06
GPS Fix	3D Fix
Diff. Site/GPS	3.11m

Update Site and Mount

Cancel



Acquisition Information

Picamera2 Library:

Dropped Camera Frames	0
Bad Frame Delta	0

OTESTamper:

Dropped OTESTamper Frames	0
OTESTamper Comms Failed	0
Clock Drift	Record Video
Bad Clock Drifts	0
OTESTamper No Data	0
OTESTamper Not Ready	0
Frame Sequence Out Of Sync	0
Frame Timestamp Out Of Order	0
Clock Status != 0x07 or 0x0B	0

RavfWriter:

Dropped SHM Full Frames	0
Final Frame Not Written	0

Reset Counters

Cancel

Task

Task: OTE Video

Frame Rate(fps): 100

Gain: 16.0

Job Name: UCAC4_579-006301

Display 1

Stretch: MinMax (15,100)

Zebra:

Object Target:

Star Detect <=0.5fps:

Display 2

Exposure Analysis

Mount (JNOW)

Name: 10micron

Park

Tracking

Position RA: 2h51m02.95569

Position DEC: +25d45m36.0383

Meridian: -290m

Tracking Rate: sidereal

4x

STOP

Object (ICRS)

Database: Custom

Search: UCAC4 579-006301

RA: 2h49m35.09210

DEC: +25d39m26.6681

Add

List

Status

Site

GPS

Timing

Acquisition

UTC Time: 23:39:03 - Jan 11

Aufnahme

Montierung

Ziel

Letzte Aufnahme

Status

CCD Field Rectangles

Rectangle 1

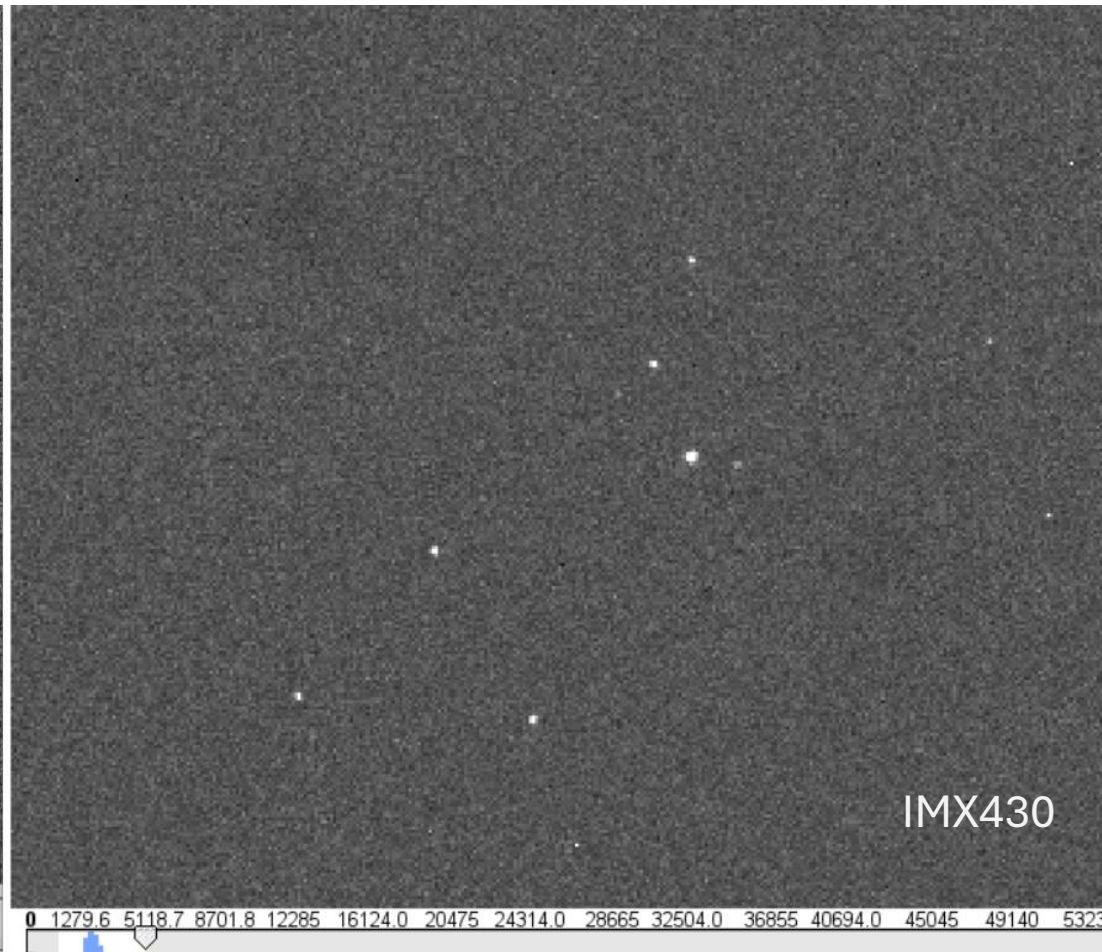
CCD Size		Pixel		Sampling		Field	
Focal (m):	0.49	X (mm):	5.023	X (μ):	3.45	X ("/pixel):	1.45
Rotation:	0	Y (mm):	3.754	Y (μ):	3.45	Y ("/pixel):	1.45
						X:	0° 35' 14"
						Y:	0° 26' 20"

Guiding Camera		CCD Size		Guider Shift		Guider Angular Shift			
<input type="checkbox"/>	Angle:	0				RA		DE	
<input type="checkbox"/>	Focal (m):	2.5	X (mm):	17.7	dX (mm):	h	m	s	°
<input checked="" type="checkbox"/>	Rotation:	0	Y (mm):	13.4	dY (mm):	0	0	0	0

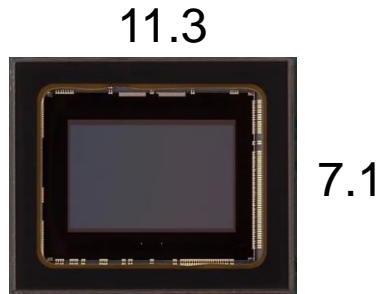
TEC f=980 mm with 0.5x Reducer and Astrid



Kurzer Vergleich mit der DVTI+CAM (nicht repräsentativ, wegen schlechten Bedingungen und Wolkendurchzug)

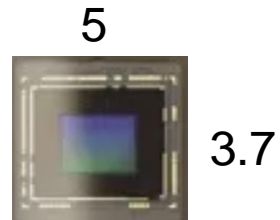


Sensor-Vergleich



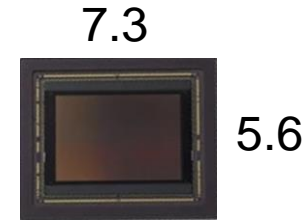
IMX174

- Pregius Gen. 1
- 5.86 μm Pixel
- 1920 x 1200
- 76% QE
- 12-bit ADC
- > 3.5e- readout noise



IMX296

- Pregius Gen. 2
- 3.45 μm Pixel
- 1440 x 1080
- 68% QE
- 10-bit ADC
- > 2.5e- readout noise



IMX430

- Pregius Gen. 3
- 4.5 μm Pixel
- 1620 x 1240
- 77% QE
- 12-bit ADC
- > 2.2e- readout noise

Astrid

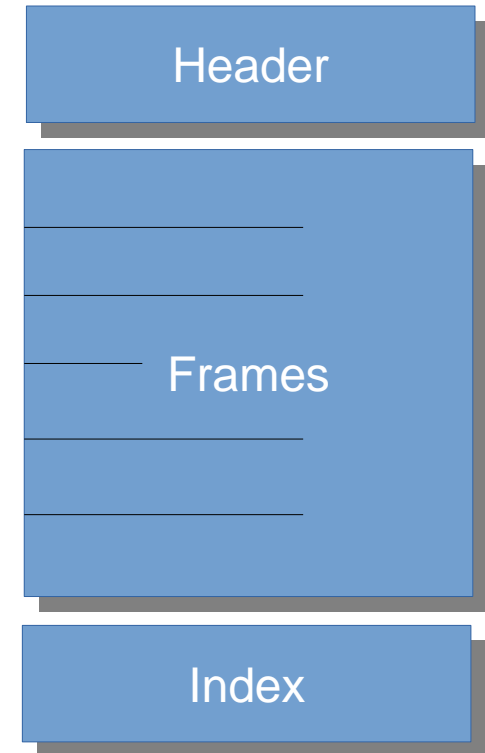
IMX296

IMX430

IMX174

Astrid-Videoformat RAVD

- Ähnlich wie ADV...
 - Globale Metadaten (Bildformat, Kamera, Sensor, Teleskop, Obj, RA/DEC, Ort)
 - Per-Frame Metadaten (Start-Zeit, Belichtungs-Zeit, Frame-Nr., GPS-Status)
 - Rekonstruierbare Indextabelle
- ...aber mit Vereinfachungen
 - Auswahl der Metadaten ist fix
 - Nur 1 Stream
 - Keine Kalibrationsdaten
 - Keine Komprimierung
 - Kein ROI



Was haben wir festgestellt?

Pro's

- Sehr kompakt. Grundsätzlich kein Laptop nötig, wenn alles eingerichtet ist (was wir aber nicht getestet haben).
- Erstaunlich empfindlicher Mono-Chip.
- Geeignet für den mobilen Einsatz, insbesondere beim Betrieb von mehreren autonomen Systemen.
- Für Betrieb mit einer azimutalen Aufstellung ohne Nachführung optimiert. Platesolving mit Zielsuche.
- Benutzerführung in der Astrid App (Status-
"Lichtsignale")

Con's

- Inbetriebnahme nicht einfach. Verbindungsprobleme über WLAN. Kein paralleles Internet. Technischer Background nötig. Daher eher etwas für "Bastler" mit Linux-Erfahrung.
- Stromanschluss "wackelig", System reagiert heikel bei kurzen Unterbrüchen.
- Sensor sehr klein.
- INDI-Treiber für die Montierung nötig, was bei unserer 10micron nicht funktioniert hat.