

# **KMTNet - Next-generation Planetary Microlensing Experiment**



Chungbuk Natl. University

Cheongho Han

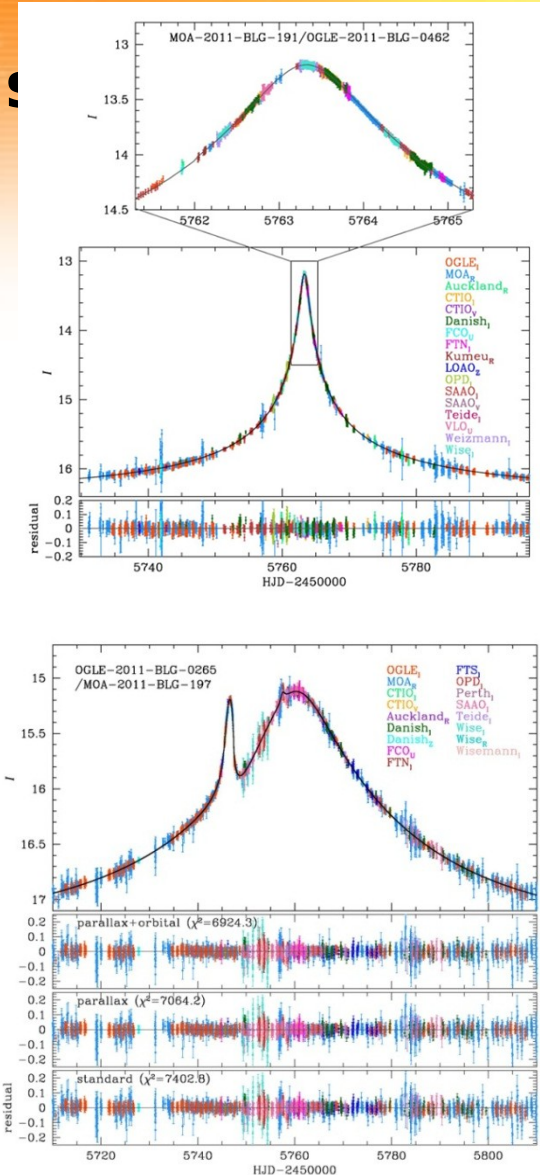
# Microlensing Planetary Signals

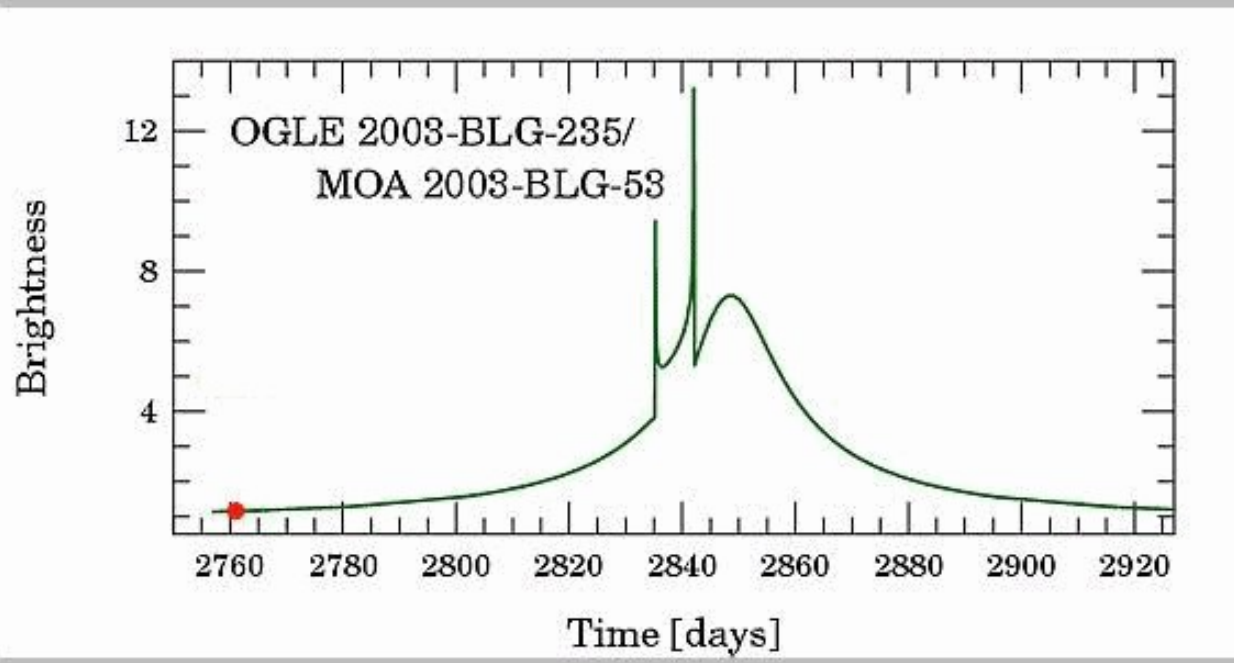
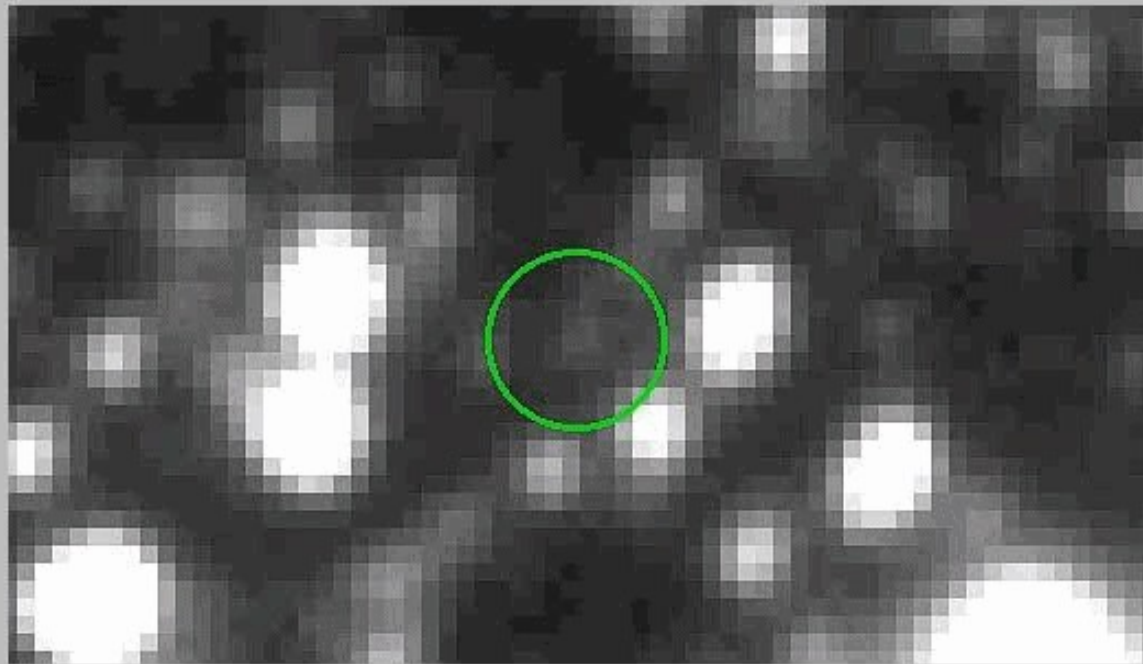
## Single lensing

- Symmetric with respect to  $t_0$
- Smooth variation
- Peak magnification depends on  $u_0$

## Planetary lensing

- Short-term perturbation
- Duration: a few days for a giant planet, a few hours for an Earth-mass planet





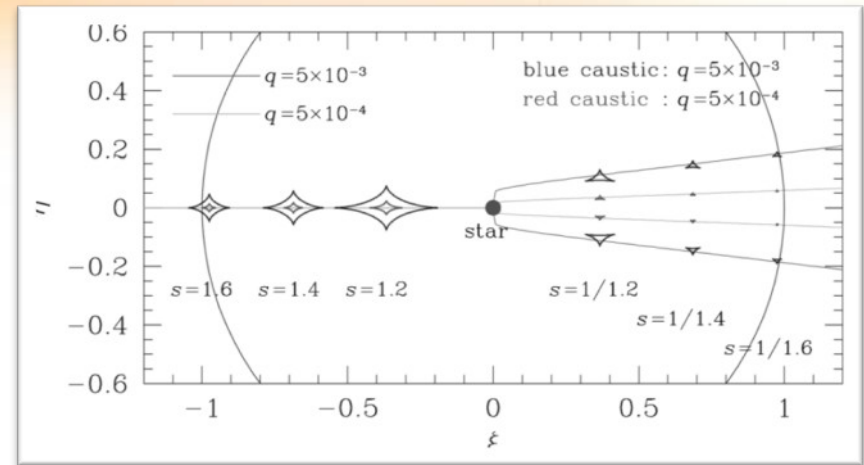
# Types of Planetary Signals

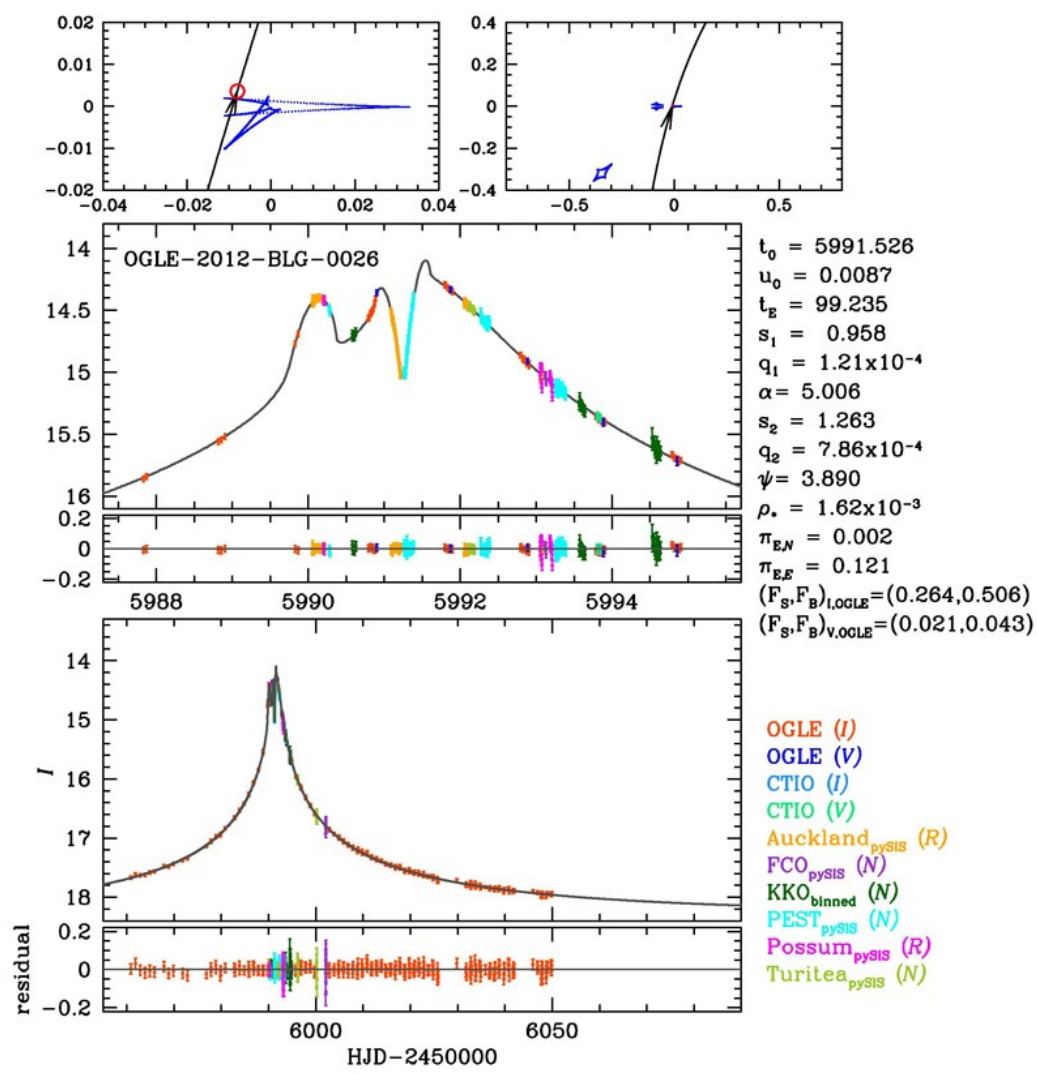
## Planetary caustic

- Bigger → longer duration
- It occurs at any part of the light curve → unpredictable

## Central caustic

- Smaller → shorter duration
- It occurs near the peak of a high-magnification ( $A > 100$ ) events → predictable, bright at the time of the perturbation
- Good target for small telescopes (uFUN)





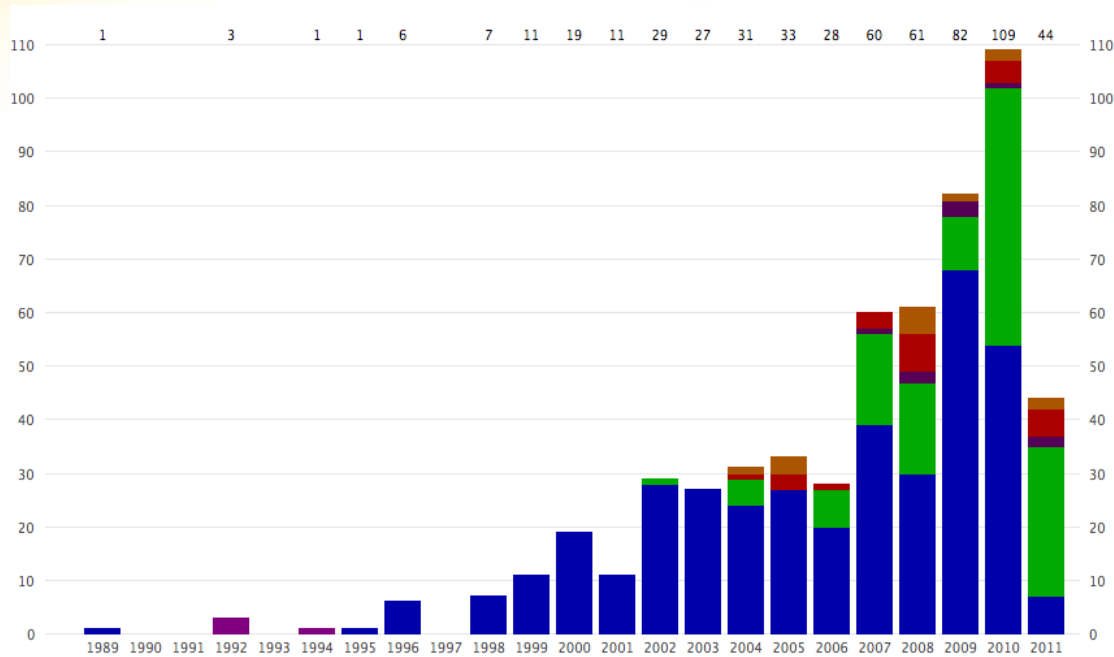
# Next-generation Experiments

## Requirements for Improvement

- **Continuous, high-cadence, high-quality** monitoring
  - **Continuous** observation to pick up unpredictable perturbations caused by planetary caustics → large increase in planet detection rate
  - **high-cadence** monitoring → to pick up shorter perturbations caused by Earth-mass planets
  - **high-quality** photometry → to pick up planetary events involved with faint stars.\*
- finite-source effect erases signals of low-mass planets.

# Exoplanet Discovery

- more than ~1,000 planets
- < 20 microlensing planets
- We need an order higher detection rate for competition



Microlensing:  
brown

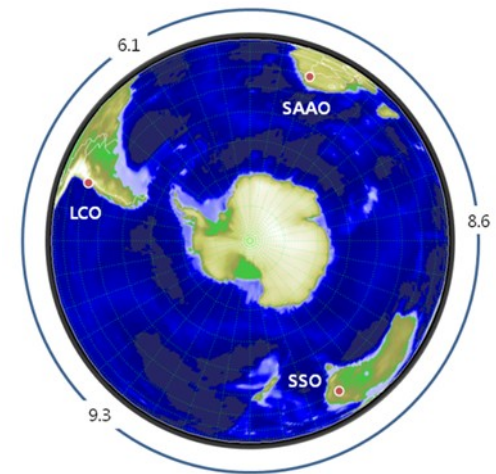
# KMTNet (Korea Microlensing Telescope) Project

## (1) **Wide field & large-format CCD camera**

- 2x2 deg<sup>2</sup> field of view
- Four 9Kx9K chips, 0.36" per pixel
- Fast readout
- Enables high-cadence (6/hour) observations of all lensing events

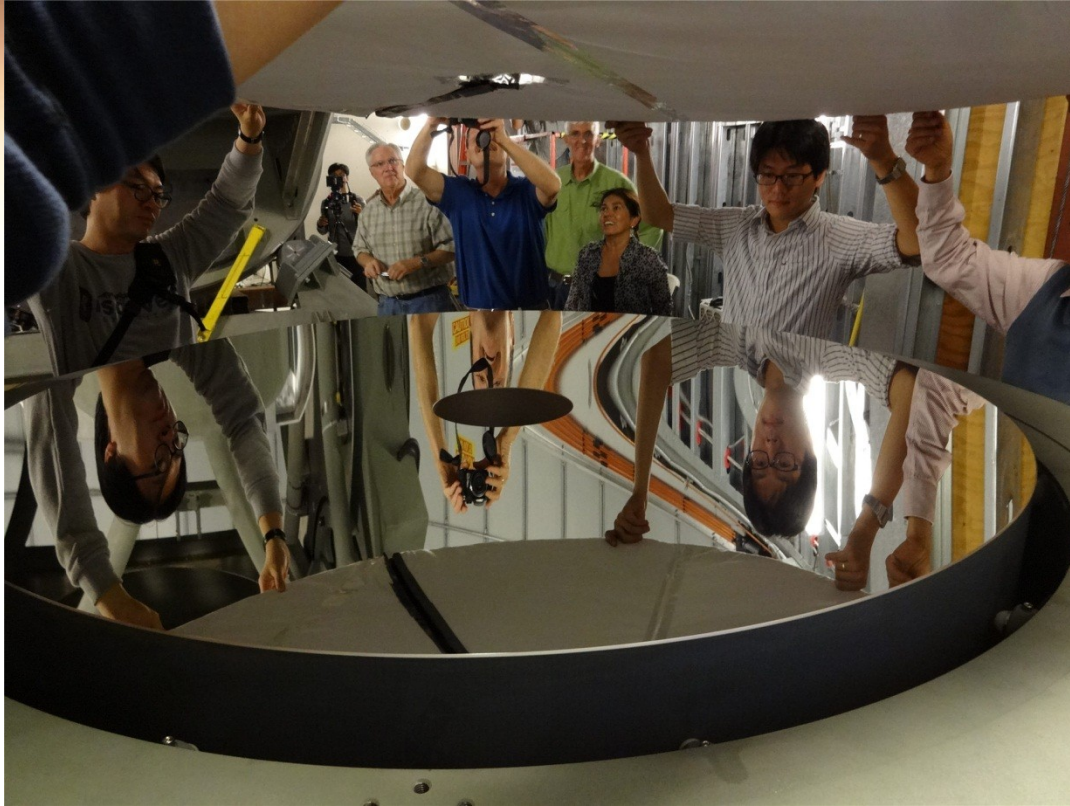
## (2) **3 high-quality telescopes**

- CTIO (Chile), SAAO (South Africa), SSO (Australia)
- ~8-hour difference in longitude
- 24-hour continuous monitoring
- Aperture: 1.6m, exclusive for microlensing





# KMTNet 1



**Mirror (1.6m, made in Russia) arrived.**



**Inspection and mounting the mirror**

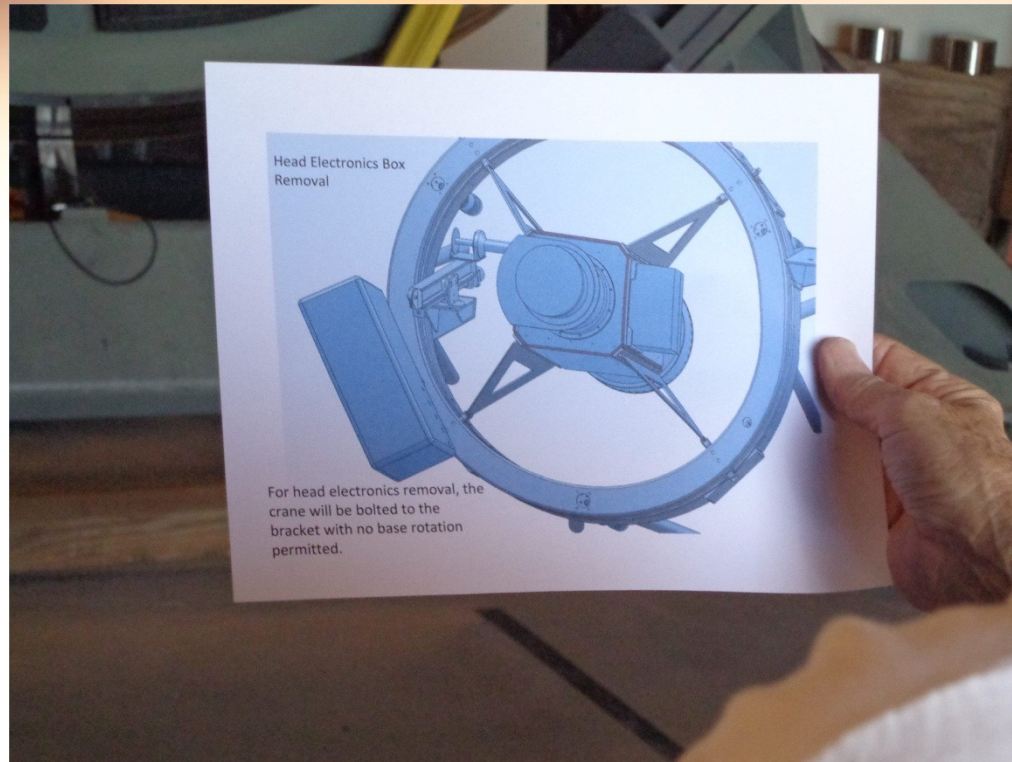


**Mirror about to be installed.**

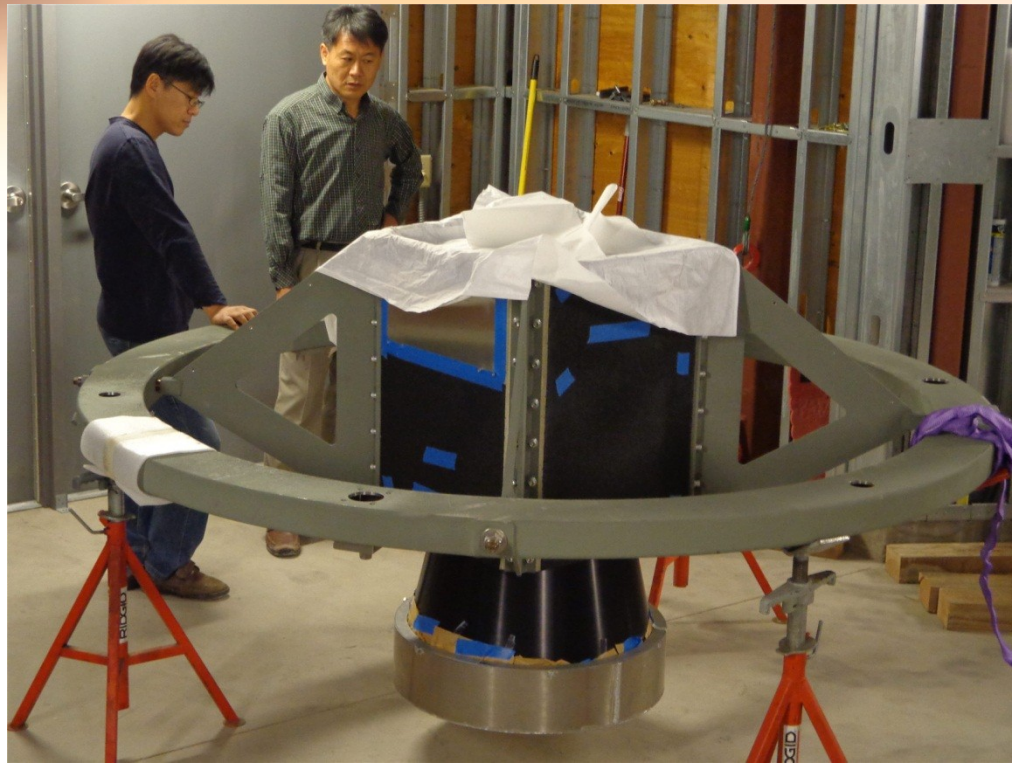




**Mirror installed.**



**Secondary lens, filter, focus, & electronic box**

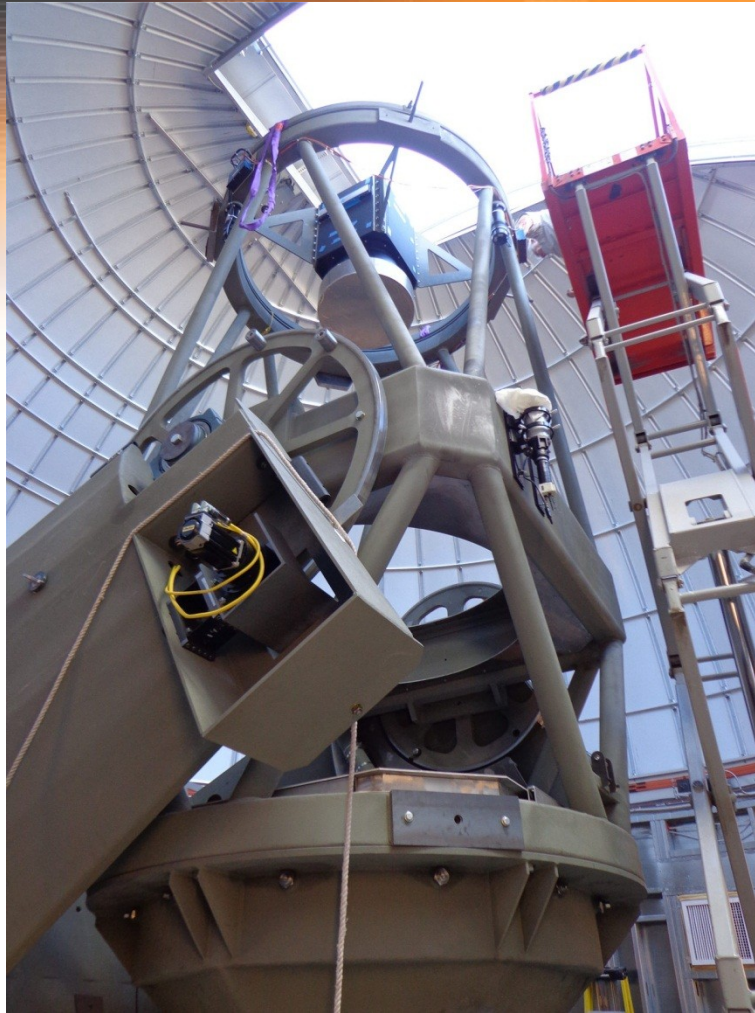


**Instrument arrived**



## Installation

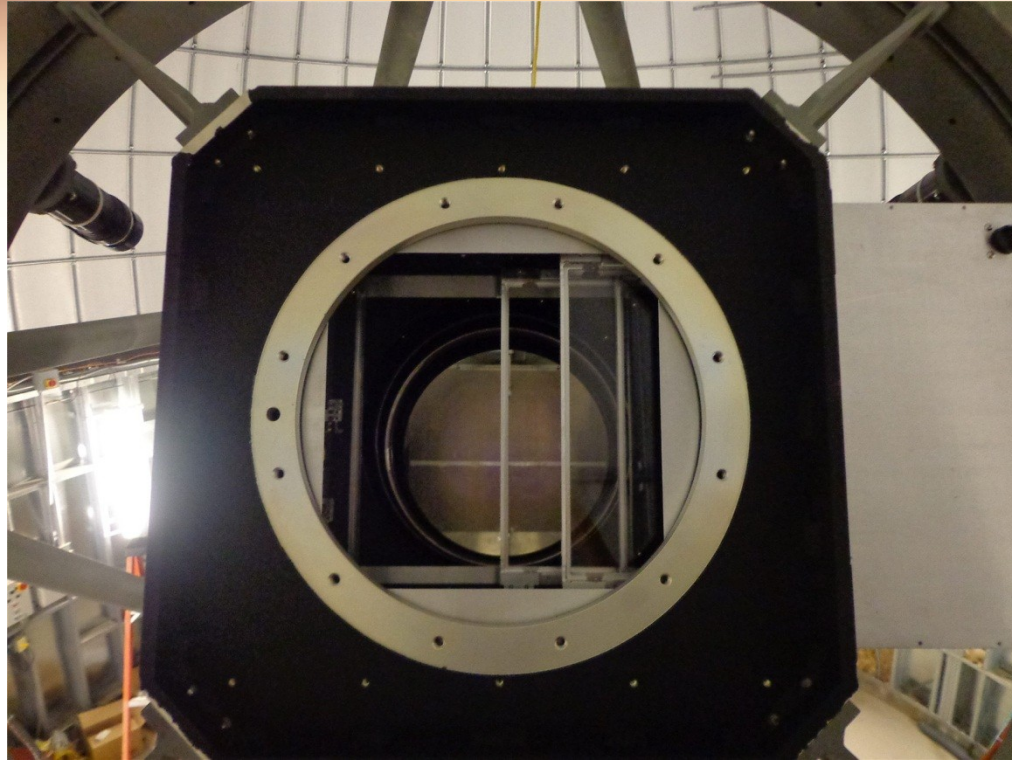




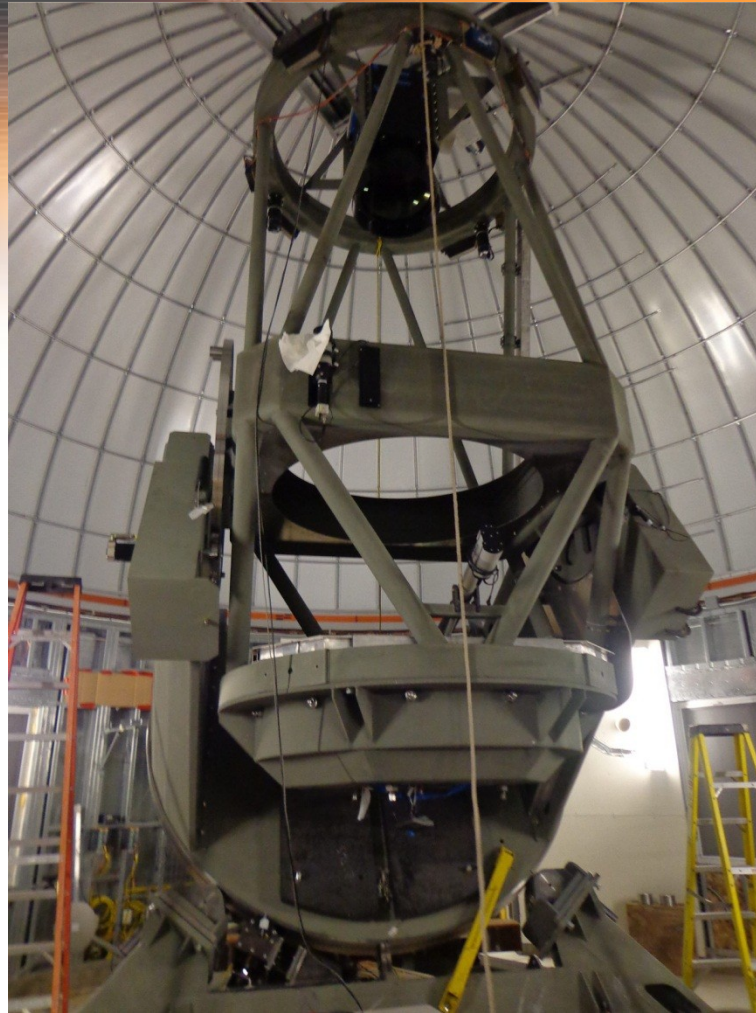
**Being installed.**



**Adjustment**



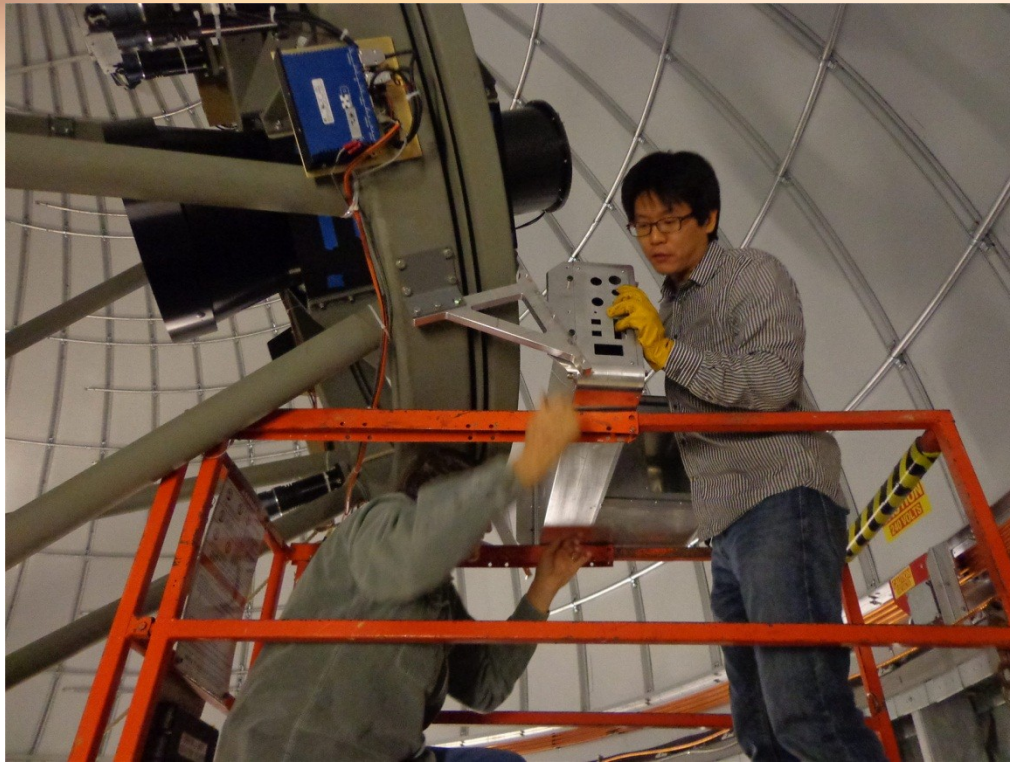
**Prime focus where a camera will be installed.**



**Secondary done.**



**Test observation.**



**Installing the electronic box**





**EB installed**



## KMTNet (Korea Microlensing Telescope Network) Timetable

year	plan	comments
2012	<input type="checkbox"/> Test observation	• Tucson, AZ
2013	<input type="checkbox"/> 1 <sup>st</sup> telescope (Jan)	• CTIO, Chile
	<input type="checkbox"/> 1 <sup>st</sup> camera installation (Aug)	• 18Kx18K, E2V
	<input type="checkbox"/> 2 <sup>nd</sup> telescope (Aug)	• SAAO, South Africa
2014	<input type="checkbox"/> 1 <sup>st</sup> telescope in full operation (Mar)	• -
	<input type="checkbox"/> 2 <sup>nd</sup> camera (Jan)	• -
	<input type="checkbox"/> 3 <sup>rd</sup> telescope (Jan)	• SSO, Australia
	<input type="checkbox"/> 3 <sup>rd</sup> camera (Mar)	• -
	<input type="checkbox"/> In full operation in 2014 season	• -