# Automated operations in Changchun station Part I : **Current**

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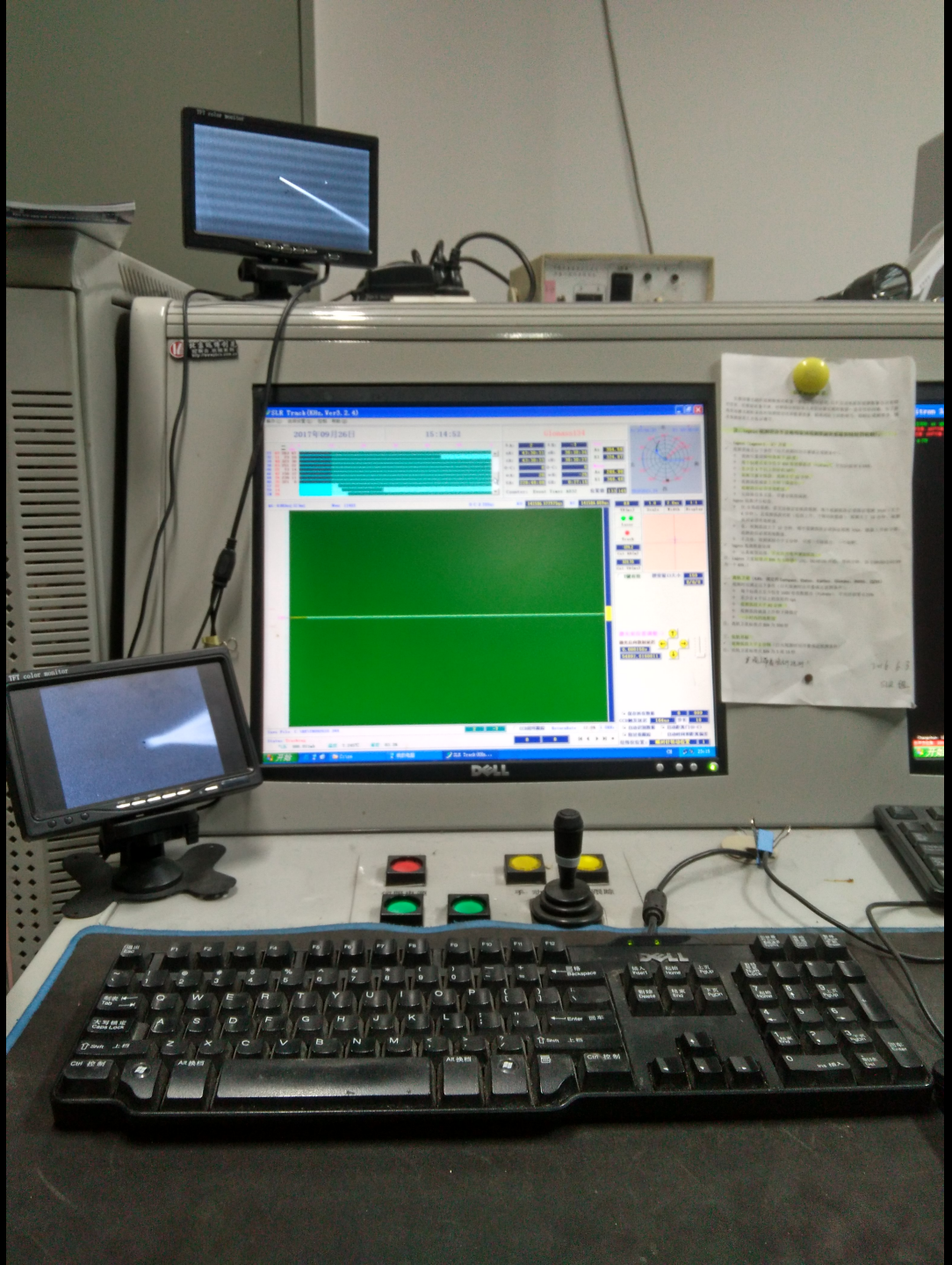
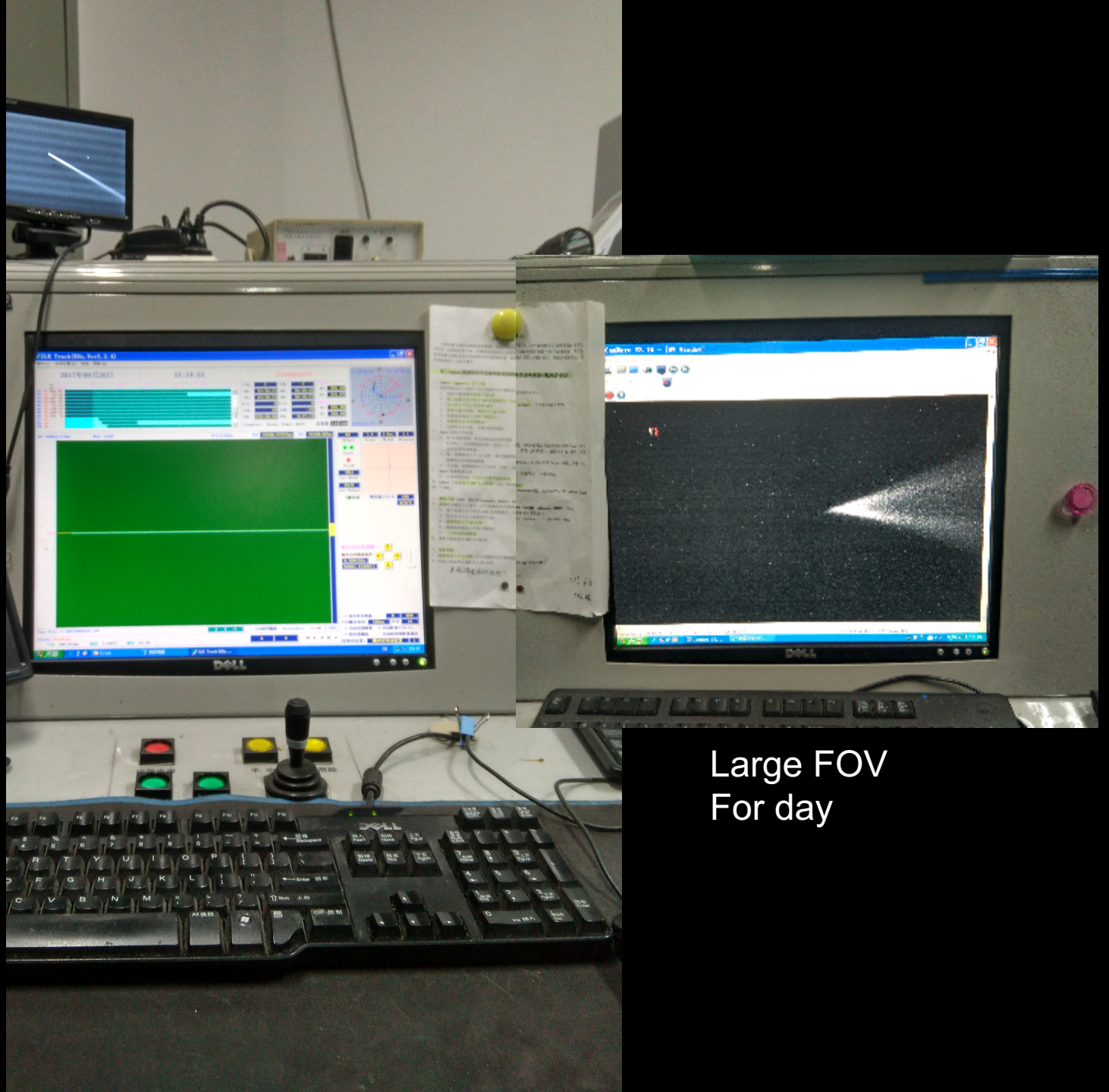
# Outline: Current

- Real-time data recognition
- Range-gate following function
- Daylight laser beam monitoring
- Daylight pointing improvement

Small FOV
For night

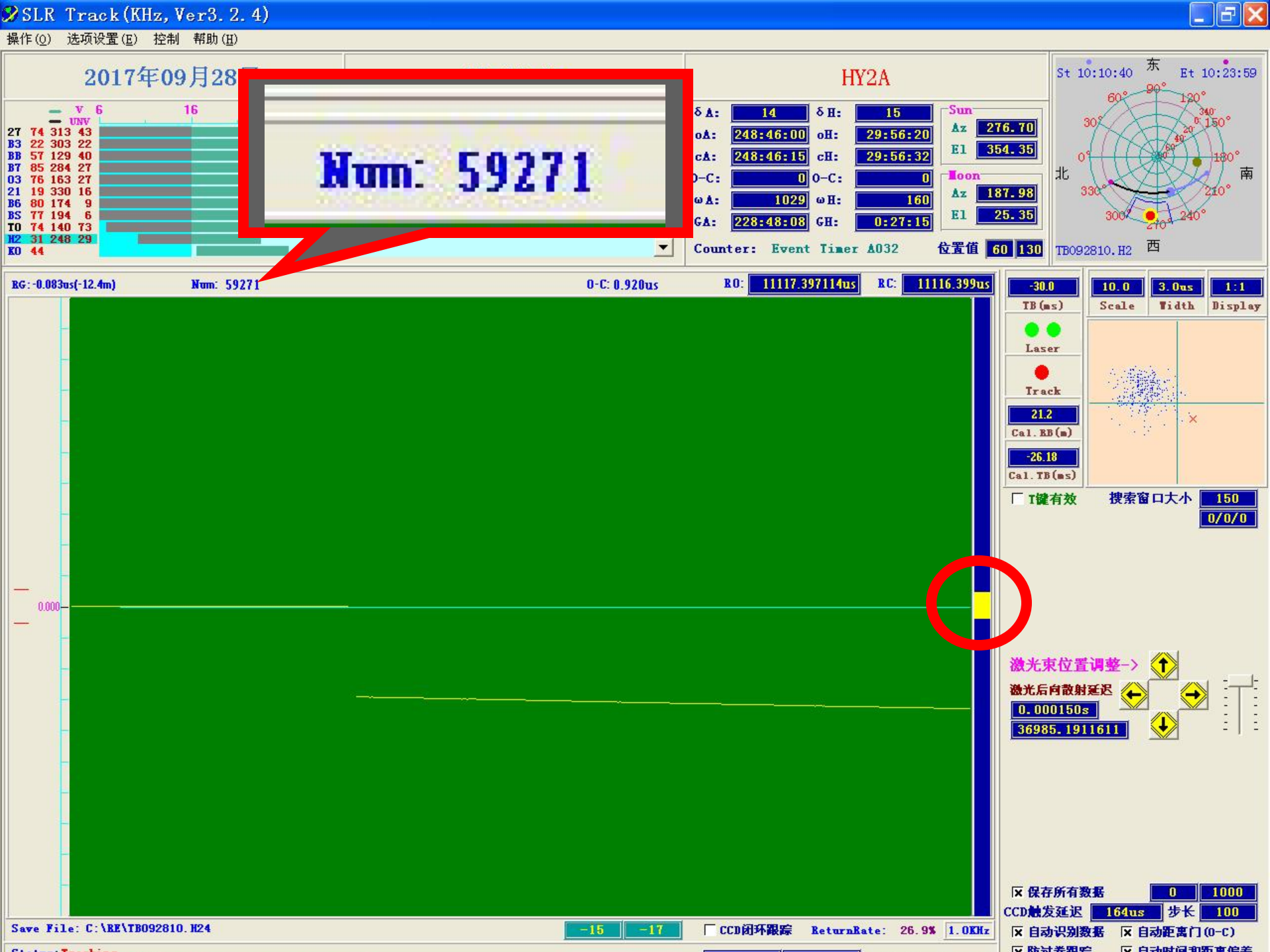




Large FOV
For day

# Real-time data recognition

- Useful in knowing echo number
- Require good prediction
- Mechanism: data points cluster in narrow range interval
- Problem
  - False-alert in heavy noise
  - No-alert for very weak signal
  - Not accurate in number of points


SLR Track(KHz,Ver3.2.4)
操作(O) 选项设置(E) 控制 帮助(H)
2017年09月28
HY2A
Num: 59271
RG:-0.083us(-12.4m)
Num: 59271
O-C: 0.920us
RO: 11117.397114us
RC: 11116.399us
δA: 14
δH: 15
oA: 248:46:00
oH: 29:56:20
cA: 248:46:15
cH: 29:56:32
O-C: 0
O-C: 0
ωA: 1029
ωH: 160
GA: 228:48:08
GH: 0:27:15
Sun
Az 276.70
El 354.35
Moon
Az 187.98
El 25.35
Counter: Event Timer A032
位置值 60 130
St 10:10:40
Et 10:23:59
东
北
南
西
TB092810.H2
-30.0
TB(ms)
10.0
Scale
3.0us
Width
1:1
Display
Laser
Track
21.2
Cal.RB(m)
-26.18
Cal.TB(ms)
T键有效
搜索窗口大小 150
0/0/0
激光束位置调整->
激光后向散射延迟
0.000150s
36985.1911611
保存所有数据 0 1000
CCD触发延迟 164us 步长 100
自动识别数据
自动距离门(O-C)
Save File: C:\RE\TB092810.H24
-15
-17
CCD闭环跟踪
ReturnRate: 26.9%
1.0KHz

# Range-gate following function

- Useful for SPAD and bad prediction
- Require data recognition
- Range-gate follows echo
  - To adapt for rapid changes in range
  - To maintain echo position in range gate
- Solve for real-time TB+RB to compensate rapid change of range offset

SLR Track(KHz,Ver3.2.4)

操作(O) 选项设置(E) 控制 帮助(H)

2017年09月28日 | 10:16:25 | HY2A

St 10:10:40 Et 10:23:59 TB092810.H2

| | | | |
|---|---|---|---|
| δA: | 14 | δH: | 15 |
| αA: | 248:46:00 | αH: | 29:56:20 |
| cA: | 248:46:15 | cH: | 29:56:32 |
| O-C: | 0 | O-C: | 0 |
| ωA: | 1029 | ωH: | 160 |
| GA: | 228:48:08 | GH: | 0:27:15 |

Sun Az 276.70 El 354.35

Moon Az 187.98 El 25.35

Counter: Event Timer A032 位置值 60 130

RG:-0.083us(-12.4m) Num: 59271 O-C:0.920us RO: 11117.397114us RC: 11116.399us

-30.0 TB(ms) | 10.0 Scale | 3.0us Width | 1:1 Display

Laser

21.2 Cal.RB(m)

-26.18 L.TB(m)

T键有效 搜索窗口大小 150

0/0/0

激光束位置调整->

激光后向散射延迟

0.000150s

36985.1911611

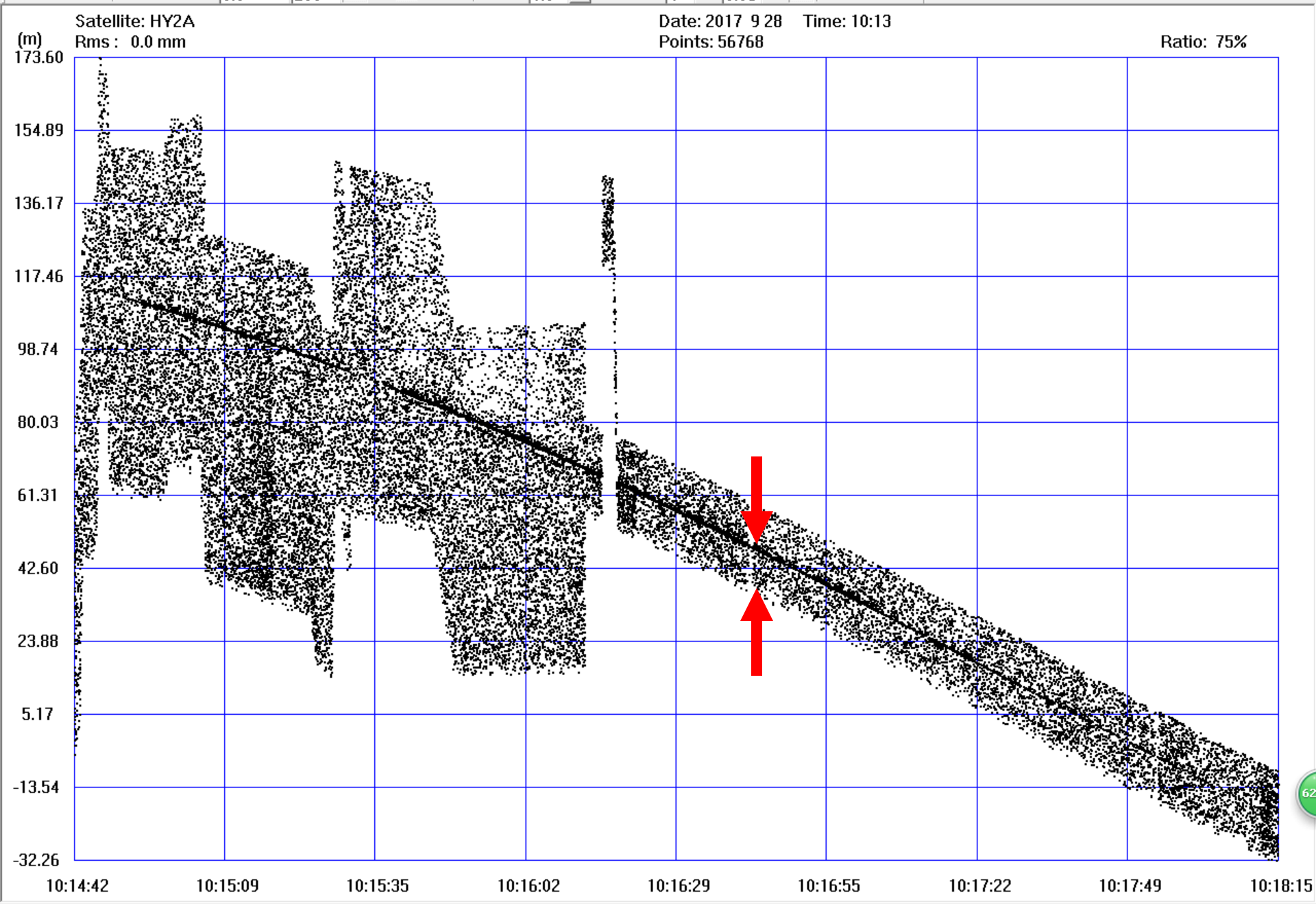
保存所有数据 0 1000

CCD触发延迟 164us 步长 100

自动识别数据 自动距离门(O-C)

Save File: C:\RE\TB092810.H24 -15 -17 CCD闭环跟踪 ReturnRate: 26.9% 1.0KHz

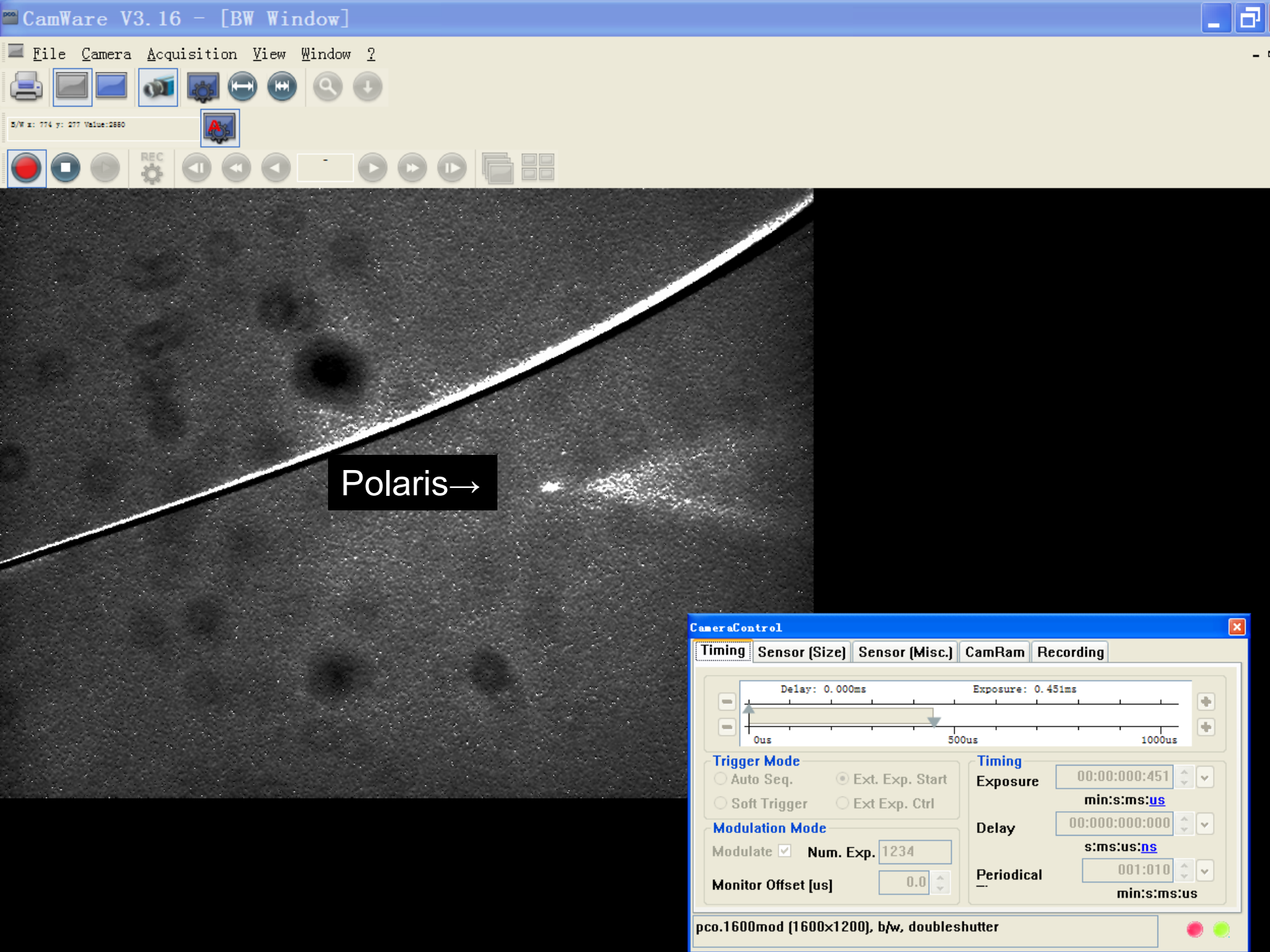
文件(F) 编辑(E) 选项与处理(V) 系统工具 帮助(H)




就绪 File: C:\TR\OUTPUT Time: 10:16:42.1807765 18:35:29

# Daylight laser beam monitoring

- Uses high speed camera and 532nm filter
- Trigger frame snapshot by fire signal
- Accumulate 1000 frames of 50us images
- Final frame rate ~1 fps
- Use Polaris to setup mark point

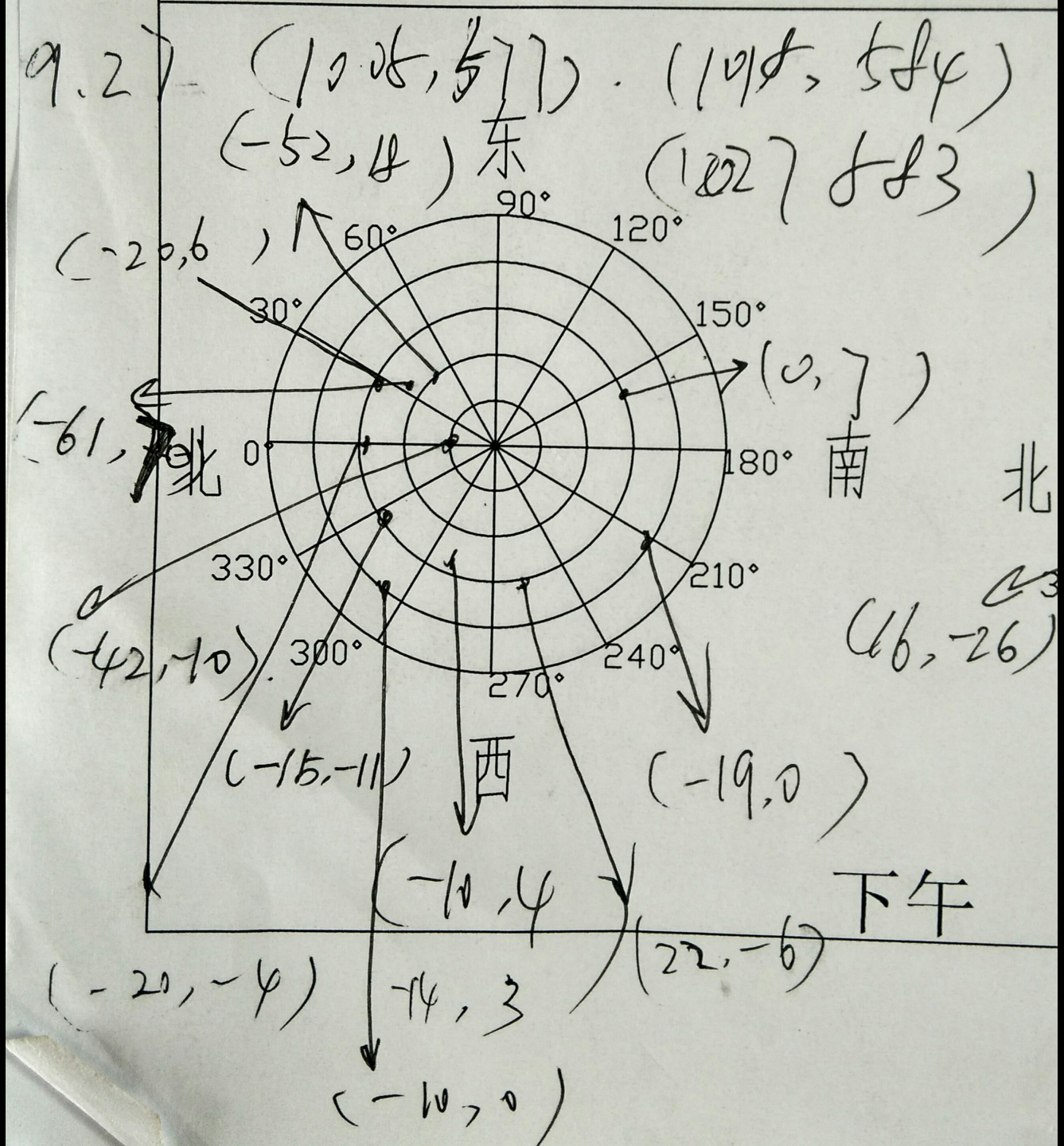

CamWare V3.16 - [BW Window]
File Camera Acquisition View Window ?
Polaris→
CameraControl
Timing
Sensor (Size)
Sensor (Misc.)
CamRam
Recording
Delay: 0.000ms
Exposure: 0.451ms
0us
500us
1000us
Trigger Mode
Auto Seq.
Ext. Exp. Start
Soft Trigger
Ext Exp. Ctrl
Modulation Mode
Modulate
Num. Exp.
1234
Monitor Offset [us]
0.0
Timing
Exposure
00:00:000:451
min:s:ms:us
Delay
00:000:000:000
s:ms:us:ns
Periodical
001:010
min:s:ms:us
pco.1600mod (1600x1200), b/w, doubleshutter

# Daylight pointing improvement

- Useful in daylight operation
- Use ‘good’ satellites as reference:
  - LAGEOS’, startlette/stella, some HEOs
- Require good prediction
  - True(1 arcsec x 1000km = 5m)
- Keep good beam position
  - With beam monitor.

9.27 (1005, 577) · (1018, 584)

(1027 583)



# Daylight pointing improvement

- Useful in daylight operation
- Use ‘good’ satellites: lageos’, startlette/stella, HEOs
- Require good prediction
- Keep good beam position
  - With beam monitor.
- Implementation: offset matrix
- Problem: lack data on sun-lit part of sky

# Thank you!

Paldies

谢谢