

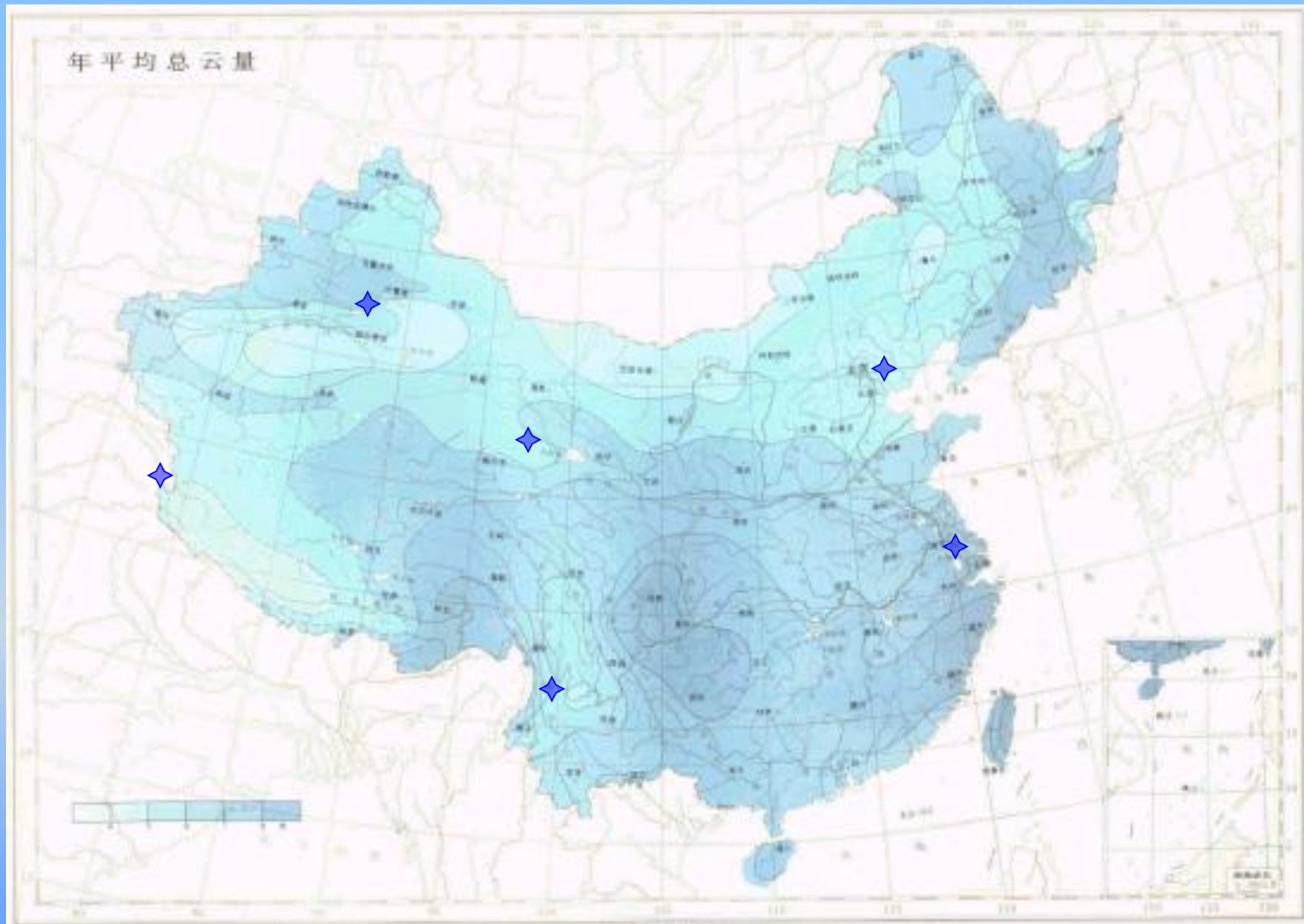


The Telescopes and Activities on Exoplanet Detection in China

ZHOU Xu

National Astronomical Observatories

Cloudage



Xinglong Station of National Astronomical Observatories

- Altitude : ~ 900M;
- Weather : 220 clear nights; 100 photometric nights.
- Distance to Beijing : 150km , 2 hours by car;
- Number of the telescopes : 9

The first director of Beijing Observatory, CHENG Maolin,
in Xinglong for site testing in 1965



Xinglong Station in Construction in 1966



Xinglong Station in 2000



Xinglong Station in 2007



2.16M Telescope



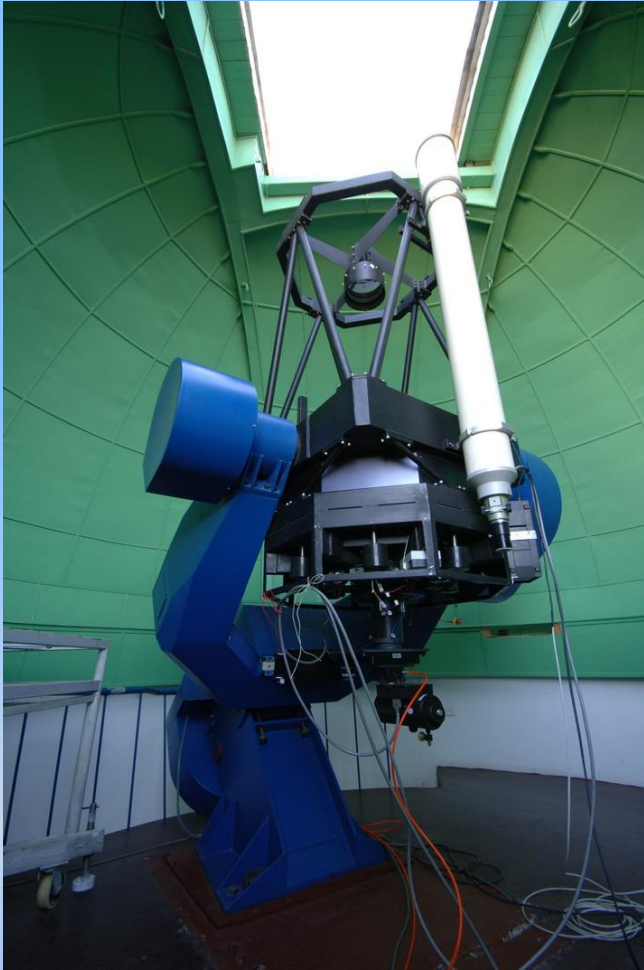
Cassegrain focus $f/9$

Coude focus $f/45$

First light in 1989



80CM Telescope



**Long period
variation**

85CM Telescope



**Short period
Variation**

BATC photometric system

温度显示
亮度旋钮

CCD温度显示
高压指示灯
CCD高电开关
低压指示灯
电源开关
CCD 控制器电源

CCD 控制器

前置放大器

快门

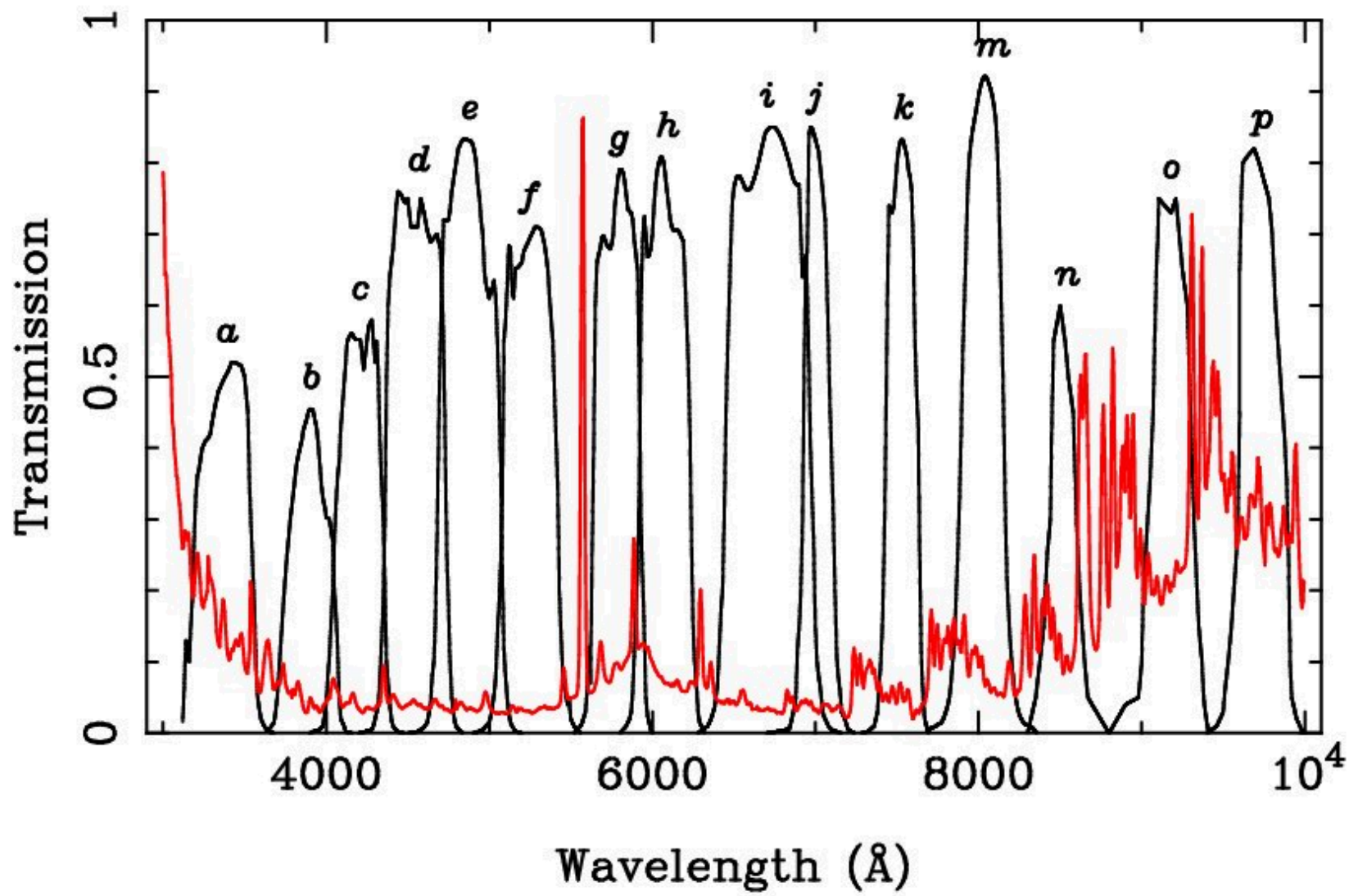
杜瓦瓶

CCD腔

Telescope: 60/90 cm f/3 Schmidt
CCD: E2V 4096x4096
Blue sensitive 12um/pixel
Filters: 15 intermediate bands
The field of view: $94 \times 94 \text{ arcmin}^2$

望远镜及CCD控制系统

2002 7 31

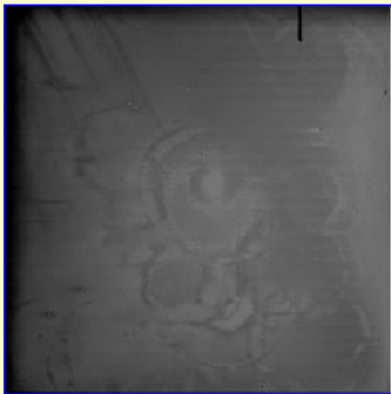


SDSS filters (u, g, r, i, z)



BATC Observation Status Viewer

Beijing Time 11:57:26 AM, Dec 16, 2004

Present Task		The Latest Image	
Image Number	067		
Field Name	UV02		
Object	NGC1663		
RA. & DEC. (J2000.0)	04:49:24.30 +13:08:25		
Filter	6660 A [<i>I</i> -band]		
Exposure time	120 (s)		
Image Size	2048 × 2048		
Telescope Status <small>[net job denied]</small>		Object	flat k 7490A
Local Time	24:26:48.5	Exposure Time	35 (s)
Local Sidereal Time	05:55:46.5	Start Time	11:06:04.0
Hour-Angle	23:35:10.2	End Time	11:06:34.0
RA. & DEC. of telescope	06:20:36.3 +30:00:00.	NAXIS1	2080
Dome Postion	0103	NAXIS2	2048
Current Filter	_____	Reading speed	slow
CCD temperature	-126 c°		

[BATC observation Status Viewer v 2.0](#)
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We participate the 1st and 3rd observation of Tr37 in August and September of 2010. There 10 nights successful observation obtained about 81Gb of image data with exposure time of 10s in R band.



Current Status and Future Prospects of Exoplanet Search at Xinglong

Gang ZHAO

趙剛

National Astronomical Observatories
Chinese Academy of Sciences

East-Asian Planet Search Network (EAPSNET)

- Okayama 1.88m tel., Japan
 - ☐ 300 GK giants ($V < 6$), since 2001
 - ☐ 10 planets and 1 brown dwarf
- Xinglong 2.16m tel. & Okayama
 - ☐ 100 GK giants ($V \sim 6$), since 2005
 - ☐ (1 planet and 1 brown dwarf)
- Bohyunsan 1.8m tel. & Okayama
 - ☐ 140 GK giants ($V < 6.5$), since 2005
 - ☐ 1 brown dwarf
- Subaru 8.2m tel., Japan & EAPSNET
 - ☐ >200 GK giants ($6.5 < V < 7$), since 2006
 - ☐ Several candidates
- TUBITAK 1.5m tel., Turkey
 - ☐ 50 GK giants ($V \sim 6.5$), since 2008



Goal:
~100 planets
from 1000 stars

EAPS-NET - China

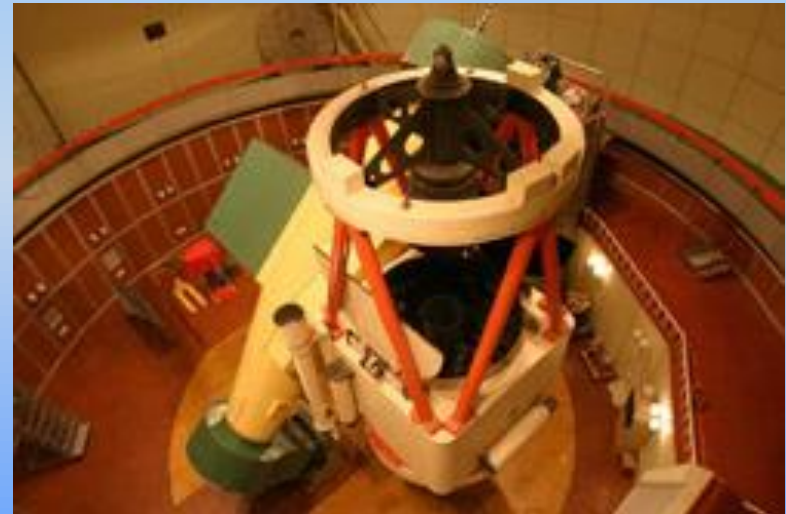
Since 2005

2.16m with I_2

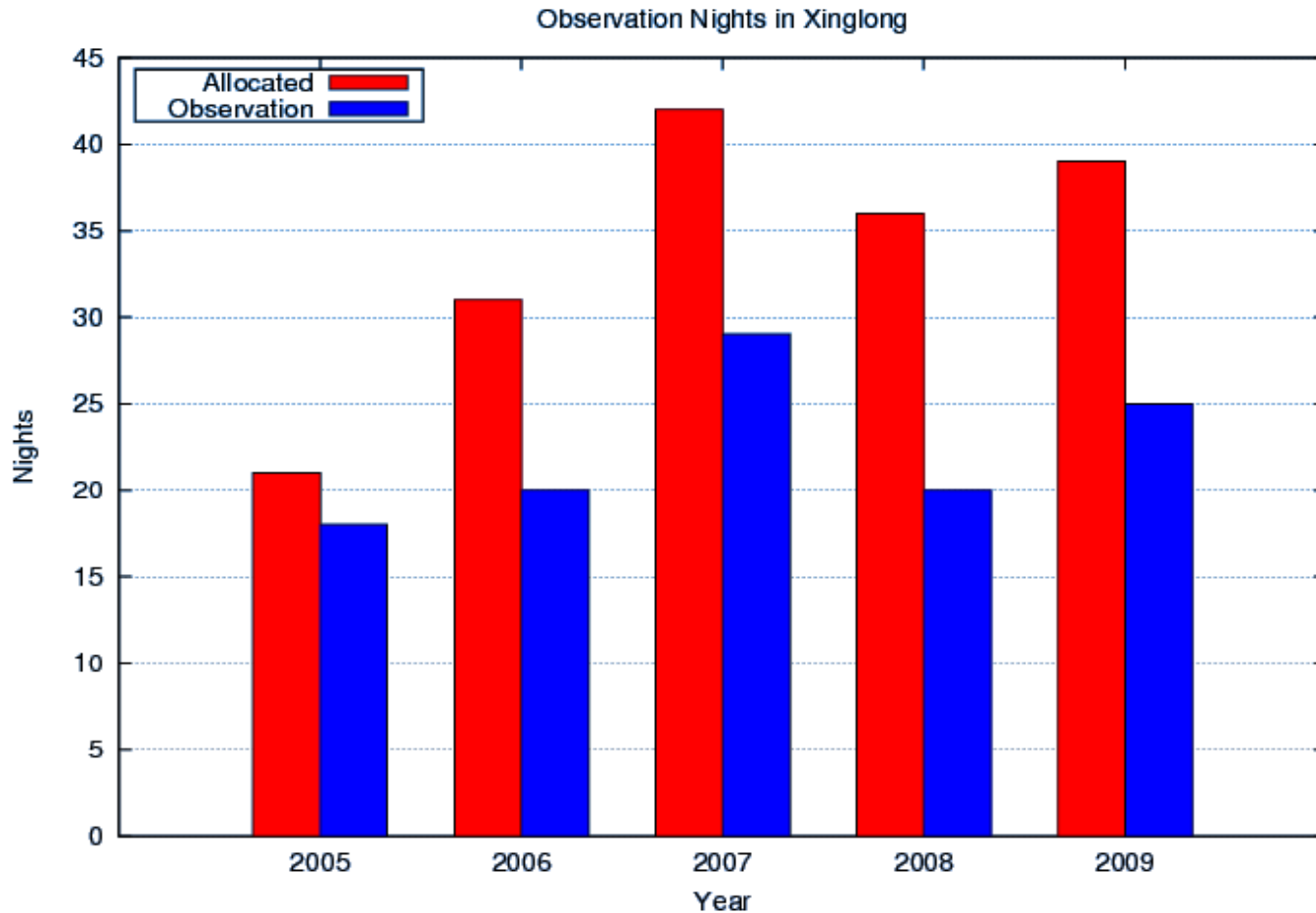
V ~ 6^m late giants

R ~ 40000

100 targets

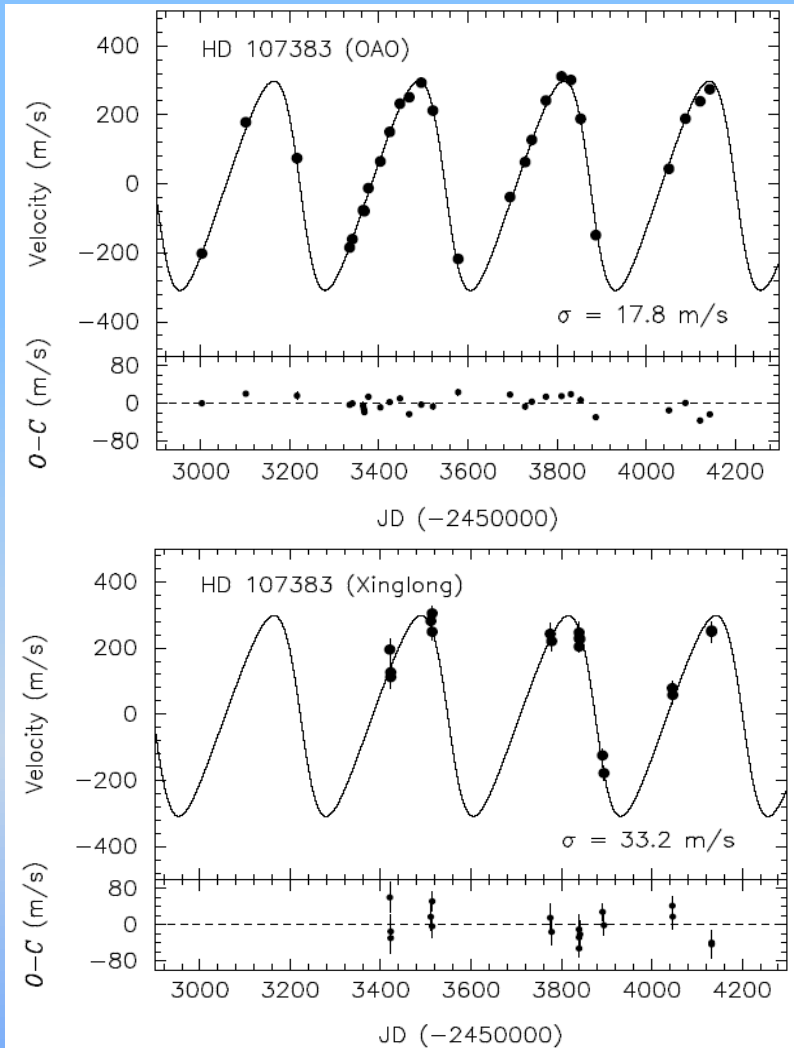


Observable Nights on Planet Search Project

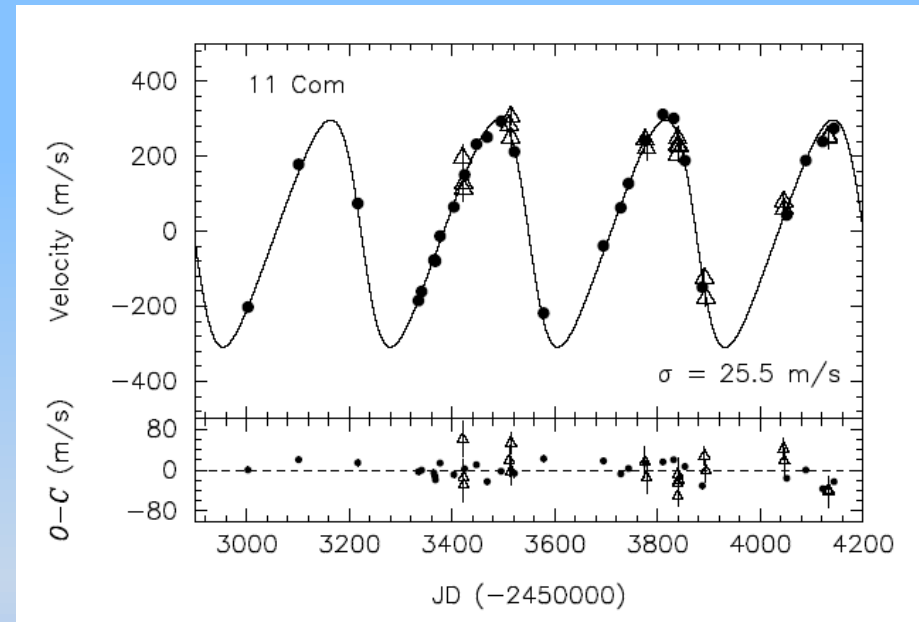


39 nights were allocated in 2010

The first result of the China-Japan joint planet search project



28 points, 3 years



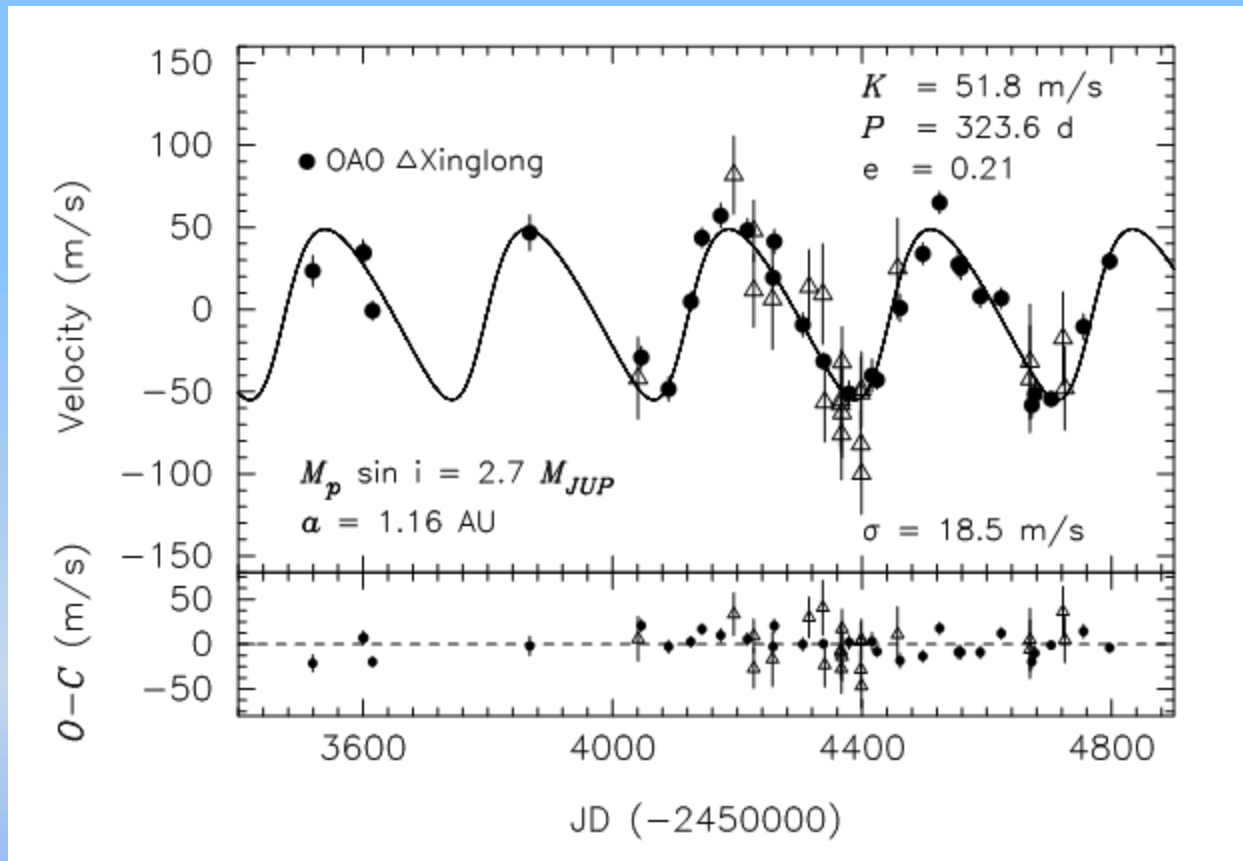
18 points, 2 years



Liu et al. ApJ, 2008, 672,553

The third brown dwarfs around intermediate mass stars

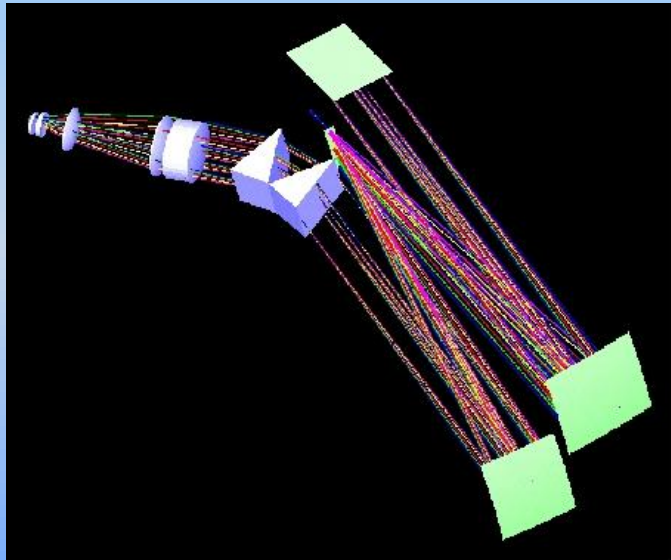
One planet around HD173416



New Spectrograph for 2.16m

Thanks to NIAOT colleagues, a new spectrograph has been installed on Xinglong 2.16m telescope this month.

- Fiber feed (2 fibers, 2.4"/1.6")
- R: 32,000~115,000/48,000~115,000
- 4k x 4k CCD. Full optical band coverage (370-1050nm)
- Thermal & vibration control

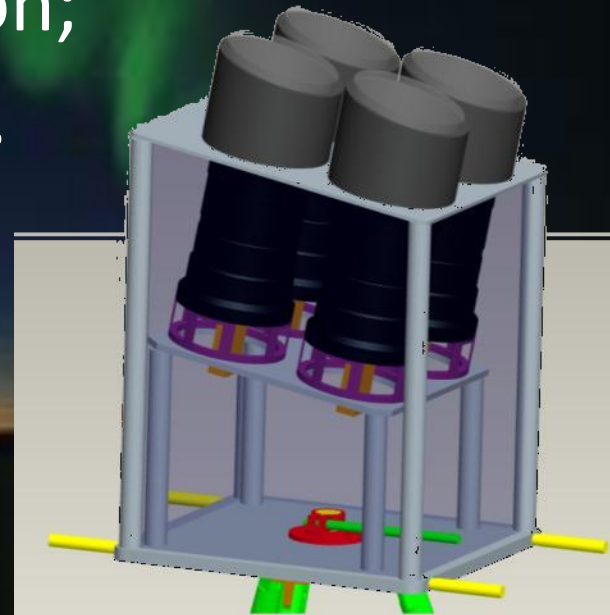


Chinese Antarctic Astronomy in Dome A



Chinese Small Telescope Array CSTAR

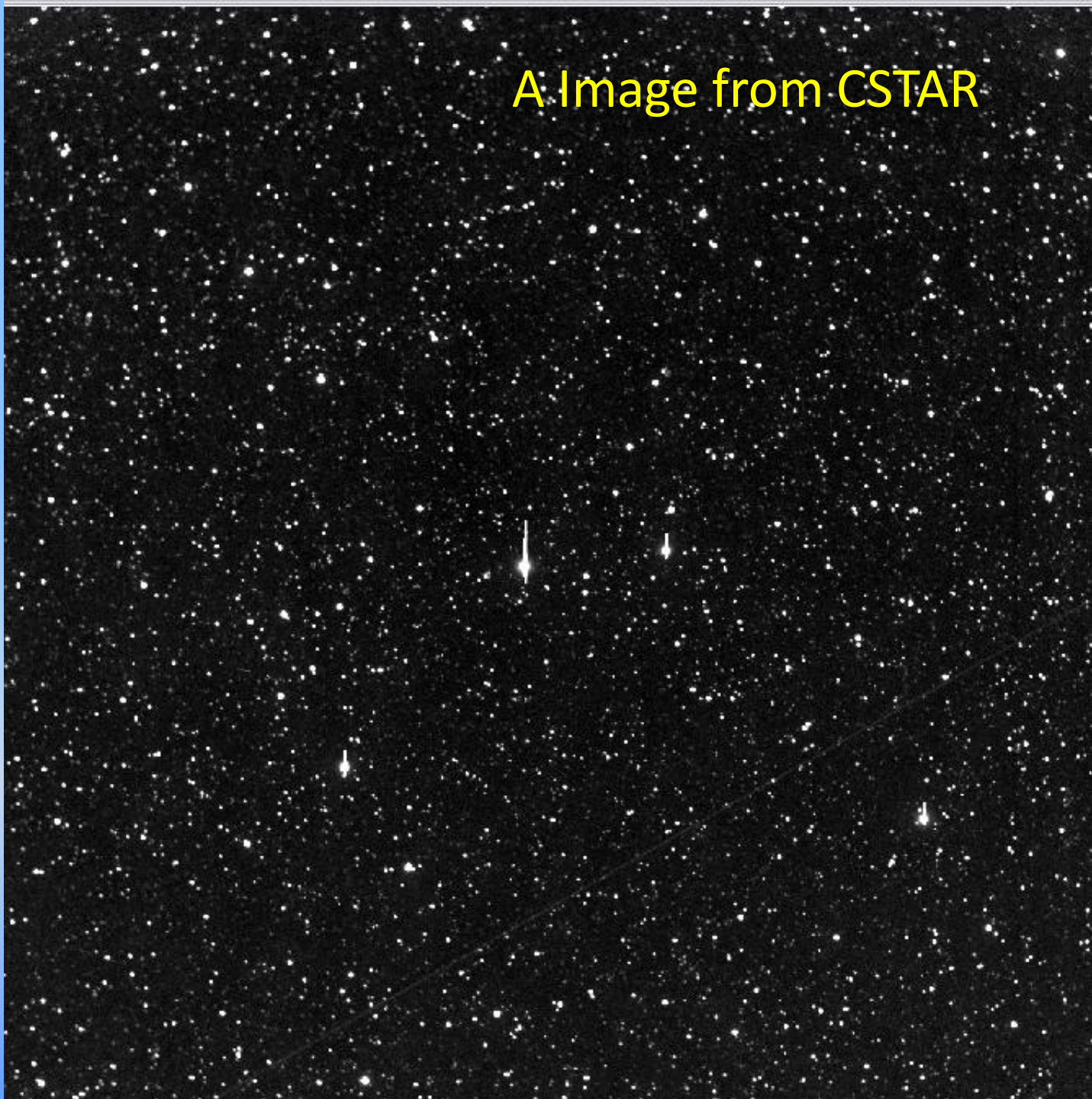
- 4 15cm small telescopes, 1Kx1K CCD, 20 square degrees view, in South Pole area;
- SDSS g, r, i filter s for 3 telescopes and one open;
- 4 monthes continue observation;
- Exposure time 20 – 30 second.



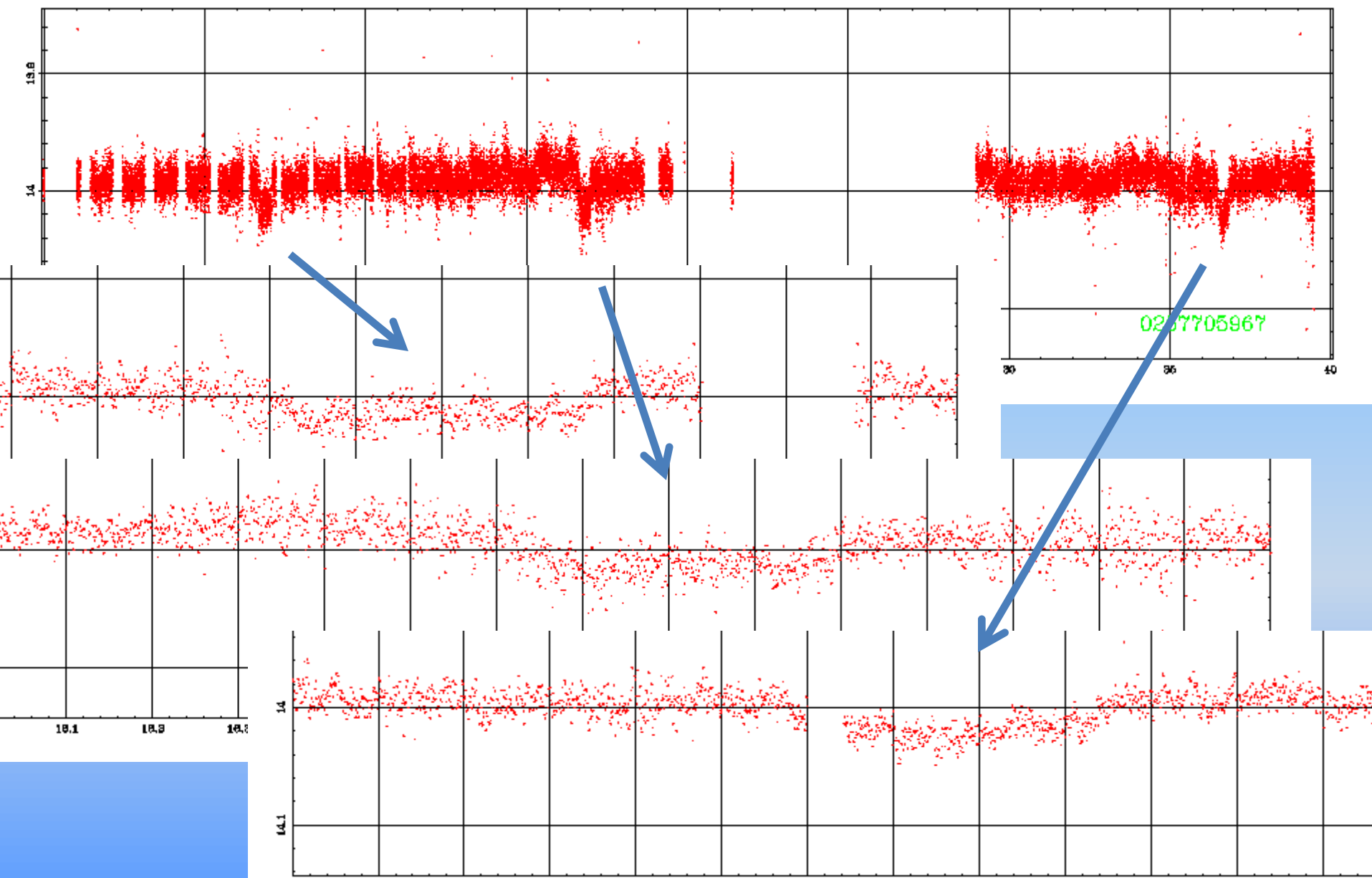
CSTAR



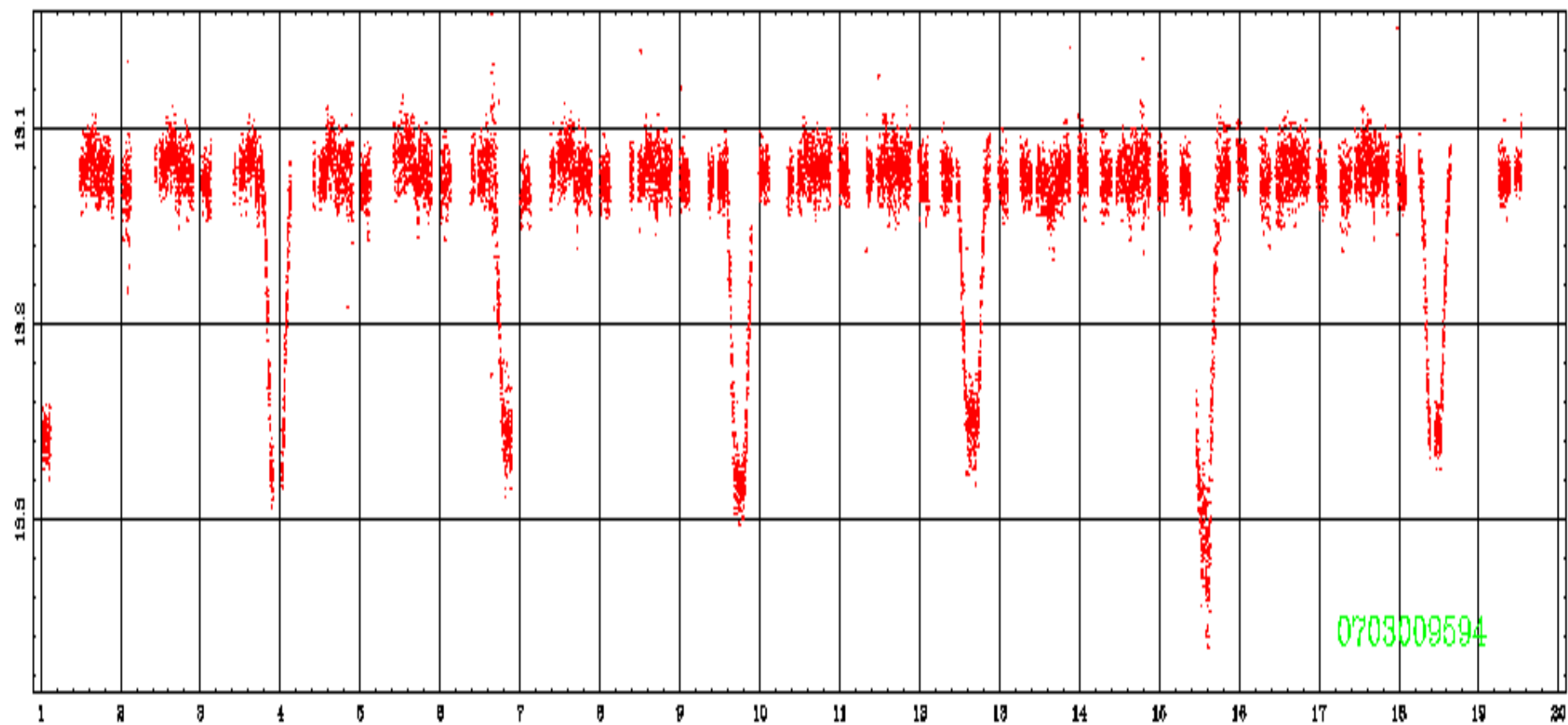
A Image from CSTAR

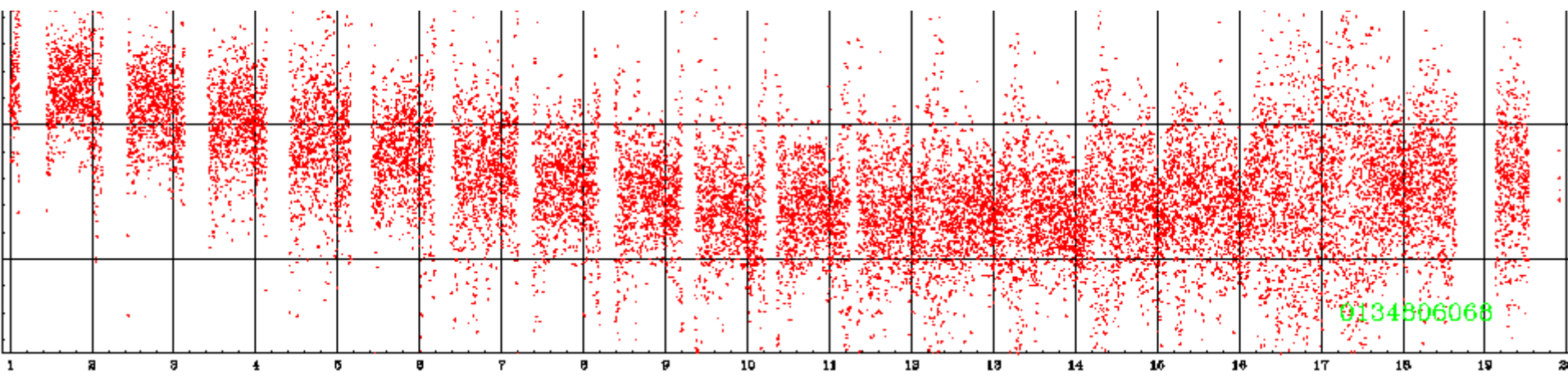
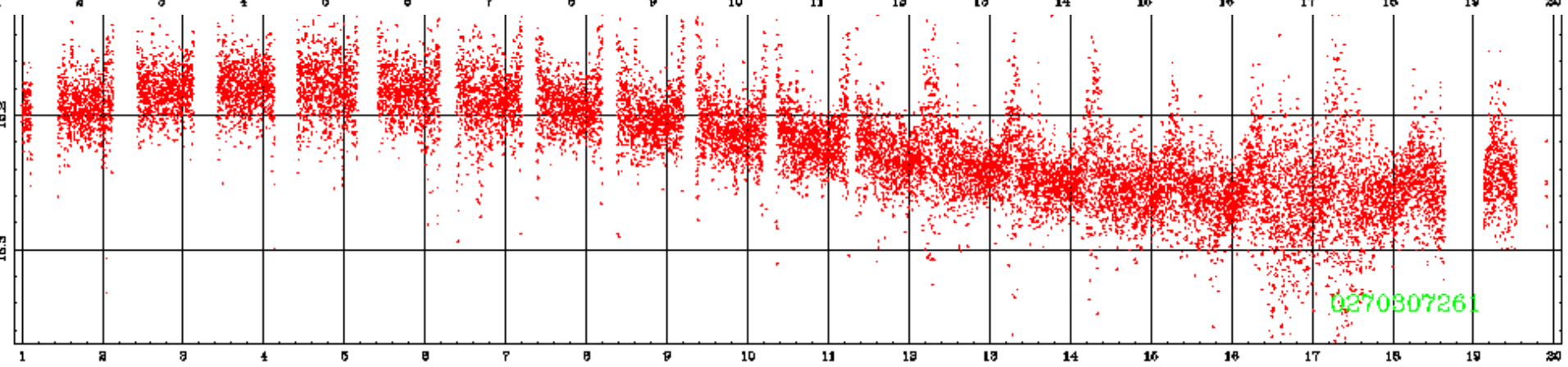
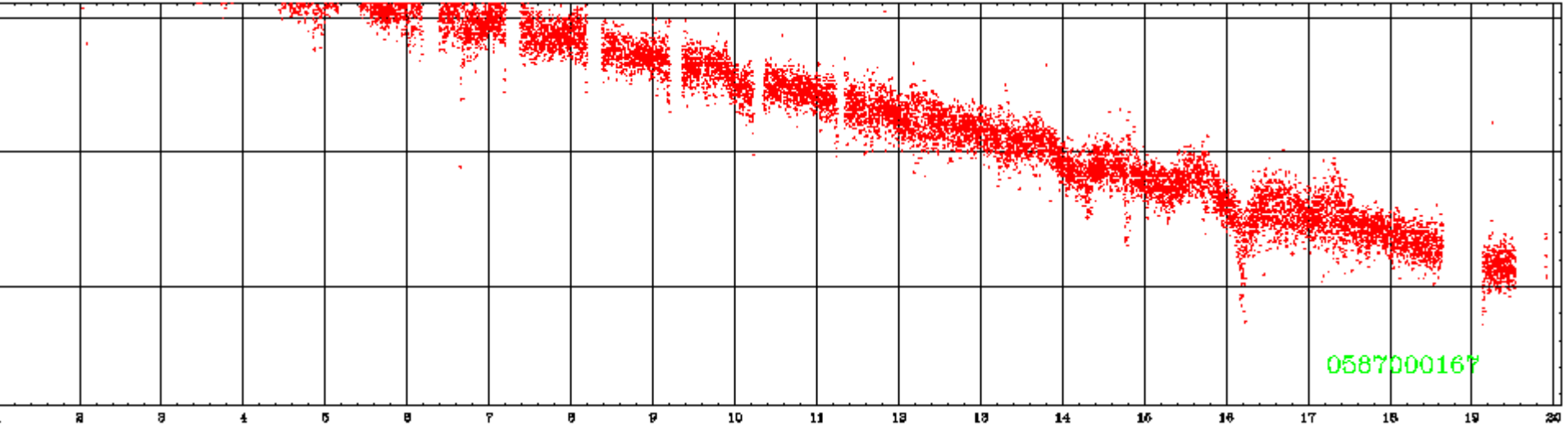


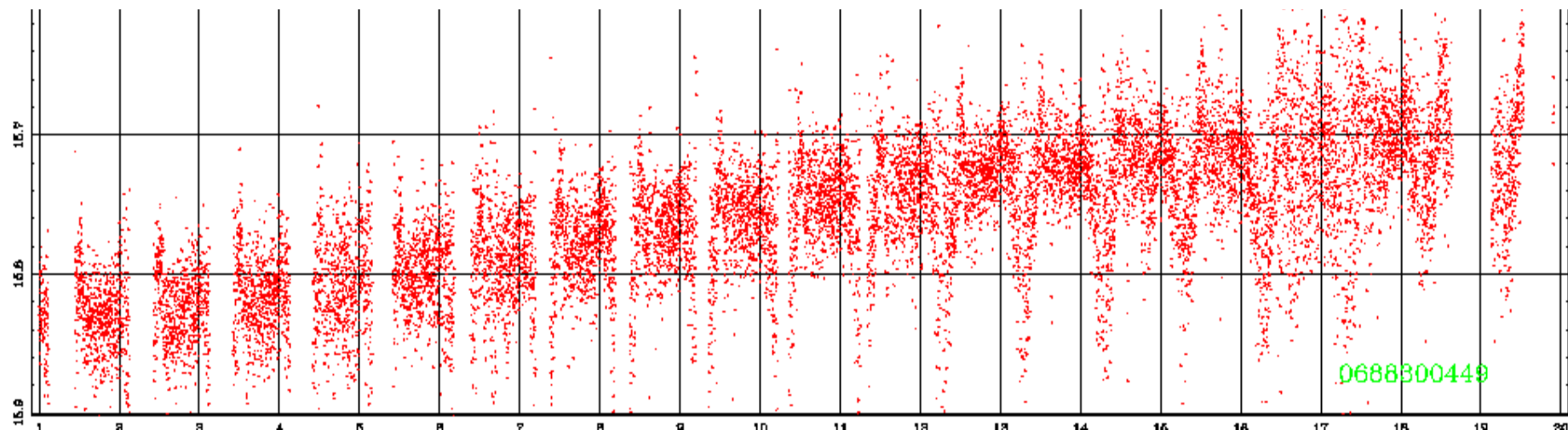
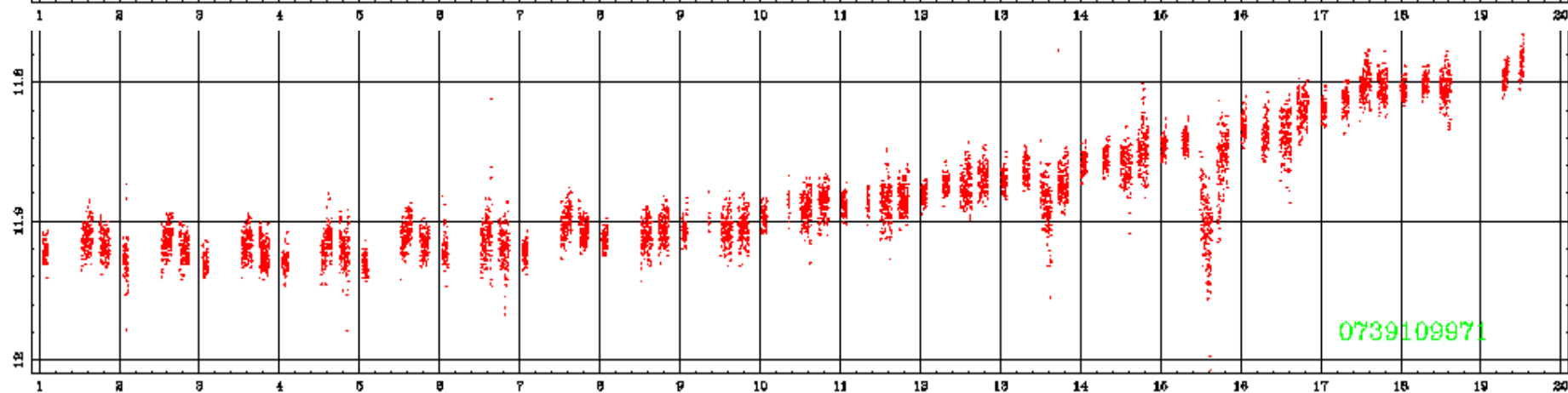
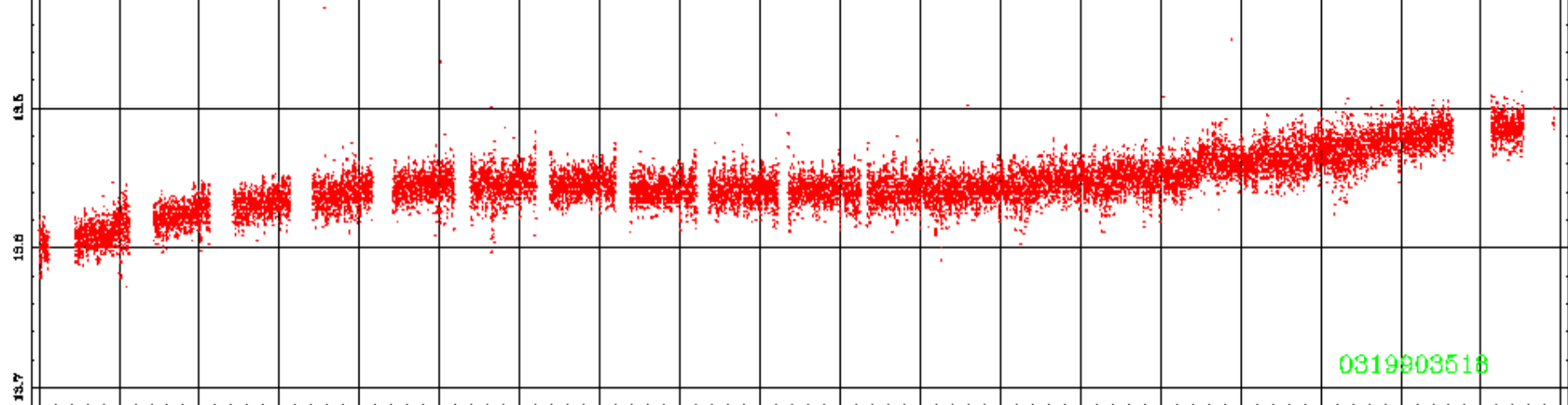
An Extra Solar Planet ?

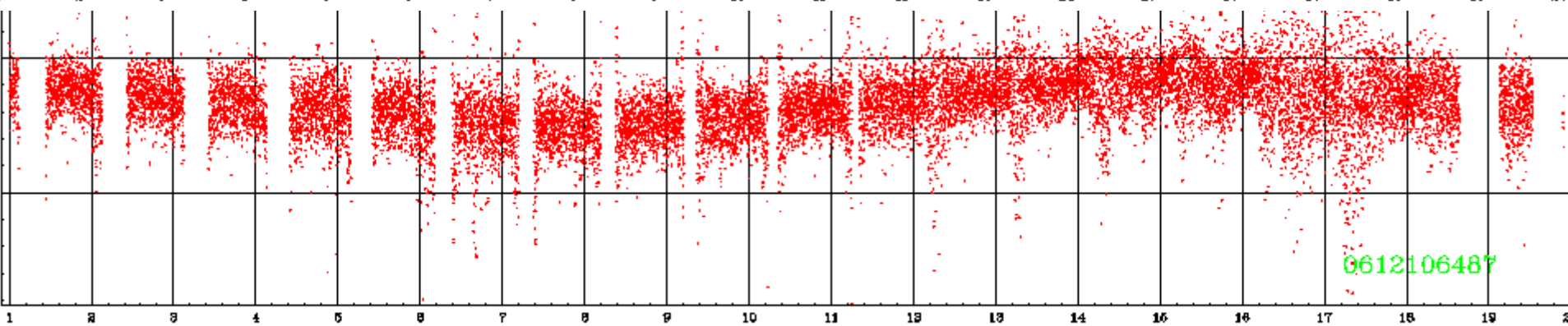
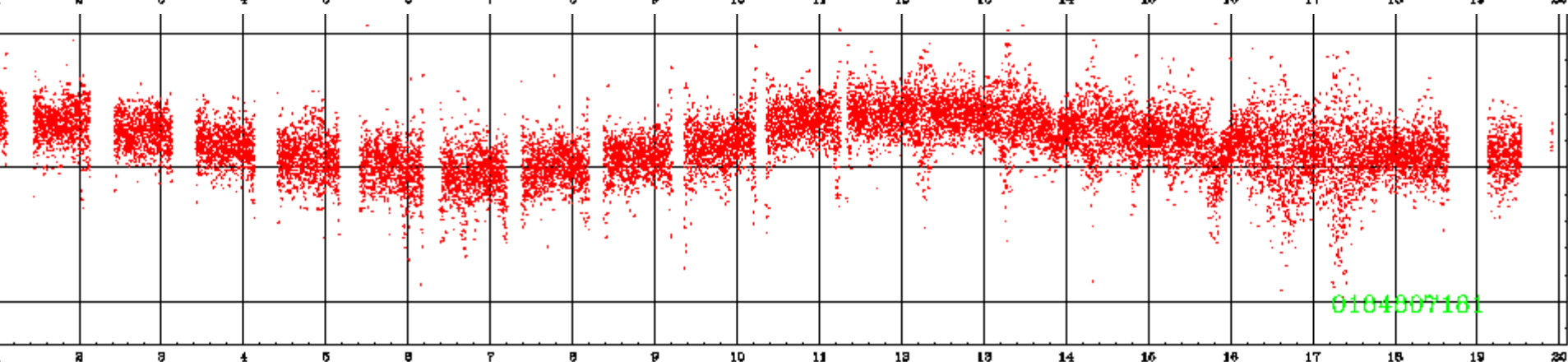
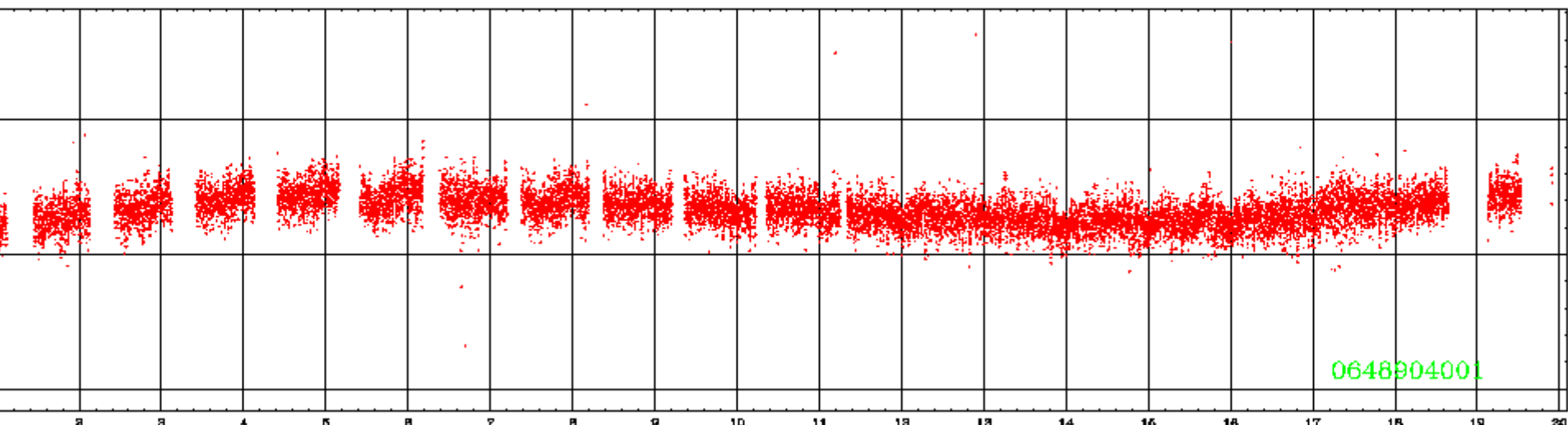


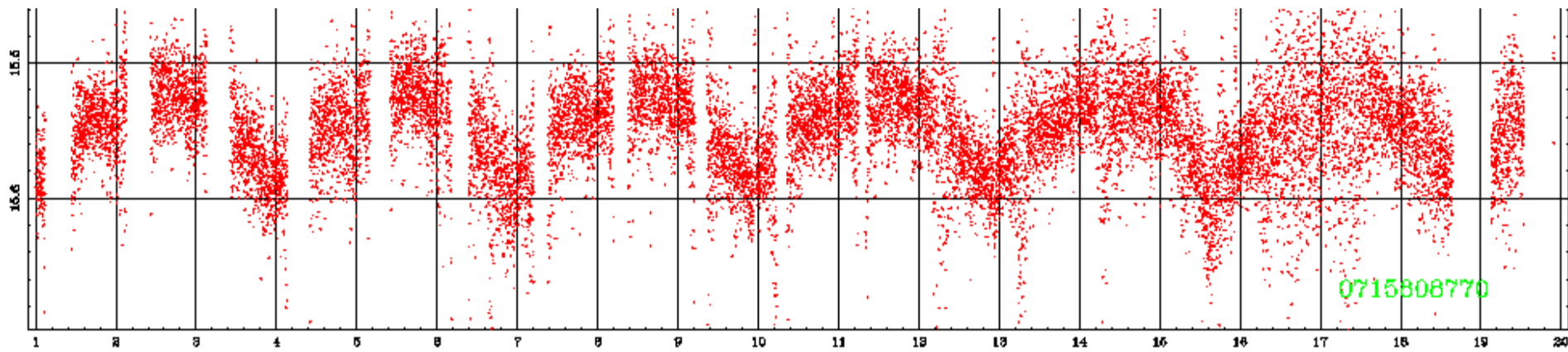
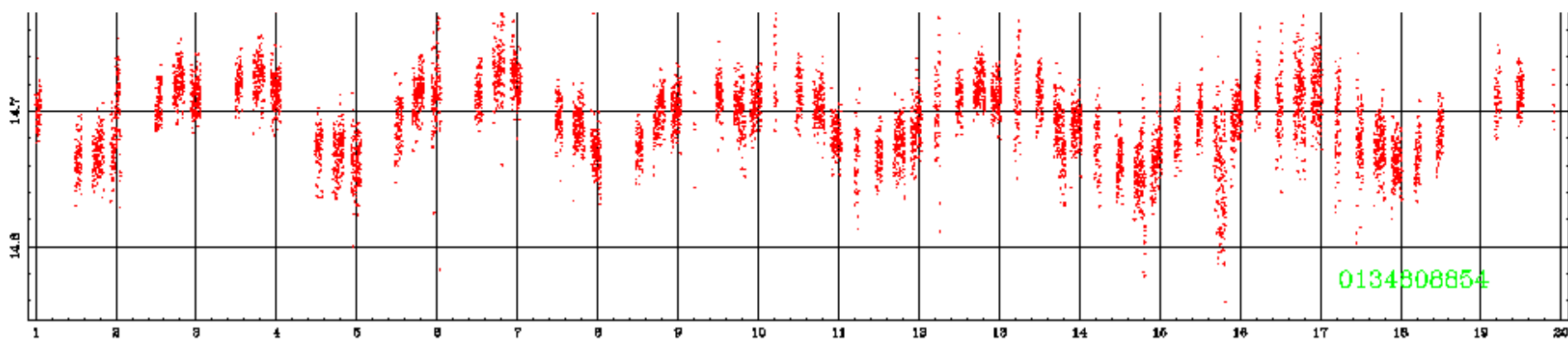
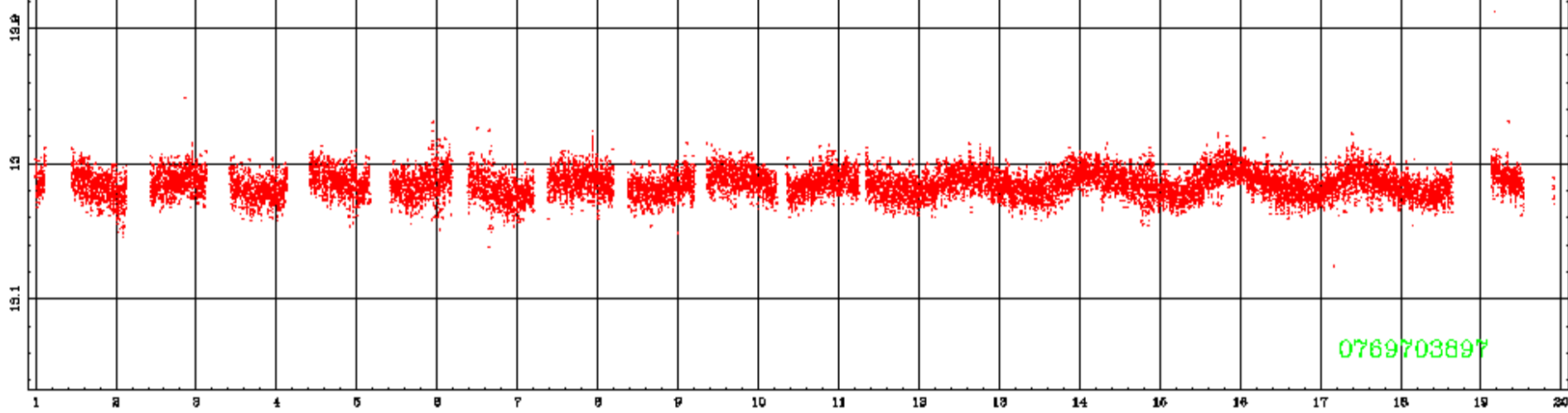
A Binary !











LiJiang Exoplanet Tracker (LiJET)

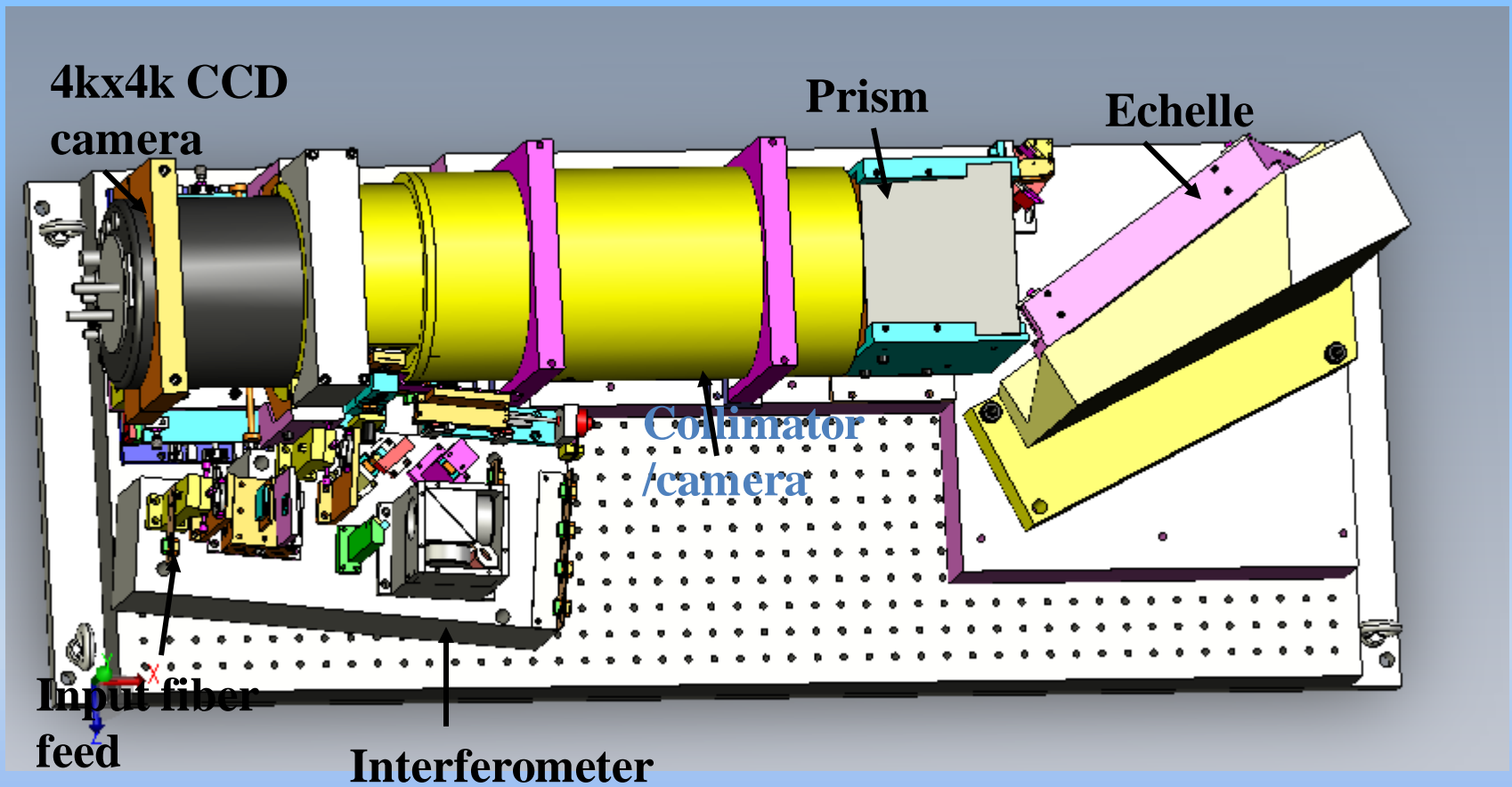
WANG Tinggui

consortium: University of Science and Technology of China (USTC),
Yunnan Astronomical Observatory (YNAO), Nanjing University
(NJU), University of Florida (UF)

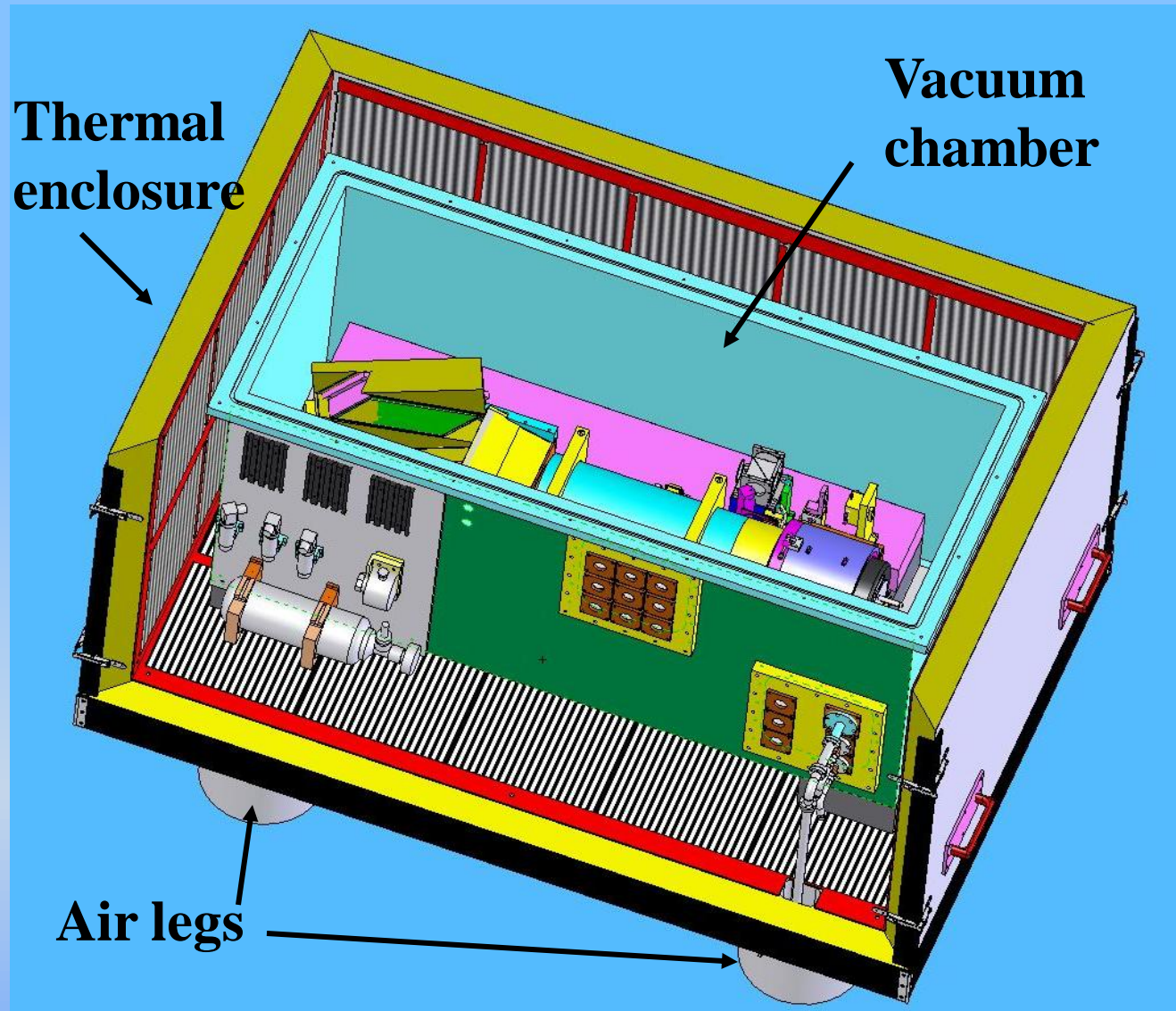


LiJiang TTL 2.4m robotic telescope

Final Mechanical Layout of LiJET



LiJET inside an Airtight Chamber in a Thermal Enclosure



- The thermal enclosure dimension: 69" x 45" x 39.9".
- Thermal stability, ~1 mK over a short time and ~3mK over a long time

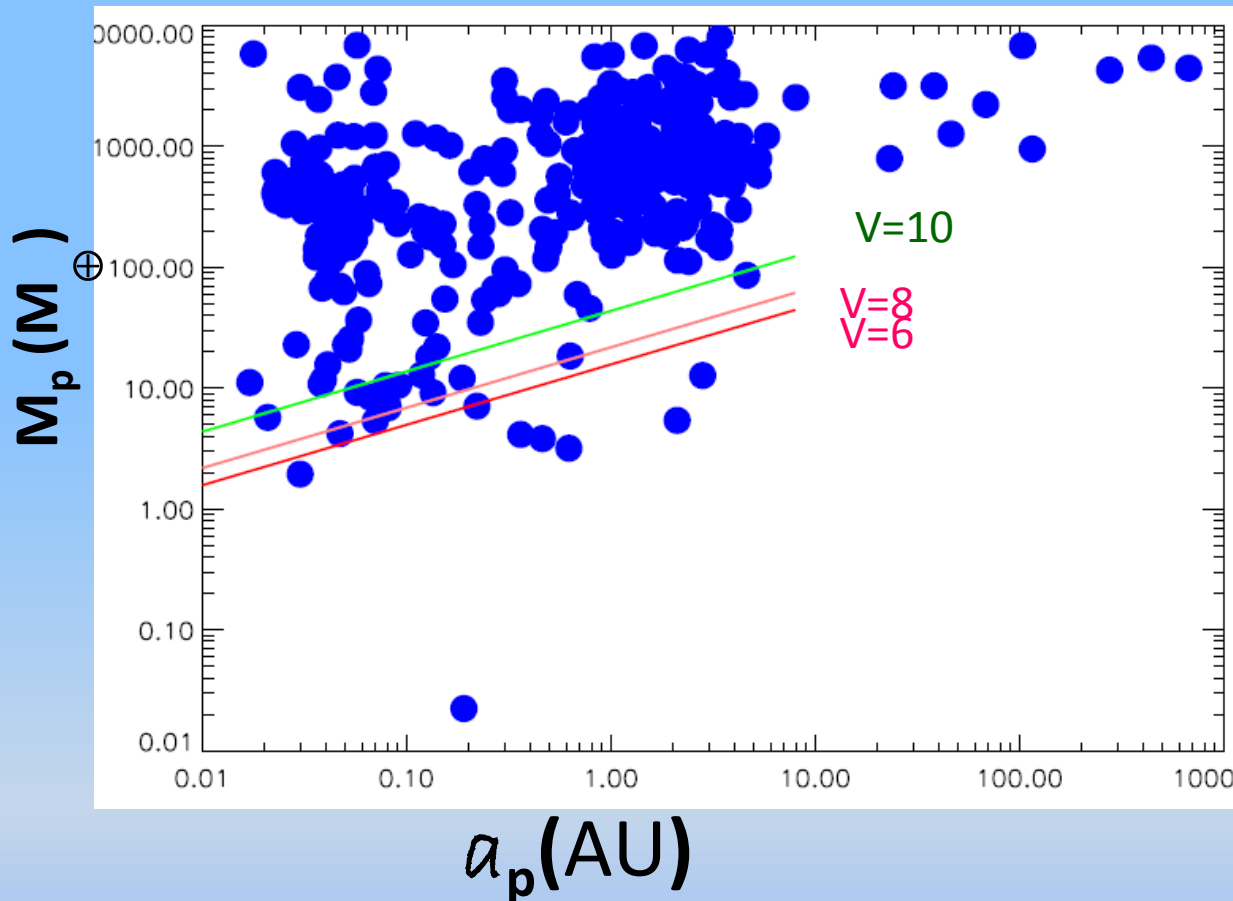
LiJET Design Parameters

Name	RV Mode	Direct Echelle
Fiber core diameter	72 μm	50 μm
Fiber input focal ratio	<i>f/4</i>	<i>same</i>
Image size on sky (arcsec)	1.55	1.07
Fiber output focal ratio	<i>f/4</i>	<i>same</i>
Collimator beam diameter	80 mm	80 mm
Camera focal ratio	<i>f/4</i>	<i>same</i>
Wavelength coverage	390-700 nm	390-1000 nm
Main disperser	87 l/mm R2 echelle	<i>same</i>
Cross-disperser	45 degree PBM2Y prism	<i>same</i>
Resolution elements	4.8 pixels	3.3 pixels
Spectral resolution	18,000	27,000
CCD detector	4kx4k with 15 μm pixels	<i>same</i>

Throughput

Telescope	81%(primary and secondary)
Fiber feed	60%
Interferometer	66%(double output including lenses and folders)
Slit	95%
Collimator	94% (4 lenses and 6 surfaces)
Echelle efficiency	75%
Camera	85% (8 lenses, 14 surfaces)
Total throughput	18%

RV sensitivity for planet search



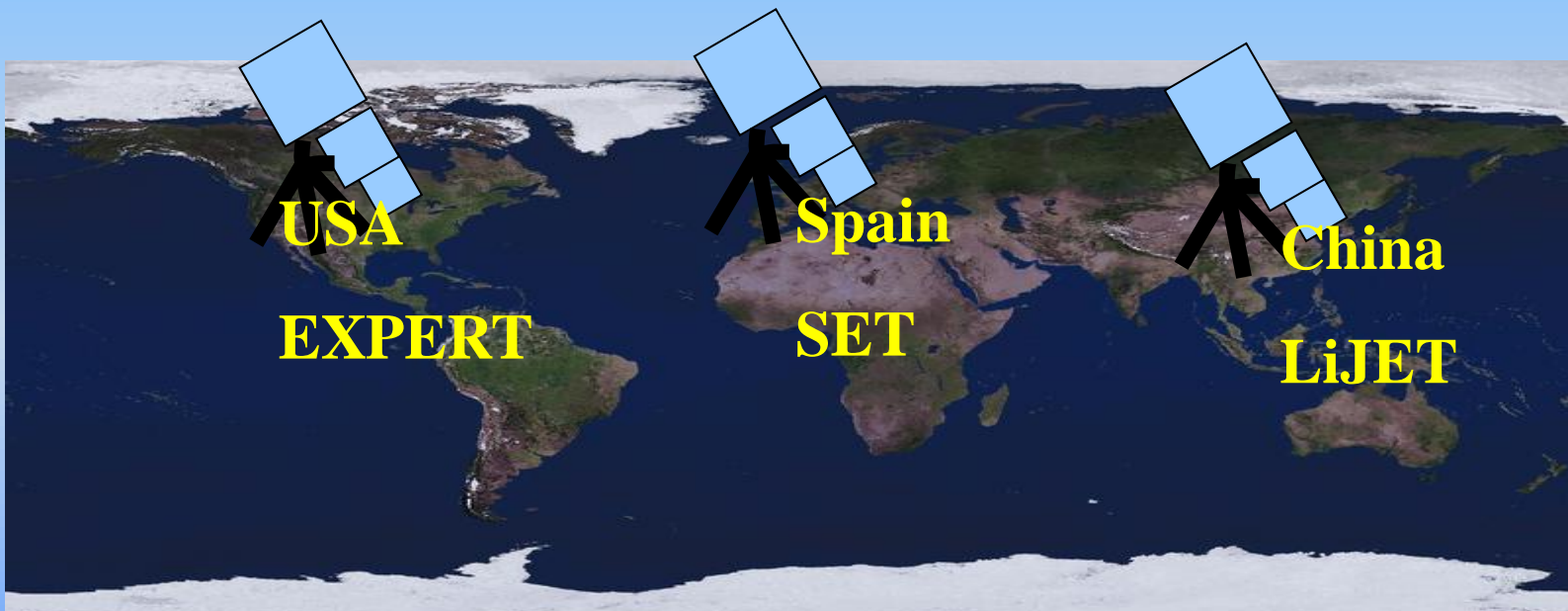
LiJET planet-detection sensitivity for 15 min exposures, total 60 observations in 3 years;

Short period Super-earth/Neptune planets in bright stars;

Jupiter-like planets for stars with $V=12$

Schedule

- Instrument Commissioning: Dec 2010
- Science verification: Jan-July 2011
- Science observation: Oct. 2011 ---



Summery

- There are many small telescopes can be used for Exoplanet observation by proposal;
- There exist some project about Exoplanet observation;
- We are interest in multi-site observation of Exoplanet in cooperation .

THANKS!