

EKOS

Automatizácia zberu dát

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Základné vlastnosti nástroja

- Ovládajte svoj teleskop, CCD (a DSLR), filtrové koleso, ostrenie, adaptívnu optiku a akékoľvek zariadenie kompatibilné s INDI z Ekosu.
 - Vstavané natívne automatické navádzanie s podporou automatického ditheringu medzi expozíciami a podporou zariadení adaptívnej optiky okrem tradičných guiderov
 - Presné GOTO pomocou astrometry.net
 - Load & Slew (Načítanie a posun): Načítajte obrázok FITS
 - Jednoducho použiteľný nástroj Polar Alignment Assistant
 - Zachytávanie a nahrávanie videostreamov vo formáte SER
 - Úplne automatizovaný plánovač na ovládanie všetkých zariadení observatória
 - Integrácia so všetkými natívnymi zariadeniami INDI
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EKOS požiadavky

- Systém Ekos možno spustiť na osobných počítačoch, prenosných počítačoch a vstavaných počítačoch. Je to kompletný balík pre astrofotografiu s veľmi malým počtom externých závislostí. Skôr ako začneme hovoriť o požiadavkách, je dôležité rozlišovať medzi Ekosom a INDI:

Ekos je frontendový grafický nástroj pre astrofotografiu, ktorý sa dodáva ako súčasť KStars. Vykonáva zachytávanie, zaostrovanie, navádzanie a plánovanie. Ekos závisí od INDI na ovládanie zariadenia.

- INDI je backendový server používaný na komunikáciu s astronomickými zariadeniami a ich ovládanie.

Ekos a INDI môžu pracovať na tom istom počítači, ale vďaka sieťovým možnostiam INDI to nie je bezpodmienečne nutné. Ekos môže komunikovať s jedným alebo viacerými vzdialenými servermi INDI bez toho, aby bol potrebný ďalší softvér. Vzdialené ovládanie je zabudované do systému INDI.

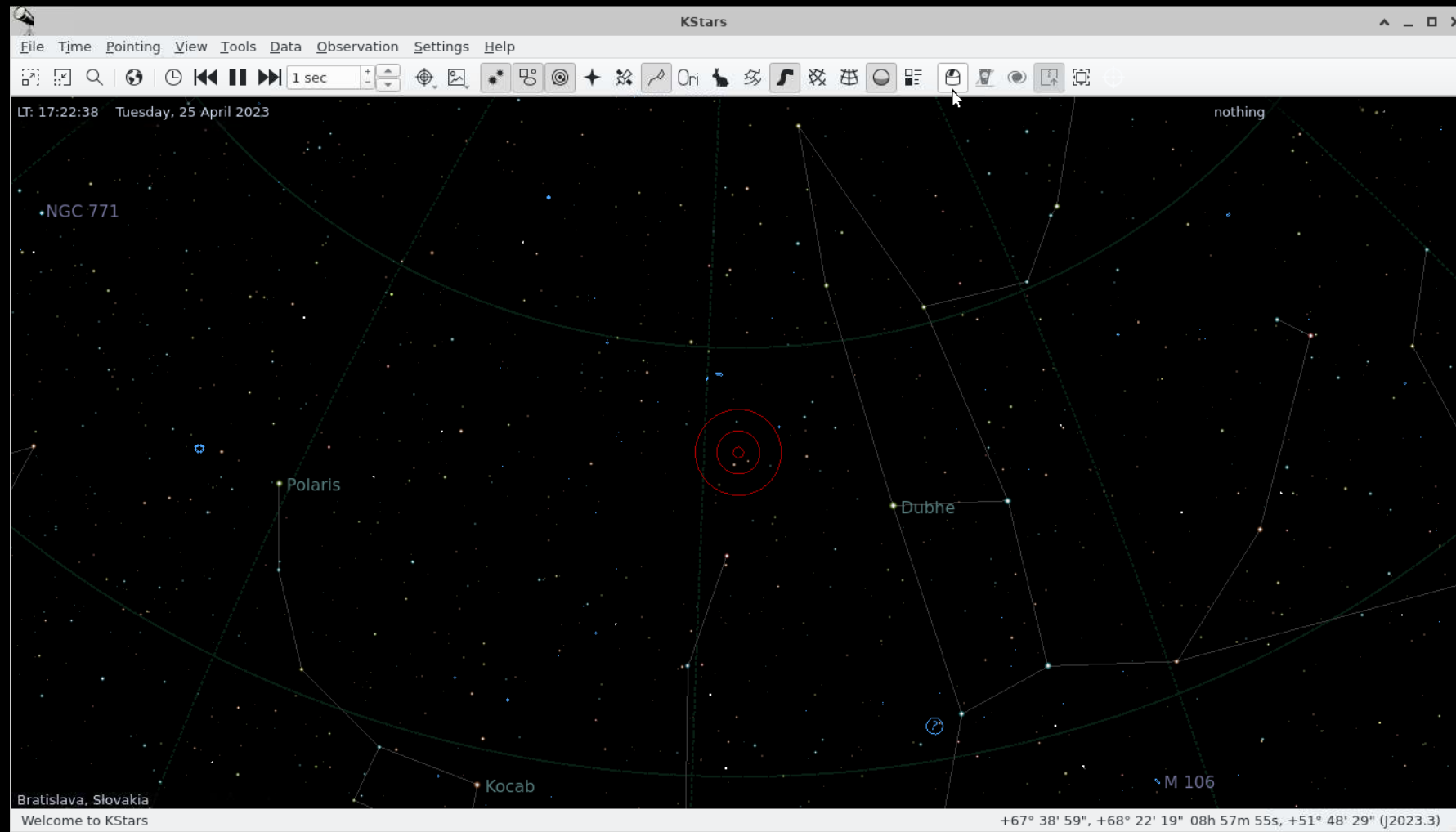
SW požiadavky

- Linux, Windows 10 64bit alebo Mac OS 10.4 alebo vyšší.
INDI sa používa na ovládanie zariadení a v súčasnosti je plne podporovaný v systéme Linux a čiastočne v systéme Mac OS. INDI nie je oficiálne podporované v systéme Windows, ale na komunikáciu so zariadeniami v systéme Windows môžete použiť prevodník ASCOM na INDI.
 - Dôrazne sa odporúča spustiť INDI vo vstavanom počítači s Linuxom (napr. Raspberry PI) a pripojiť sa k nemu vzdialene z Ekosu.
 - Ekos teda môže bežať na viacerých operačných systémoch, ale odporúča sa spustiť INDI na vstavanom jednodoskovom počítači.
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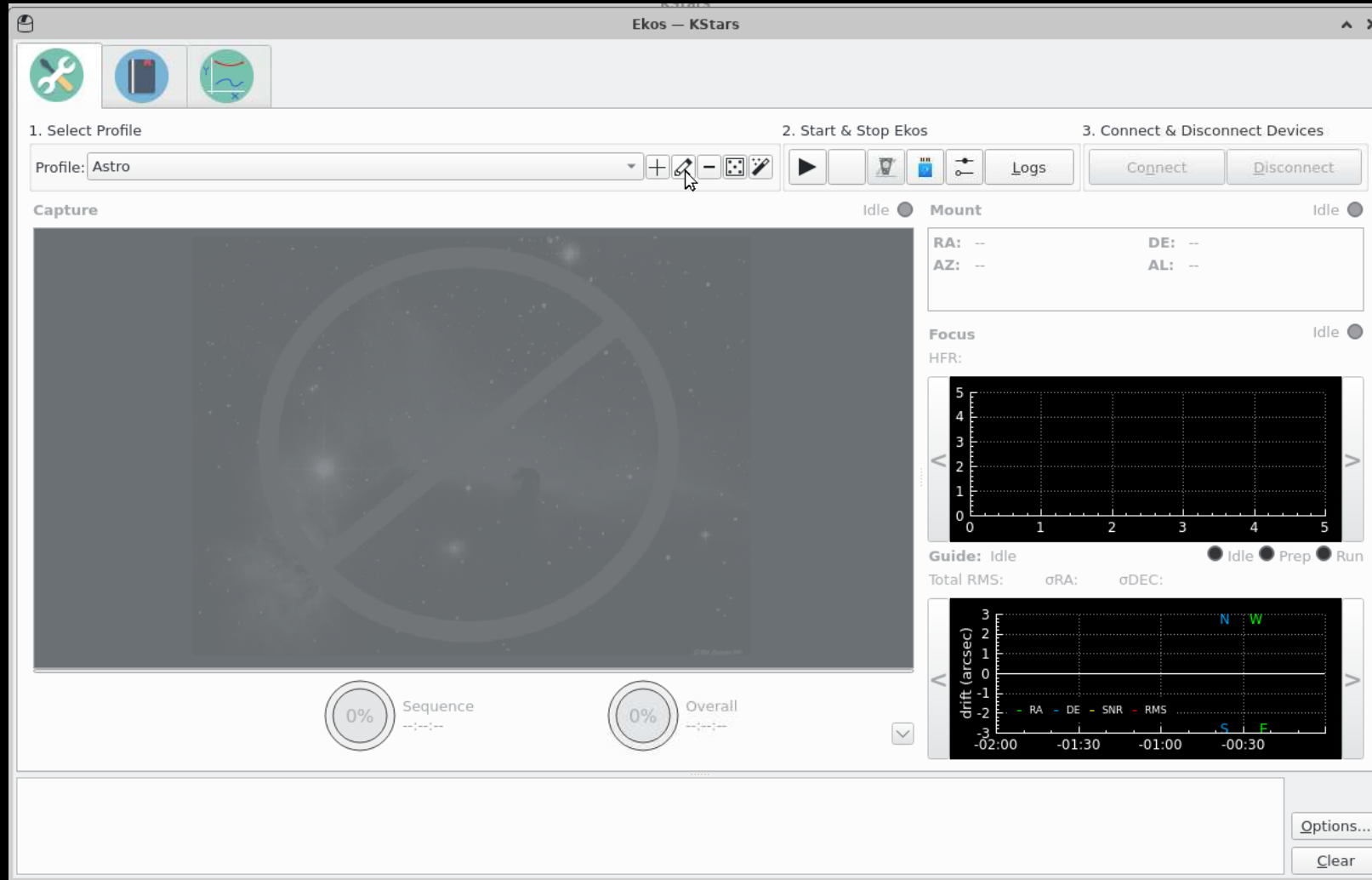
Podporované zariadenia INDI

- <https://www.indilib.org/individuals.html>
 - Na stránke indilib si môžete skontrolovať či je Vaše zariadenie kompatibilné a v akej verzii ovládača
 - Príklad pre Skywatcher montáže
<https://www.indilib.org/individuals/devices/telescopes/skywatcher.html>
 - Príklad pre ZWO kamery
<https://www.indilib.org/individuals/devices/cameras/zwo-optics-asi-cameras.html>
-

Kstars – spustenie nadstavby EKOS



EKOS – výber / nastavenie profilu



EKOS – Nastavenie profilu

Profile Editor — KStars

Profile

Name: ☒ Auto Connect ☐ Port Selector ☐ Site Info

Mode: ☒ Local ☐ Remote Host: Port:

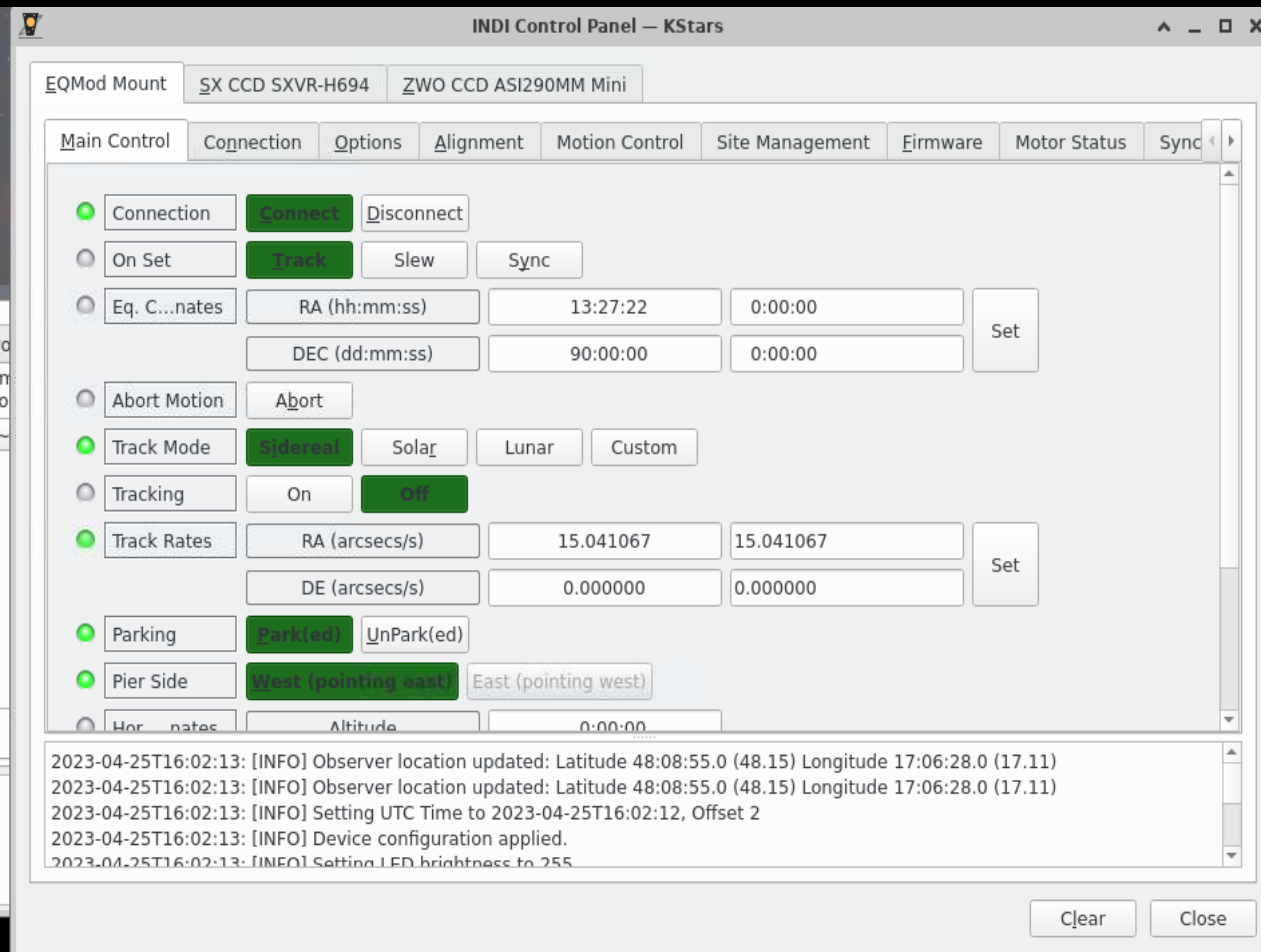
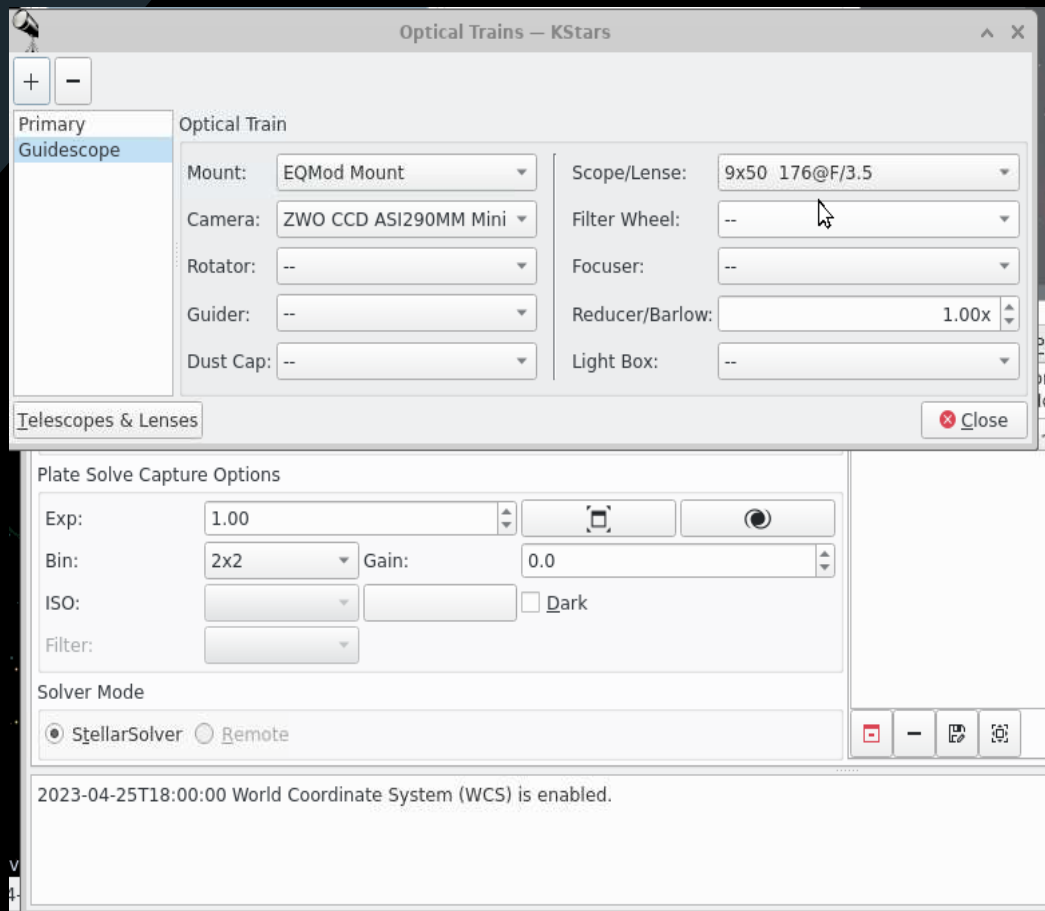
Guiding: Host: Port:

☐ INDI Web Manager Port:

Select Devices

Mount:	<input type="text" value="EQMod Mount"/>	Filter:	<input type="text" value="--"/>	Aux 1:	<input type="text" value="--"/>
Camera 1:	<input type="text" value="SX CCD"/>	AO:	<input type="text" value="--"/>	Aux 2:	<input type="text" value="--"/>
Camera 2:	<input type="text" value="ZWO CCD"/>	Dome:	<input type="text" value="--"/>	Aux 3:	<input type="text" value="--"/>
Focuser:	<input type="text" value="--"/>	Weather:	<input type="text" value="--"/>	Aux 4:	<input type="text" value="--"/>
Remote:	<input type="text" value="driver@host:port,driver@host,@host:port,@host,driver"/>				<input type="button" value="Scripts"/>

EKOS – Spustenie profilu



EKOS – Primárna kamera a scheduling

The screenshot displays the Ekos - Astro Profile - KStars software interface. The window title is "Ekos - Astro Profile - KStars". The interface is divided into several sections:

- Top Bar:** Contains icons for various functions: a wrench (Tools), a book (Help), a graph (Monitor), a camera (Camera), a magnifying glass (Find), a telescope (Align), a target (Go To), and a red circle with a white dot (Focus).
- Train:** Set to "Primary".
- Camera & Filter Wheel:**
 - Camera: SX CCD SXVR-H694
 - Cooler: On (indicated by a red button)
 - Exposure: 1.000000
 - Count: 1
 - Format: RAW (selected), FITS
 - Type: Light
 - Frame: X: 0, Y: 0
 - Size: W: 2750, H: 2200
 - Binning: H: 1, V: 1
- Capture Settings:**
 - Filter: (empty)
 - Delay: 0
 - ISO: (empty)
 - Gain: 0.0
 - Offset: 0.0
- File Settings:**
 - Target: Target
 - Directory: /home/odroid/Pictures
 - Format: /%t/%T/%F/%t_%T_%F
 - Save: Locally (selected), Remote: /home/pi
- Sequence Queue:** A table with columns: Status, Filter, Count, Exp, Type, Bin, ISO/Gain, O. It is currently empty.
- Tools:** Includes buttons for Darks, Limits, and Scripts. A "Dark" checkbox is also present.
- Progress:** Shows "Expose (-/-): --:--:--" and "total remaining: --:--:--". A progress bar is visible below.
- Status Bar:** Displays the message "2023-04-25T18:06:53 Cooler is on".

EKOS – Guidscope – platesolving – polar align.

The screenshot displays the Ekos - Astro Profile - KStars window. The interface is divided into several sections:

- Top Bar:** Contains icons for various tools: a wrench, a book, a line graph, a camera, a magnifying glass, a telescope, and two target symbols.
- Train:** A dropdown menu set to "Guidscope".
- Solver Control:** Includes buttons for "Capture & Solve", "Load & Slew...", and "Stop".
- Solver Action:** Radio buttons for "Sync", "Slew to Target" (selected), and "Nothing".
- Telescope Coordinates (JNow):** Fields for RA (13:32:46), DE (90:00:00), Accuracy (30), and Settle (1500).
- Solution Coordinates (JNow):** Fields for RA, DE, Pix, PA, FOV (109.7' x 62.1'), R (1.00x), FL (176.0 (176.0)), and F/ (3.5 (3.5)).
- Plate Solve Capture Options:** Fields for Exp (1.00), Bin (2x2), Gain, ISO, Filter, and a checkbox for Dark.
- Solver Mode:** Radio buttons for "StellarSolver" (selected) and "Remote".
- Bottom Status:** A message stating "2023-04-25T18:00:00 World Coordinate System (WCS) is enabled." and buttons for "Options..." and "Clear".
- Right Panel:** A large image of a star field with a red circle and a diagonal line through it, indicating a failed or rejected solution. Below this is the "Solution Results" section, which includes a "Polar Alignment" tab. The text below the tab reads: "The results from Astrometric Solutions from the Capture and Solve Tool, the Load and Slew Tool, and the Mount Model Tool will be displayed below." Below this text is a table with columns: RA, DEC, Obj Name, ~~ dRA, dDE. To the right of the table is a polar alignment plot showing concentric circles and a crosshair, with axes labeled dRA (arcsec) and dDE (arcsec).

EKOS – Guiding

Ekos - Astro Profile — KStars

Train: Guidescope

Control

Capture Loop

Guide

Stop

Subframe

Auto Star

Dark

Exp: 1.000 Delay: 0.00

Box: 32 Bin: 2x2

Directions

RA DEC

+ - + -

Connect Disconnect

Scope / Lens Info

f_x 176mm 50mm 1.00x

F/3.5 109.7' x 62.1'

Guide Info

Guiding Delta "	xxx	xxx
Pulse Length (ms)	xxx	xxx
RMS" (RA/DEC)	xxx	xxx
Total RMS"	xxx	xxx
Guide SNR	xxx	xxx

Idle Prep Run

Drift Plot Calibration Plot

drift (arcsec)

dRA (arcsec)

dDE (arcsec)

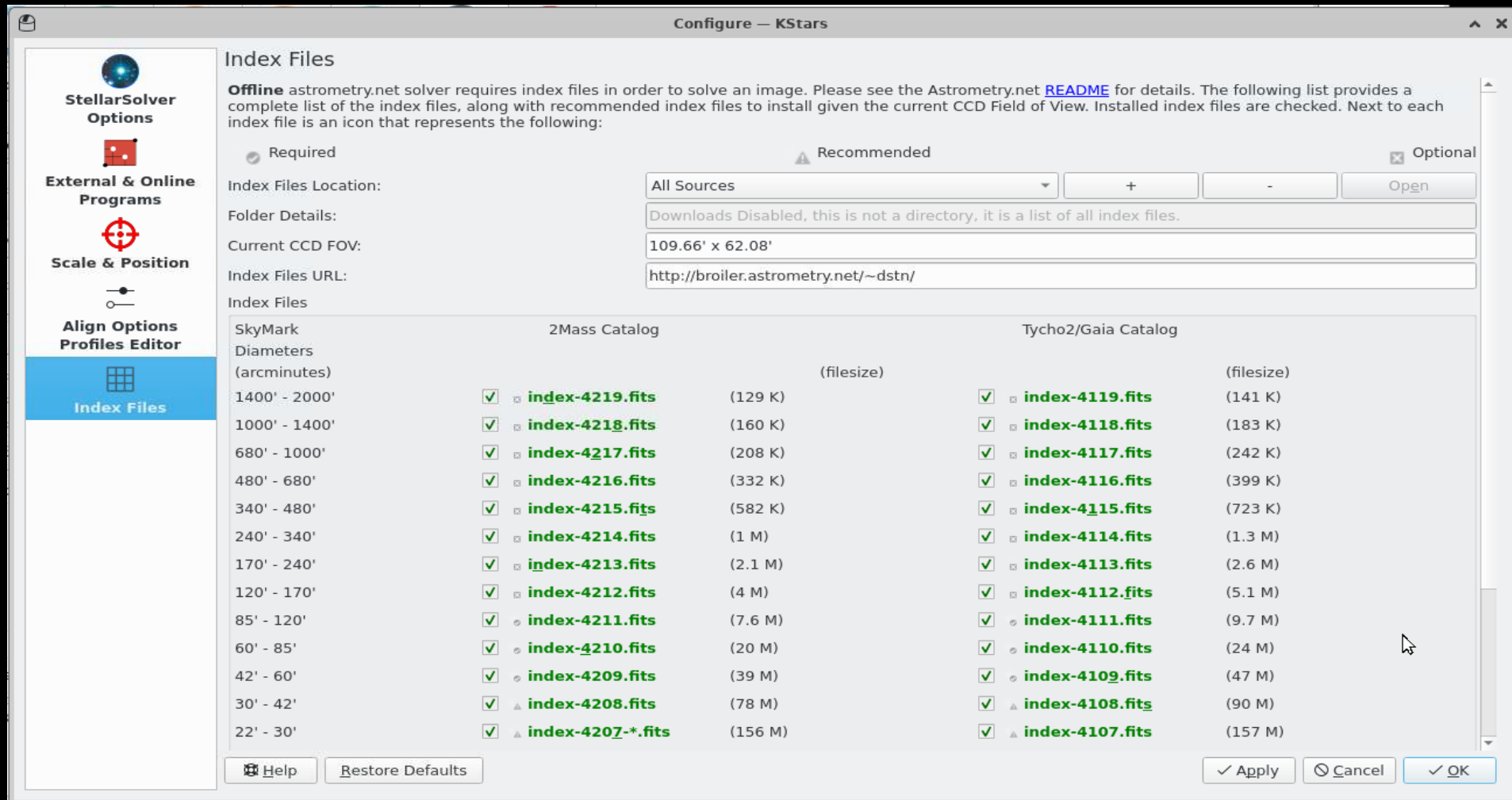
RA DE SNR RMS

Corr Corr RMS

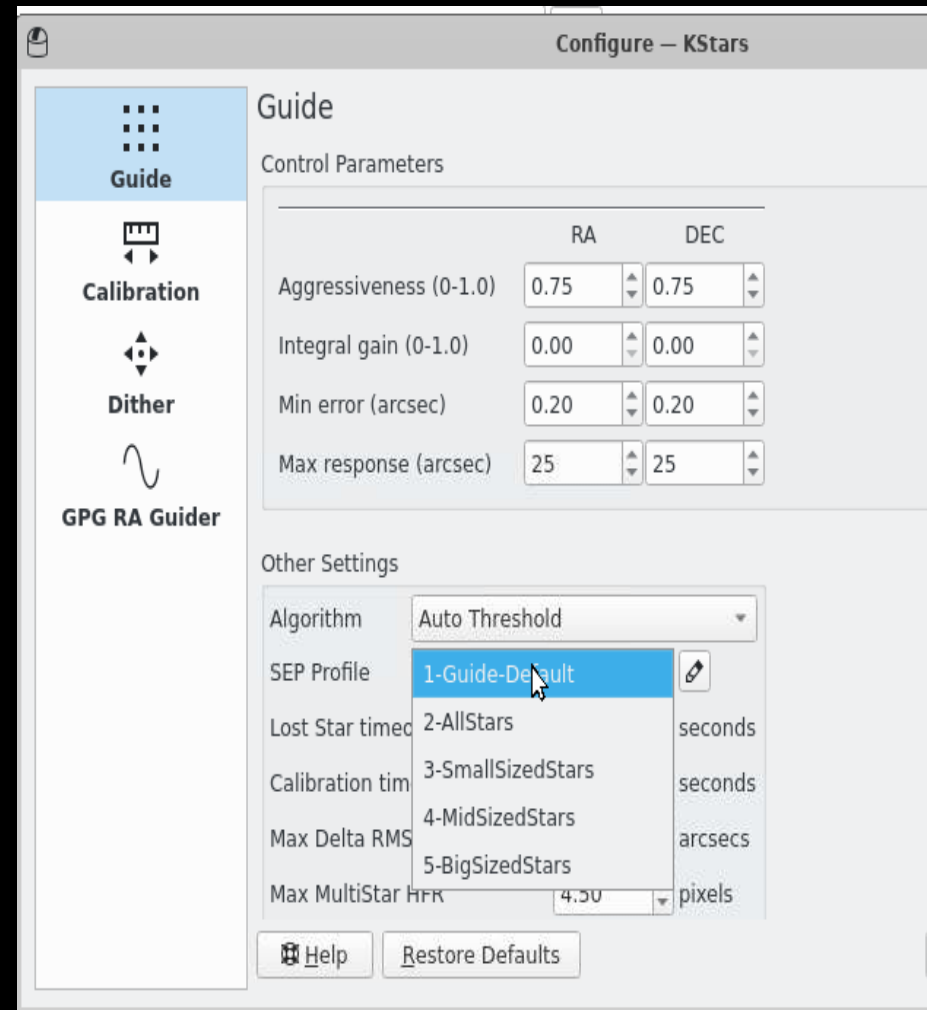
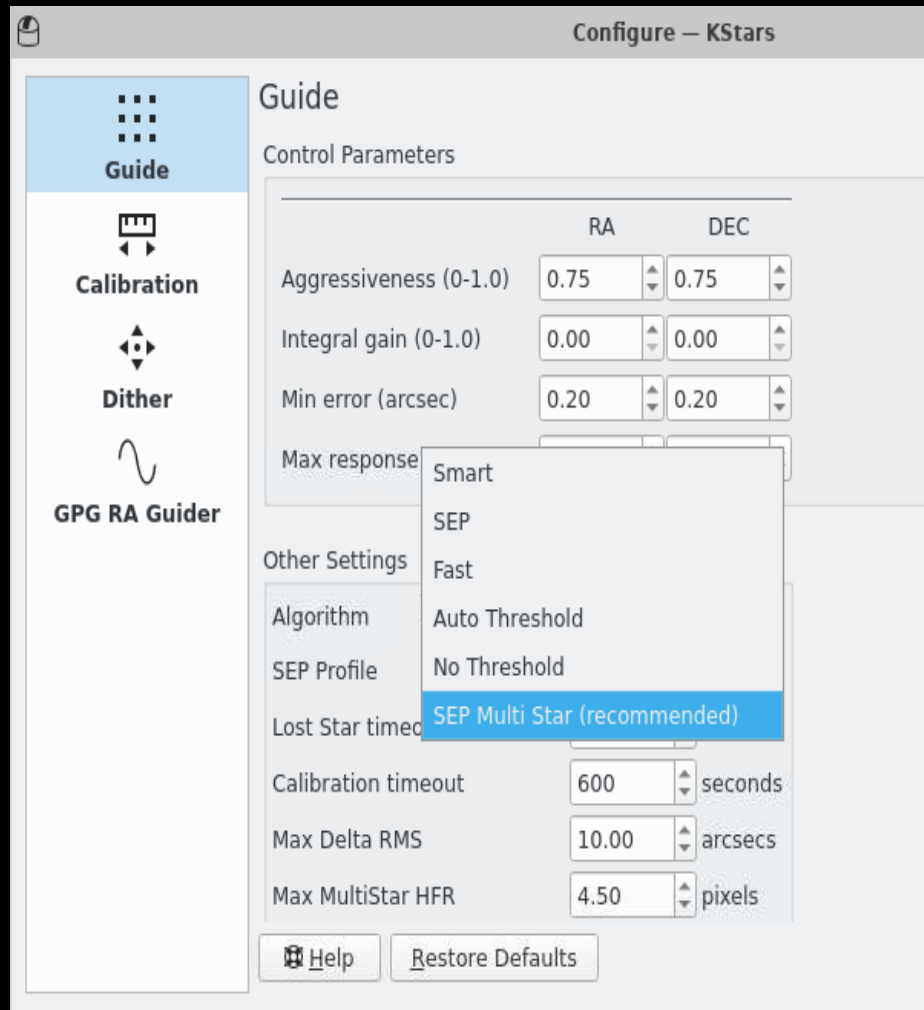
Trace: + -

Options... Clear

EKOS – Guiding nastavenie



EKOS – Guiding nastavenie



EKOS – Mount control / meridian flip

Ekos - Astro Profile — KStars

Train: Primary

Coordinates

RA

DEC

AZ

ALT

HA

LST

Meridian Flip

☒ Flip if HA > 5.00 deg

Meridian flip inactive (parked)

Auto Park

Park At: 03:00:00

☐ Every day

00:00:00

Reset

Clear Model

Clear Parking

Purge all configuration

Mount Control

Tracking

ON

OFF

Parked

Park

UnPark

Limits

Min. Alt: 0.00

Max. Alt: 90.00

☐ Enable Alt Limits

Max. HA (hours): 2.00

☐ Enable HA Limits

Options...

Clear

EKOS – Sequence scheduling

Ekos - Astro Profile — KStars

Object & Sequence Selection

Target: *

J2000: * RA hh mm ss.s DEC dd mm ss.s

PA

Sequence: *

FITS File:

Priority:

Profile:

Steps: ☒ Track ☒ Focus ☒ Align ☒ Guide

Name	Status	Captures	Altitude	Next Start	Next End
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Greedy

No job running

Job Startup Conditions

☒ ASAP

☐ Culmination Offset

☐ On

Job Constraints

☒ Alt >

☐ Moon >

☐ Weather

☒ Twilight 22:01 - 03:37

☒ Artificial Horizon

Job Completion Conditions

☒ Sequence completion

☐ Repeat for

☐ Repeat until terminated

☐ Repeat until

Observatory Startup Procedure

☐ UnPark Dome ☐ UnPark Mount ☐ UnCap

Script:

Aborted Job Management

☐ None ☒ Queue ☐ Immediate

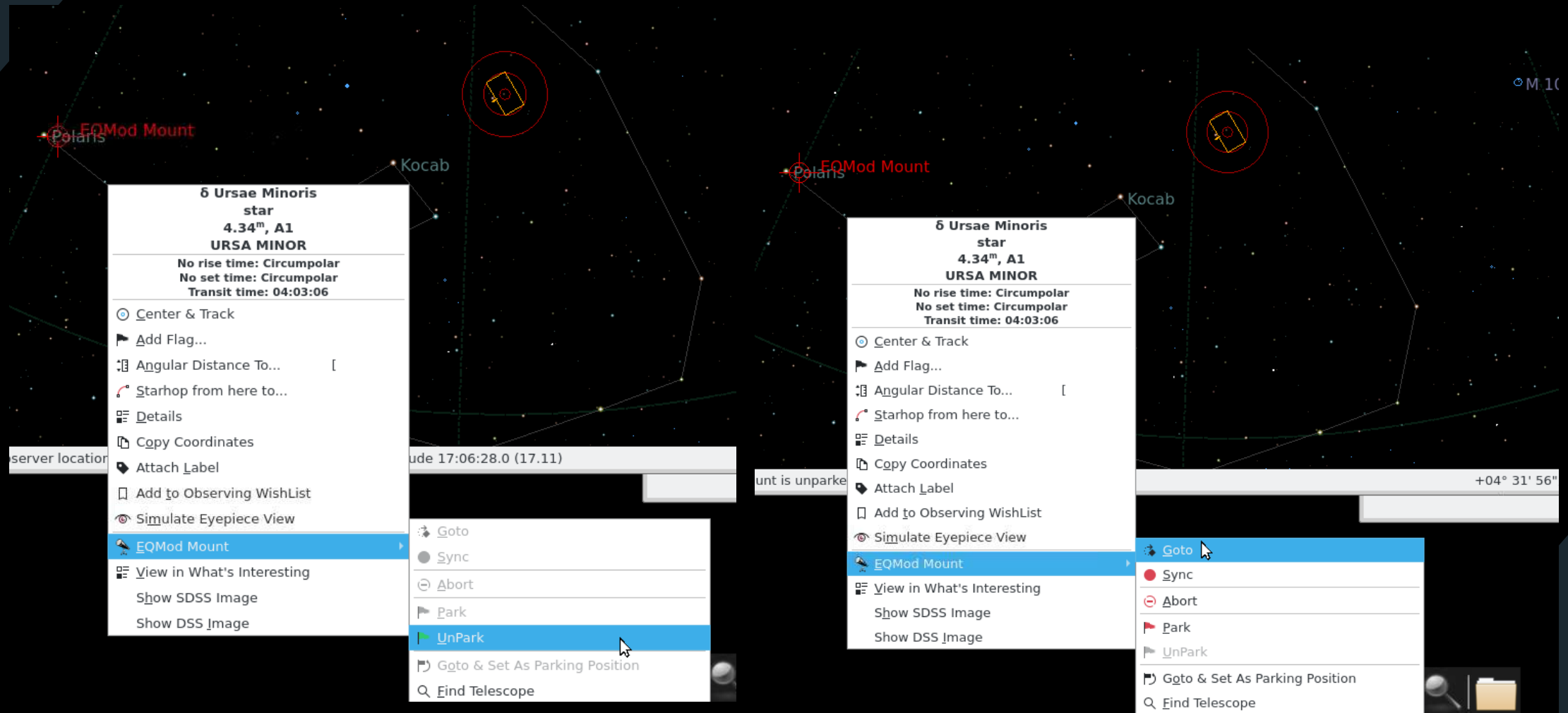
☐ Re-schedule errors

Observatory Shutdown Procedure

☐ Warm CCD ☐ Cap ☐ Park Mount ☐ Park Dome

Script:

EKOS – GOTO na pozorovaný objekt



EKOS – Platesolving

The screenshot displays the Ekos - Astro Profile - KStars window, which is used for controlling astronomical equipment and performing platesolving. The interface is divided into several sections:

- Train:** A dropdown menu set to "Guidescope".
- Solver Control:** Contains buttons for "Capture & Solve", "Load & Slew...", and "Stop".
- Solver Action:** Radio buttons for "Sync", "Slew to Target" (selected), and "Nothing".
- Telescope Coordinates (JNow):** Fields for RA (03:08:31), DE (89:21:45), Accuracy (30), and Settle (1500).
- Solution Coordinates (JNow):** Fields for RA, DE, Err, Pix, PA, FOV (109.7' x 62.1'), R (1.00x), FL (176.0 (176.0)), and F/ (3.5 (3.5)).
- Plate Solve Capture Options:** Fields for Exp (1.00), Bin (2x2), Gain, ISO, Filter, and a checkbox for "Dark".
- Solver Mode:** Radio buttons for "StellarSolver" (selected) and "Remote".
- Log:** A text area at the bottom showing the sequence of events: "2023-04-25T21:07:05 Solving with blind image position...", "2023-04-25T21:07:05 Image received.", "2023-04-25T21:07:03 Capturing image...", "2023-04-25T21:07:02 Solving with blind image scale...", and "2023-04-25T21:07:02 Image received.".
- Main View:** A large dark area representing the sky, with a toolbar above it.
- Solution Results:** A section titled "Polar Alignment" showing the results of the platesolving process. It includes a table of results and a polar alignment plot.

	RA	DEC	Obj Name	
1	03:08:24	89:21:45	Polaris (α Ursae Minoris)	✖
2	03:08:26	89:21:45	Polaris (α Ursae Minoris)	✖
3	03:08:29	89:21:45	Polaris (α Ursae Minoris)	☀

The polar alignment plot shows the dRA (arcsec) on the x-axis (ranging from -100 to 100) and dDE (arcsec) on the y-axis (ranging from -75 to 75). The plot displays concentric circles representing the error in alignment, with a green circle indicating the current alignment and a red circle indicating the target alignment.

Buttons for "Options..." and "Clear" are located at the bottom right of the Solution Results section.

EKOS – Pridanie sekvencie na zber dát

The screenshot displays the Ekos - Astro Profile - KStars interface. The top toolbar contains icons for various functions. The main window is divided into several sections:

- Train:** Primary
- Camera & Filter Wheel:**
 - Camera: SX CCD SXVR-H694
 - Cooler: Off (with a red 'On' button and a blue 'Off' button)
 - Exposure: 240.000000
 - Filter: HA
 - Count: 10
 - Delay: 0
 - Format: RAW (with a FITS button)
 - ISO: (empty)
 - Type: Light
 - Gain: 0.0
 - Frame: X: 0, Y: 0
 - Offset: 0.0
 - Size: W: 2750, H: 2200
 - Binning: H: 1, V: 1
- File Settings:**
 - Target: NGC_7023
 - Directory: /home/odroid/Light
 - Format: /%t/%T/%F/%t_%T_%F
 - Save: Locally
 - Remote: /home/pi
- Sequence Queue:**

	Status	Filter	Count	Exp	Type	Bin	ISO/Gain
1	Idle	HA	0/10	240.000...	Light	1x1	--
- Tools:** Darks, Limits, Scripts
- Progress:** Aborted (with a red dot icon). Expose (-/-): --:--:--. total remaining: --:--:--. Avg. Download: 0.00 sec.
- Log:**
 - 2023-04-25T21:03:49 CCD capture aborted
 - 2023-04-25T21:03:48 Capturing 240.000-second HA image...
 - 2023-04-25T21:03:48 Filter set to HA.
 - 2023-04-25T21:03:42 Changing filter to HA...
 - 2023-04-25T21:00:56 Cooler is on

EKOS – ďalšie zdroje informácií

- Ekos manuál na KDE stránkach
 - <https://docs.kde.org/trunk5/en/kstars/kstars/tool-ekos.html>
 - Ekos manuál
 - <https://www.indilib.org/individuals/ekos-kstars.html>
 - Video manuál
 - <https://www.indilib.org/about/ekos/video-tutorials.html>
-