



Sternberg Astronomical Institute, Moscow State University, Ural State
University, Irkutsk State University, Blagoveshensk State Education
University,
Pulkovo Observatory

MASTER NET PROJECT

Mobile Astronomical Systems Telescopes Robotic

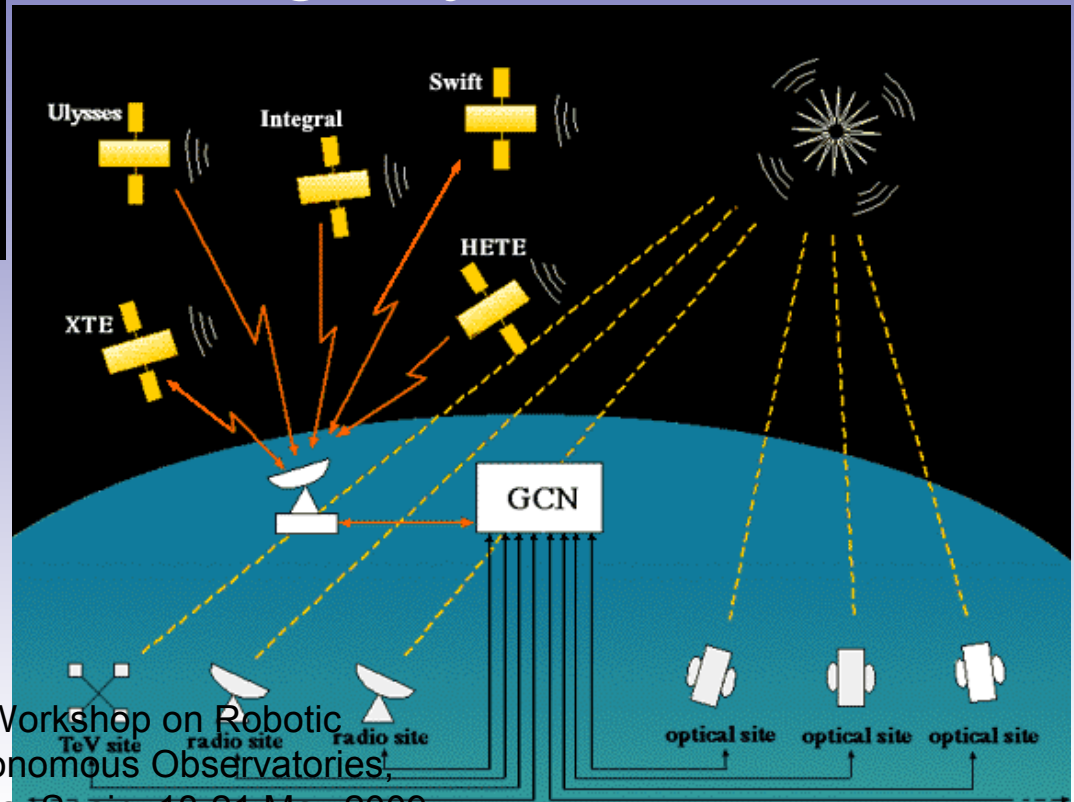
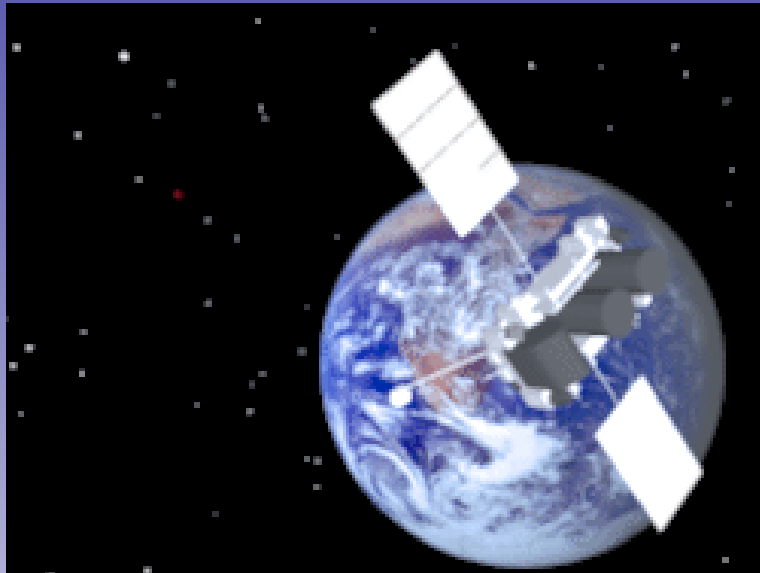
Vladimir M. Lipunov

Sternberg Astronomical Institute

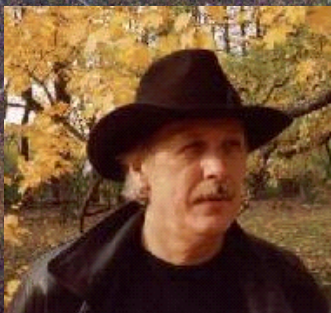
<http://observ.pereplet.ru>

GRB

The search of the optical emission from GRB started in 80th in Sternberg Institute by Evgeniy Moskalenko



Team - 2002



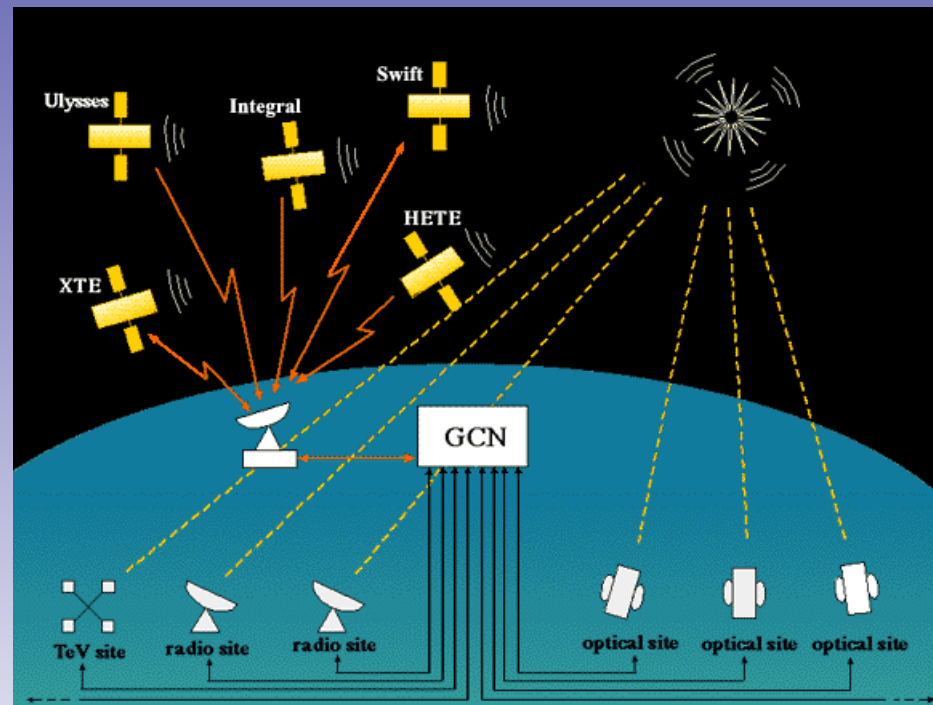
ІЕКТИВ



GCN Sites

Optical robot-telescopes:

GROCSE (LLNL & U.Mich.)
LOTIS (LLNL & Clemson)
ROTSE
TAROT
LOTOSS/KAIT
ETC (MIT)
NEAT
The BRADFORD telescope
(U.of Bradford, England)
Wyoming IR Obs (S.Howell)
LONEOS
Beijing Xinglong Observatory
BOOTES (Spain, Castro-Tirado)
APT (Australia)
NYTT (Finland)
ASAS
MERCATOR (La Palma)
REM (Italy)
BART (Czech Rep.)
MASTER (Russia)
Grove Creek Obs (Australia)



MASTER-Moscow- Vostryakovo

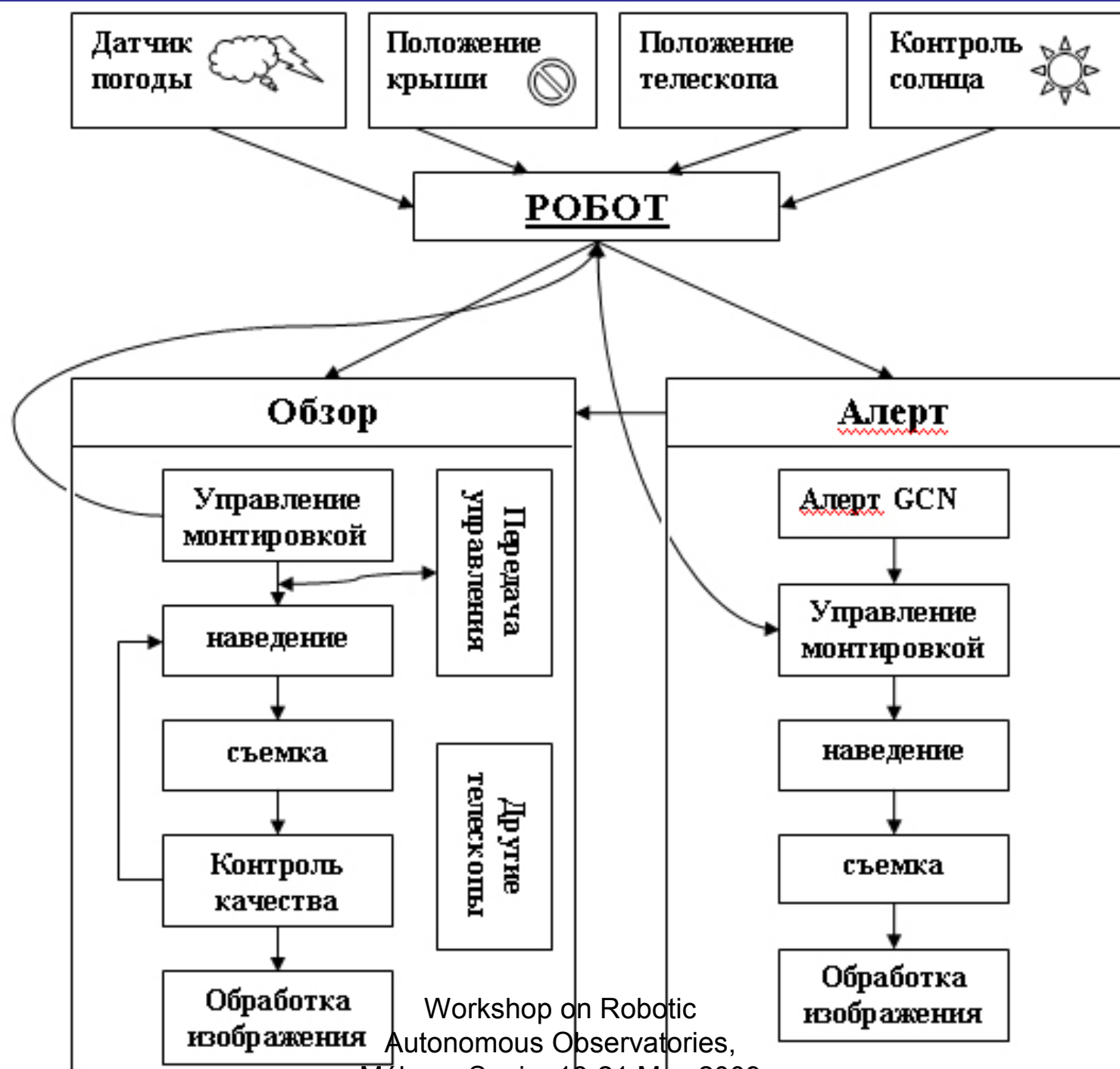
Since 2002



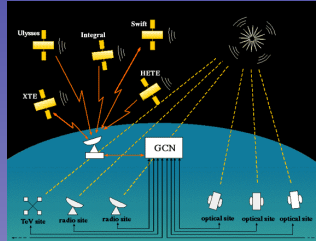
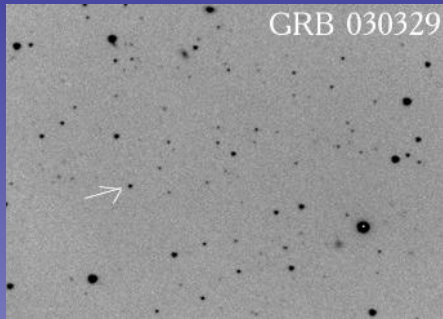
1. $D=355$ mm $D/F=2.3$
2. CCD 16 Mpx
Apogee Alta U16
3. FOV= 6 square degrees



Workshop on Robotic
Autonomous Observatories,
Málaga, Spain, 18-21 May 2006

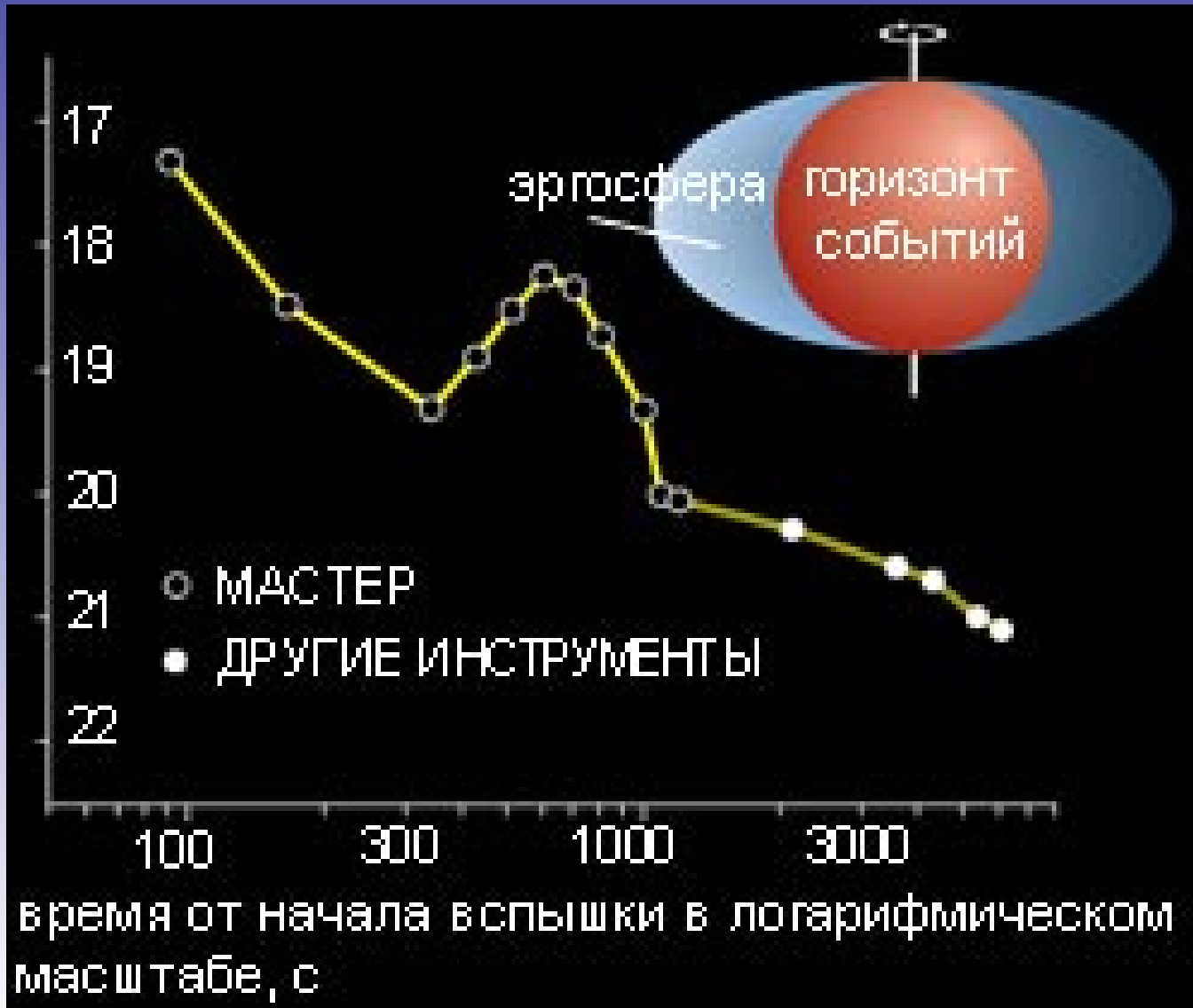


Alert regime

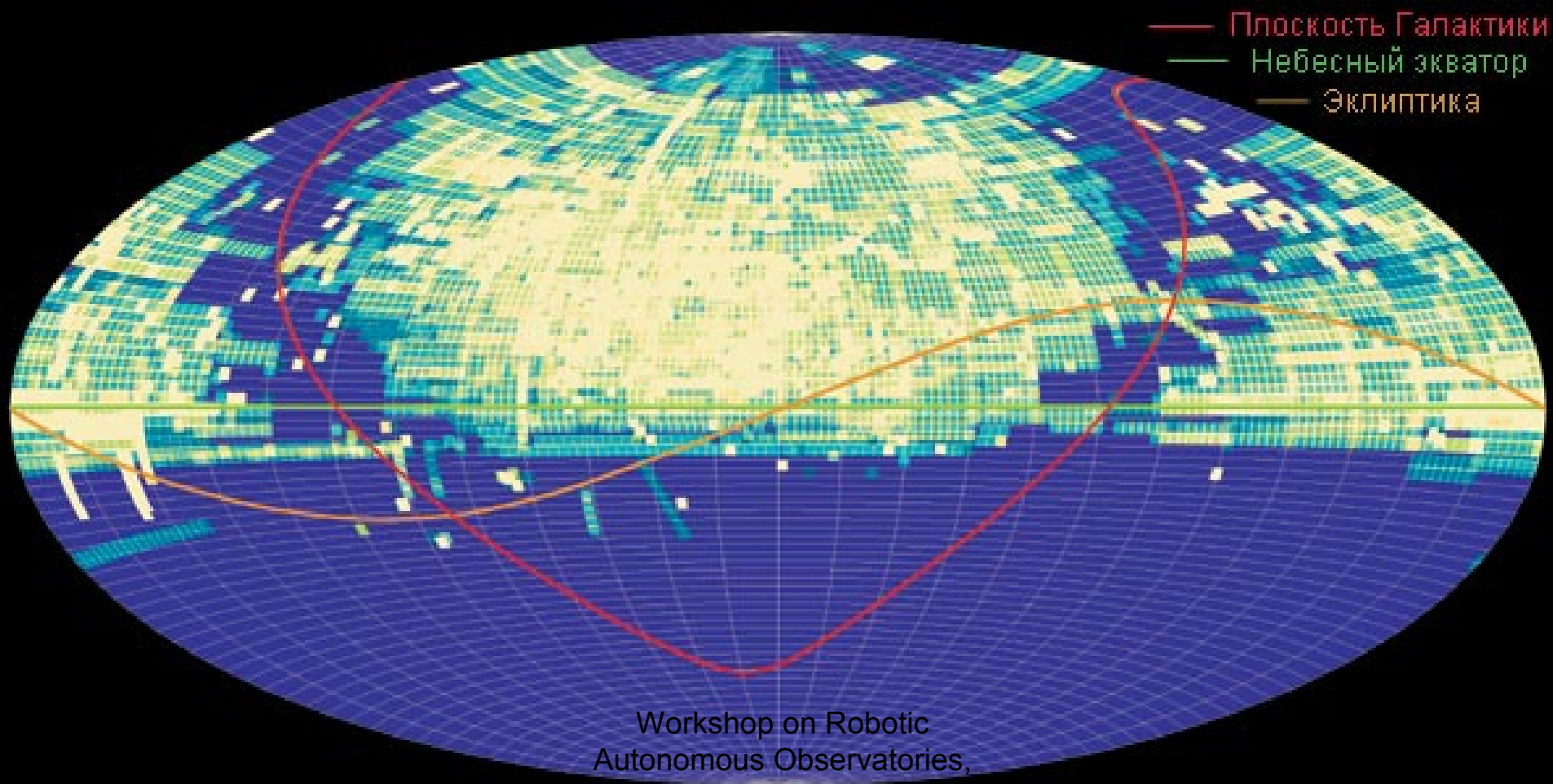


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Autonomous Observatories,
Málaga, Spain, 18-21 May 2009

ГАММА ВСПЛЕСК GRB 060926



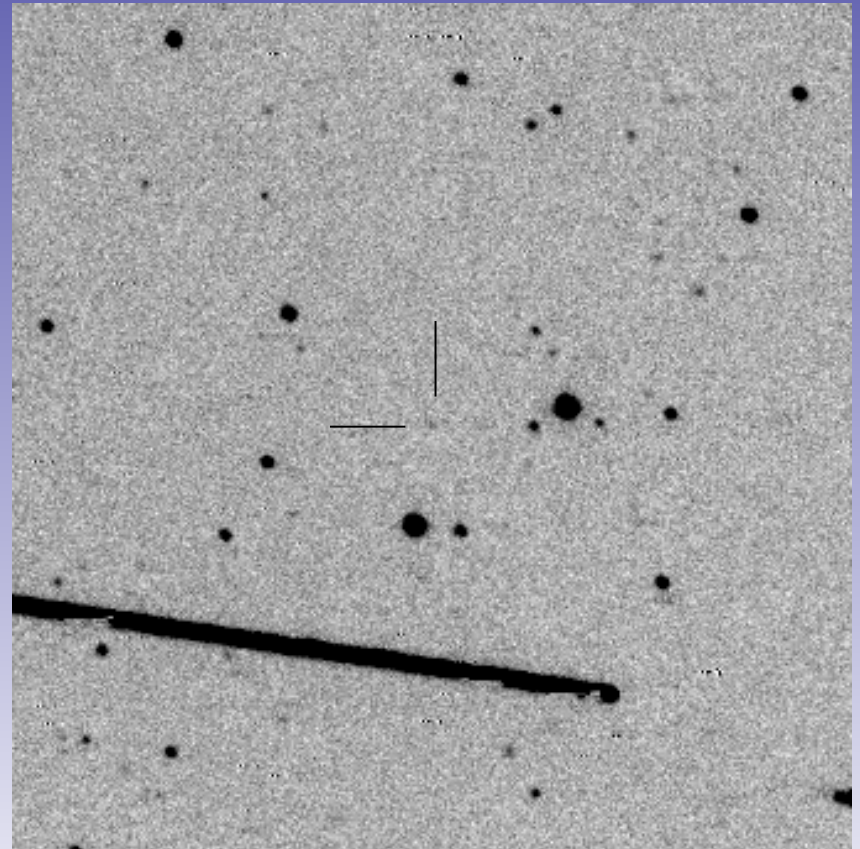
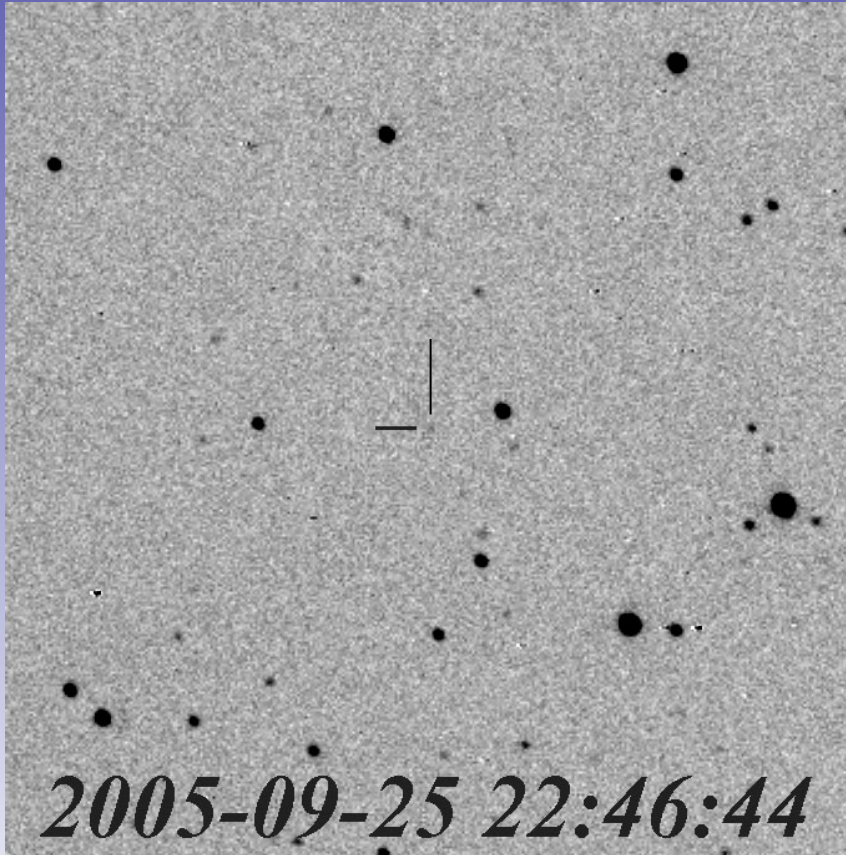
Sky Survey up to 19 m 2004-2008гг.: 80 000 reduced images



Trans Pluto Objects

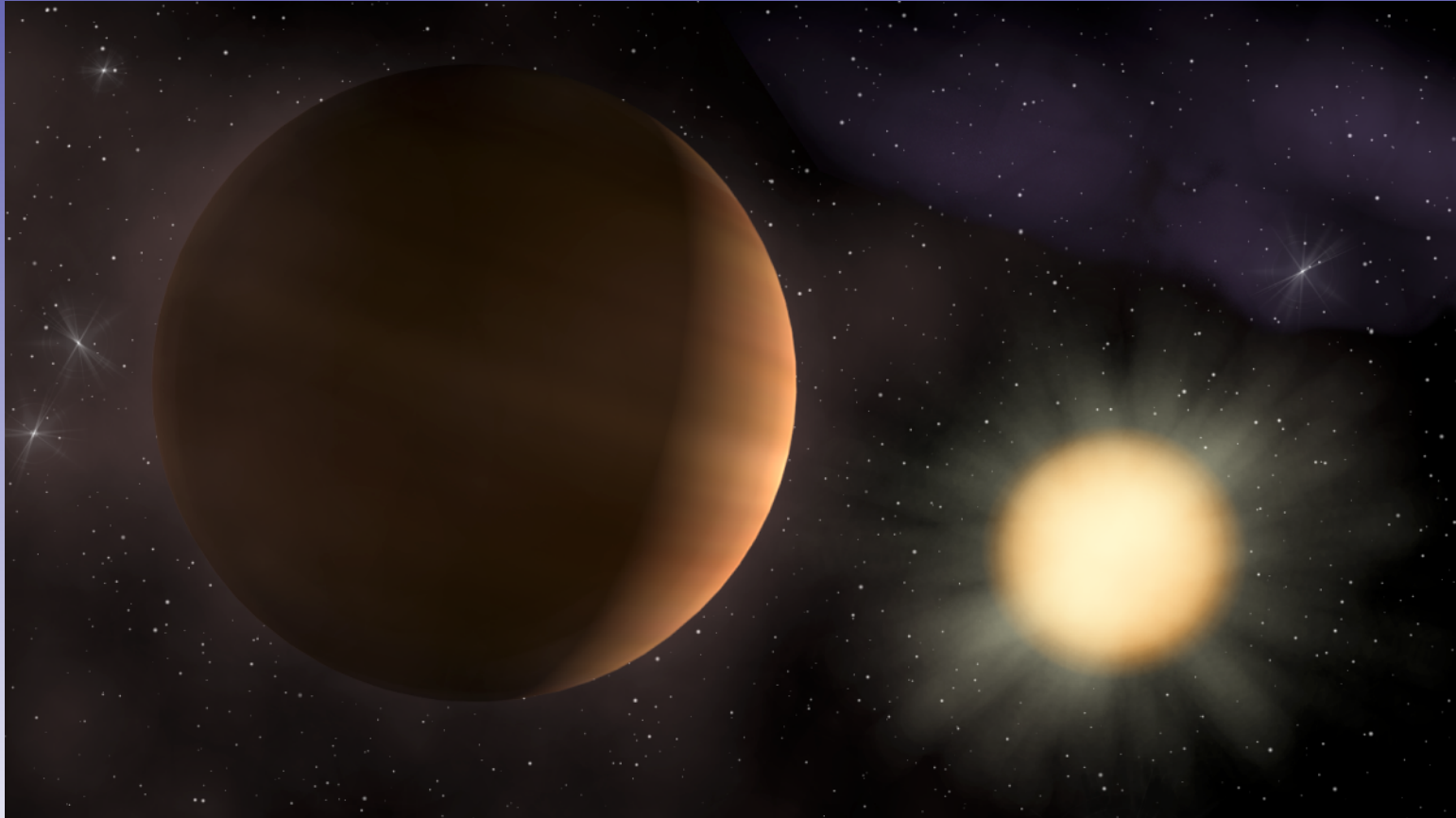
2003 UB₃₁₃

2005 Oct 1 21:55:00 01 37 55.466 -05 32 50.02 Vmag: 18.7
01 37 55.45 -05 32 48.7 mag: 18.6



2005-10-01 21:55:32

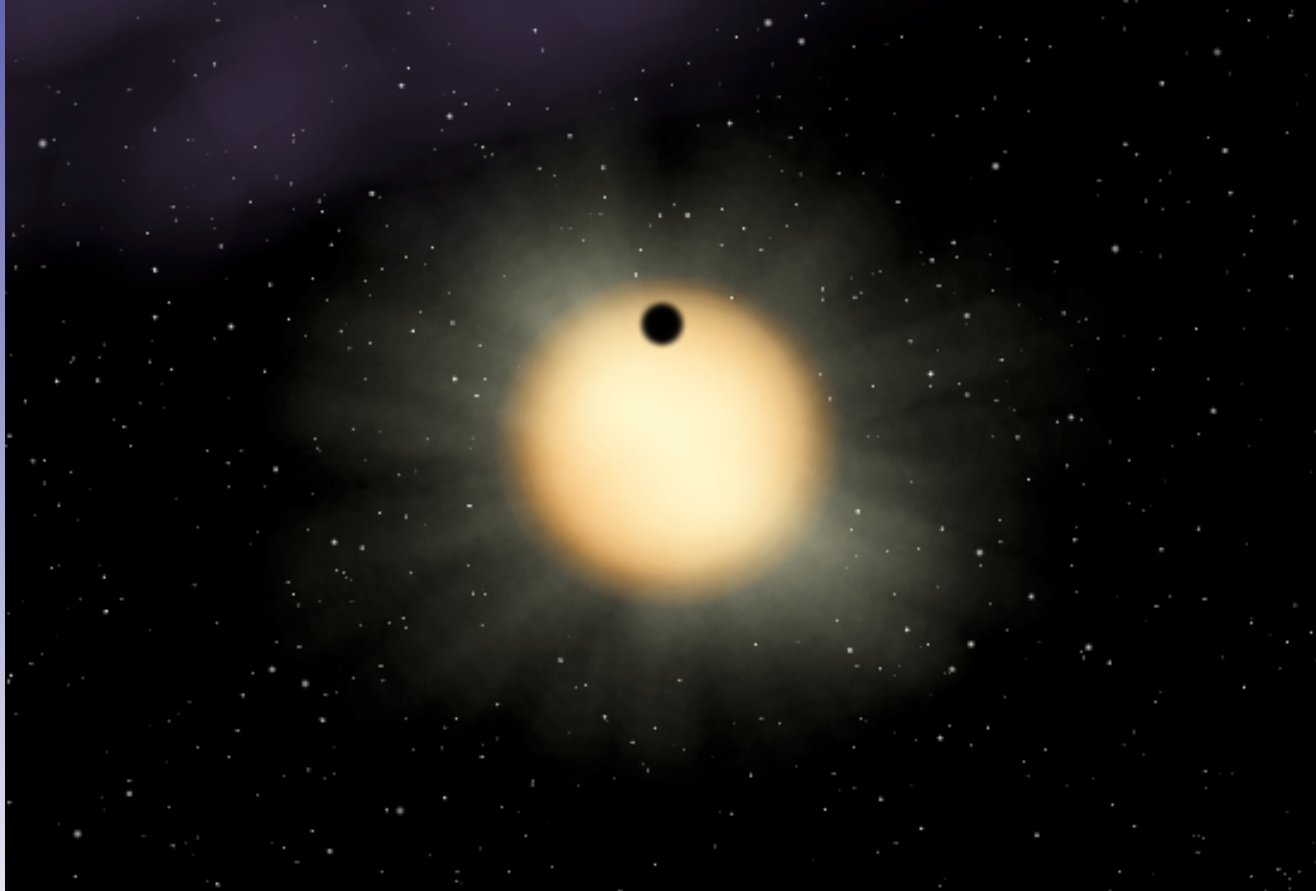
Exsoplanets transit



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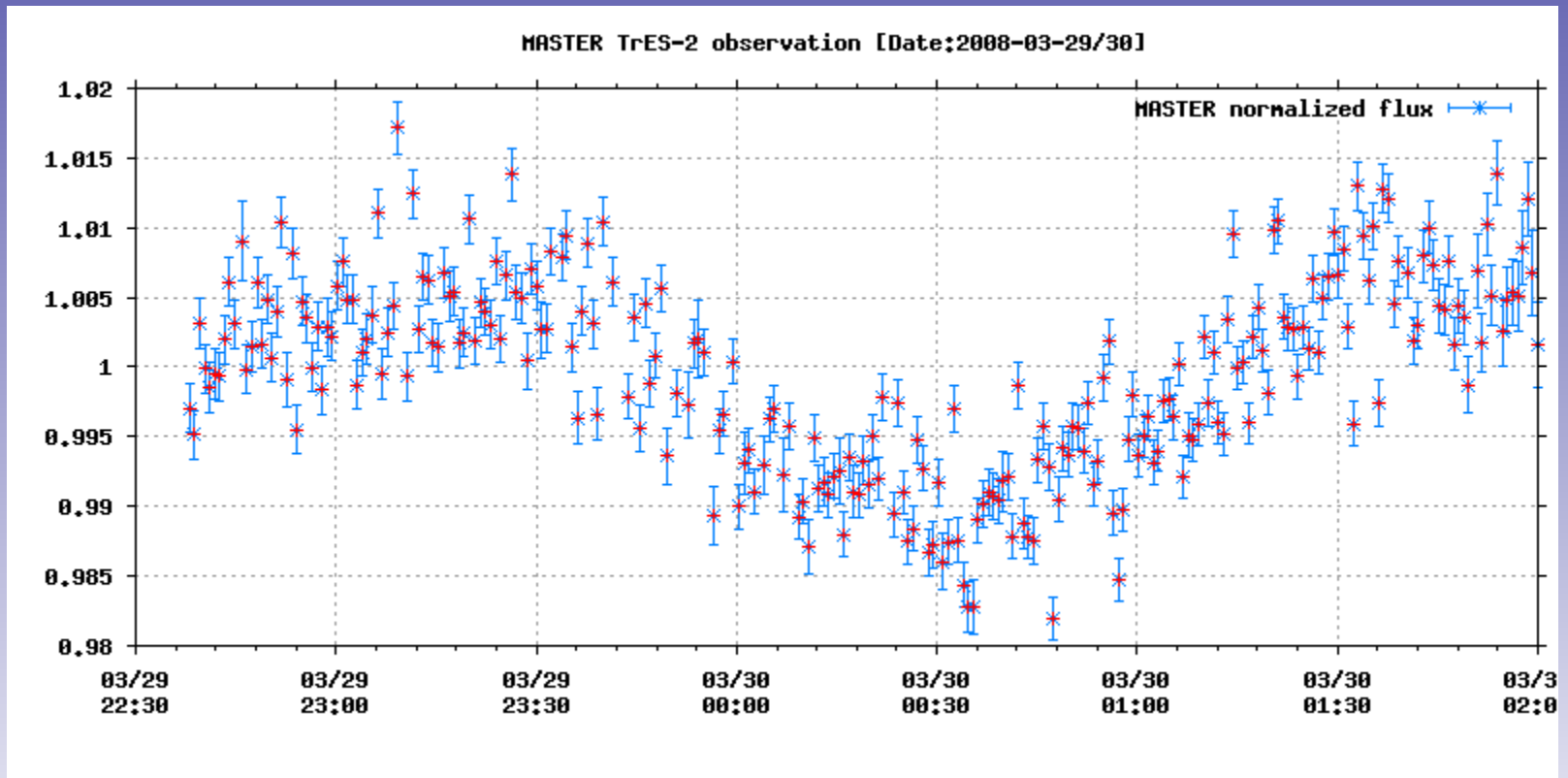
TrES-2

Trans-atlantic Exoplanet Survey



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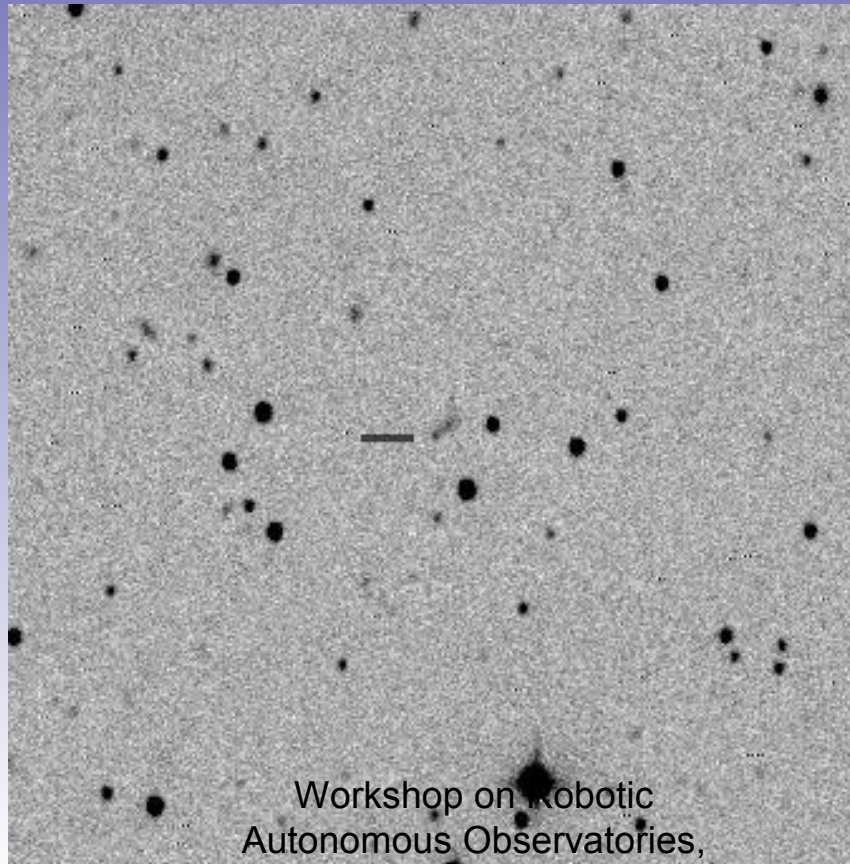
Observation of the Exoplanet Transit Tres-2



First supernova discovered from Moscow SN2005bv

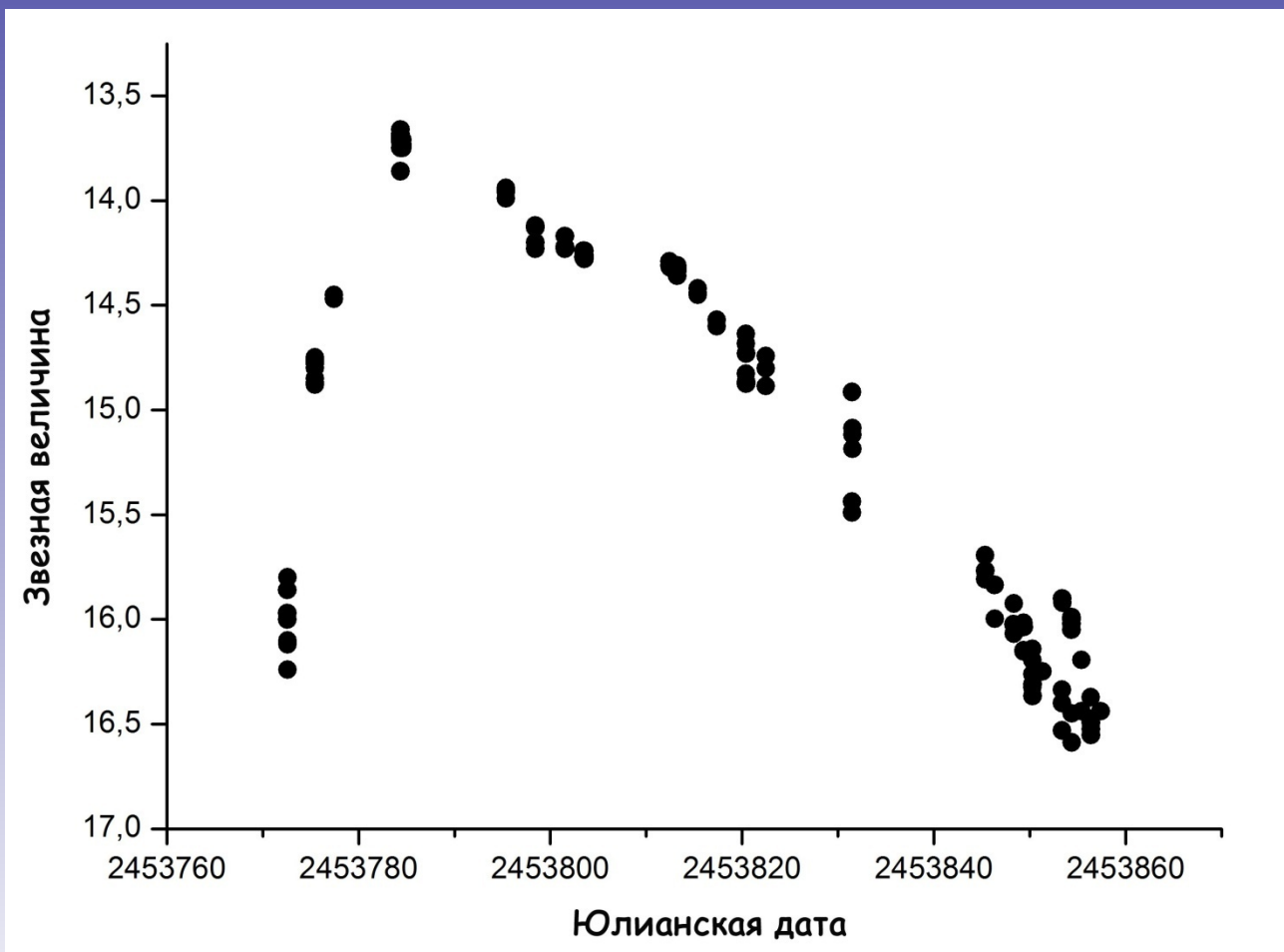
2005bv, IAUC 8520 discovered 2005/04/20.939 by MASTER robotic telescope

Found in an anonymous galaxy at R.A. = 14h24m07s.44, Decl. = +26°17'50".3

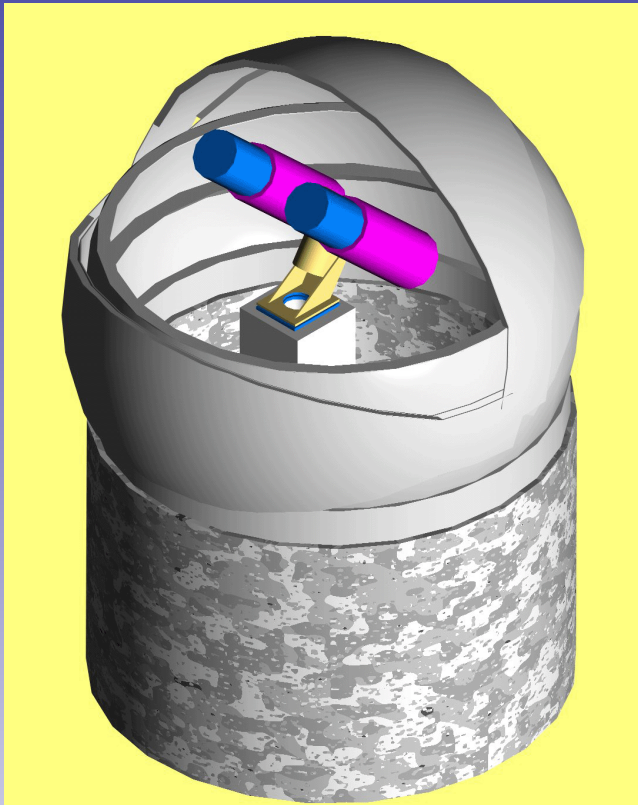


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SN 2006X - SNIa



MASTER: Designed by IAGLR ~500



MASTER II (2x D=400mm, F=1m, FOV=2x4 square degrees)

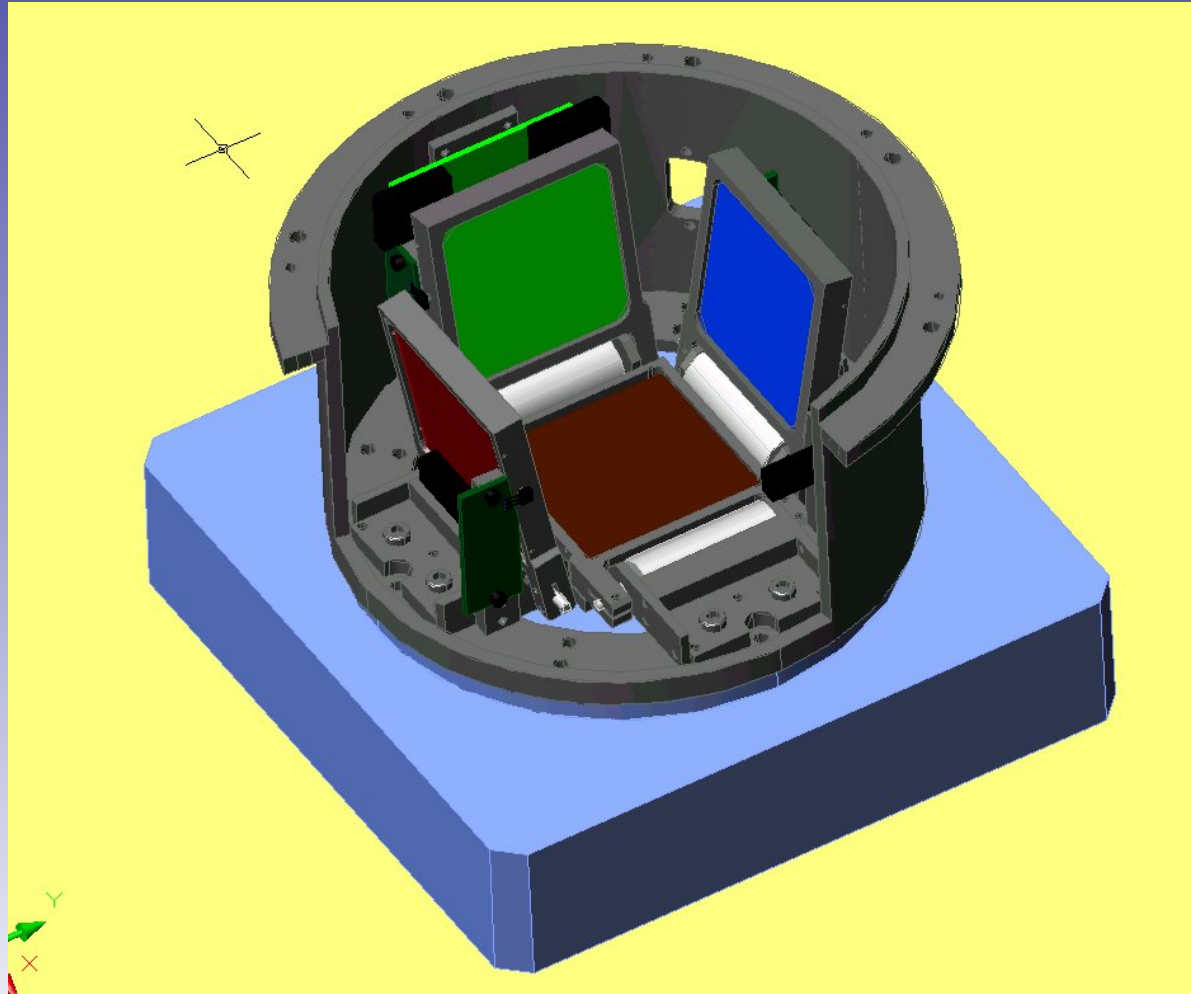
Apogee CCD Alta U16

Survey Rate 500 square degrees/hour up to 19

Mount 30 degrees/s

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MASTER photometer & polarimeter



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Autonomous Observatories,
Málaga, Spain, 18-21 May 2009

All automatized

- cloudy sensor
- GPS time synchronization
 - only Linux
- automatic roof

Russia is largest country in...

UNIVERSE

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MASTER NET

Main goal: one night-one sky up to 20m



REAL TIME PIPE-LINE FINISHED (15 programmer years)

- astrometry 0.1"
- multicolor photometry
 - polarimetry
 - OT search
 - SN search
- Minor planet (fast, unusual, tr.plutonic) search
 - comet search
- exoplanet search (under testing)

MASTER II Caucus (Kislovodsk)

2000 m



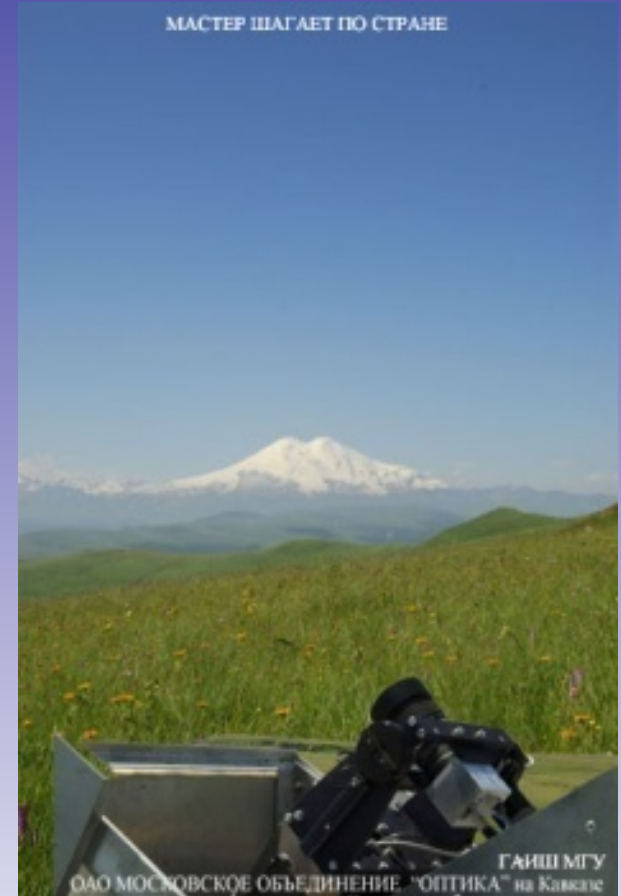
4 MASTER VWF
cameras
4000 square degrees
Up to 11m per 1sec

July 2008



November 2008
MASTER II

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МАСТЕР ШАГАЕТ ПО СТРАНЕ

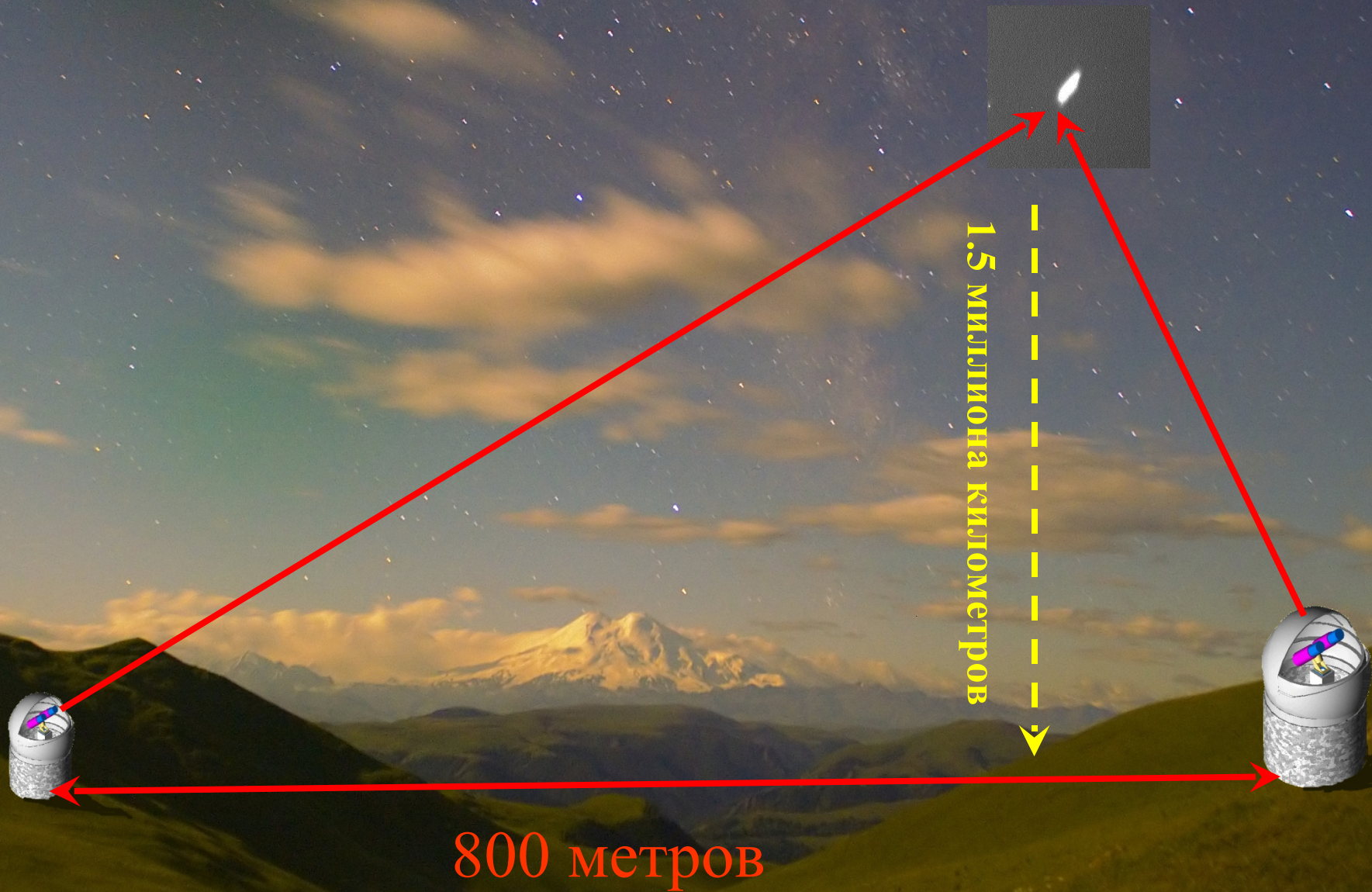
ГАНШ МГУ
ОАО МОСКОВСКОЕ ОБЪЕДИНЕНИЕ "ОПТИКА" на Кавказе

2007 г.



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МАСТЕР ГАИШ МГУ Дубна, 2009



MASTER II - Ural Kourovka observatory nov 2008 г.



500 square degrees per hour up to 19 mag

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• -29 C



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- Main Server
- 10 Tb
- 64-bit
- 4-n

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- MASTER II on Ural

FIRST LIGHT: FWHM=1.5





Галактика М81



Workshop of **Галактика М51**



Комета Лулинь Февраль, 2008

Видны газовые струи, выброшенные по ходу движения кометы

• Workshop on Robotic
Autonomous Observatories,
Málaga, Spain, 18-21 May 2009

MASTER VWF - Irkutsk

September 2008



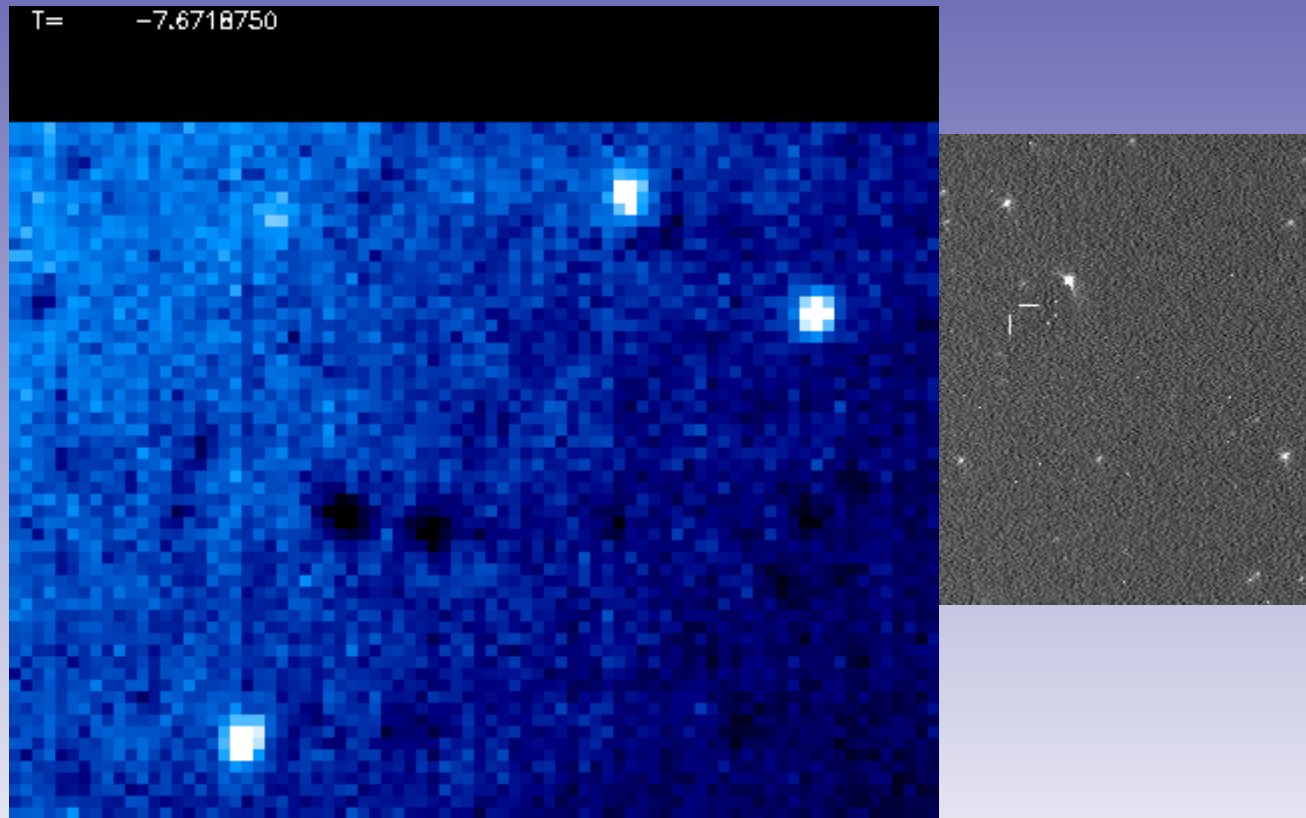
2000 square degrees up to 12 m per 1 s

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GRB 080319B π of the sky project



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12 мая 2008 года

Регистрация вспышки ГЛОНАСС **26566COSMOS 2374**

камерой сверхширокого поля
1050 кв.гр. Кисловодск. (1 pix = 35")

Измеренные:

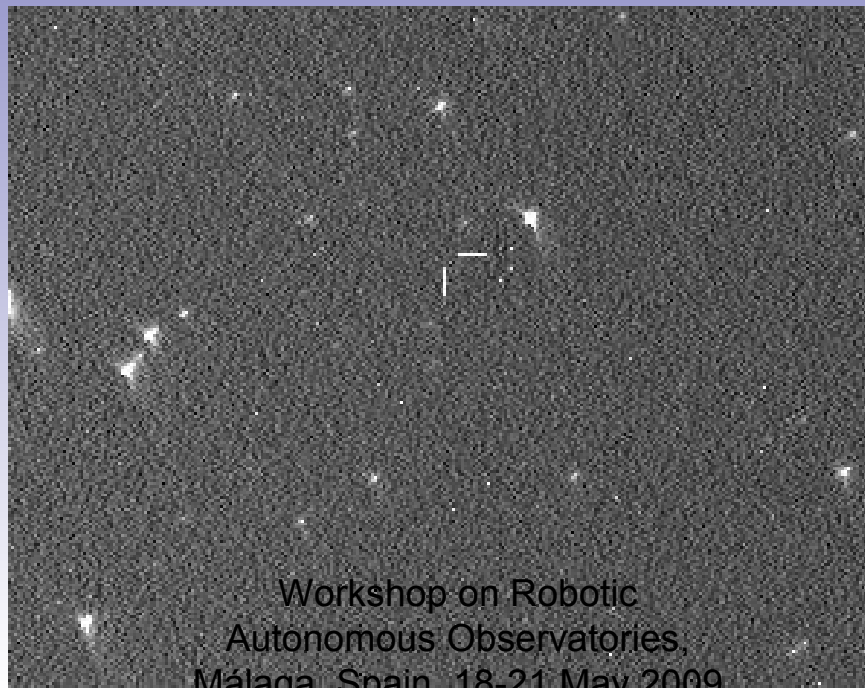
RA = 13h 30m 02s

Dec = +52d 43' 21"

Истинные:

RA = 13h 29m 59.35s

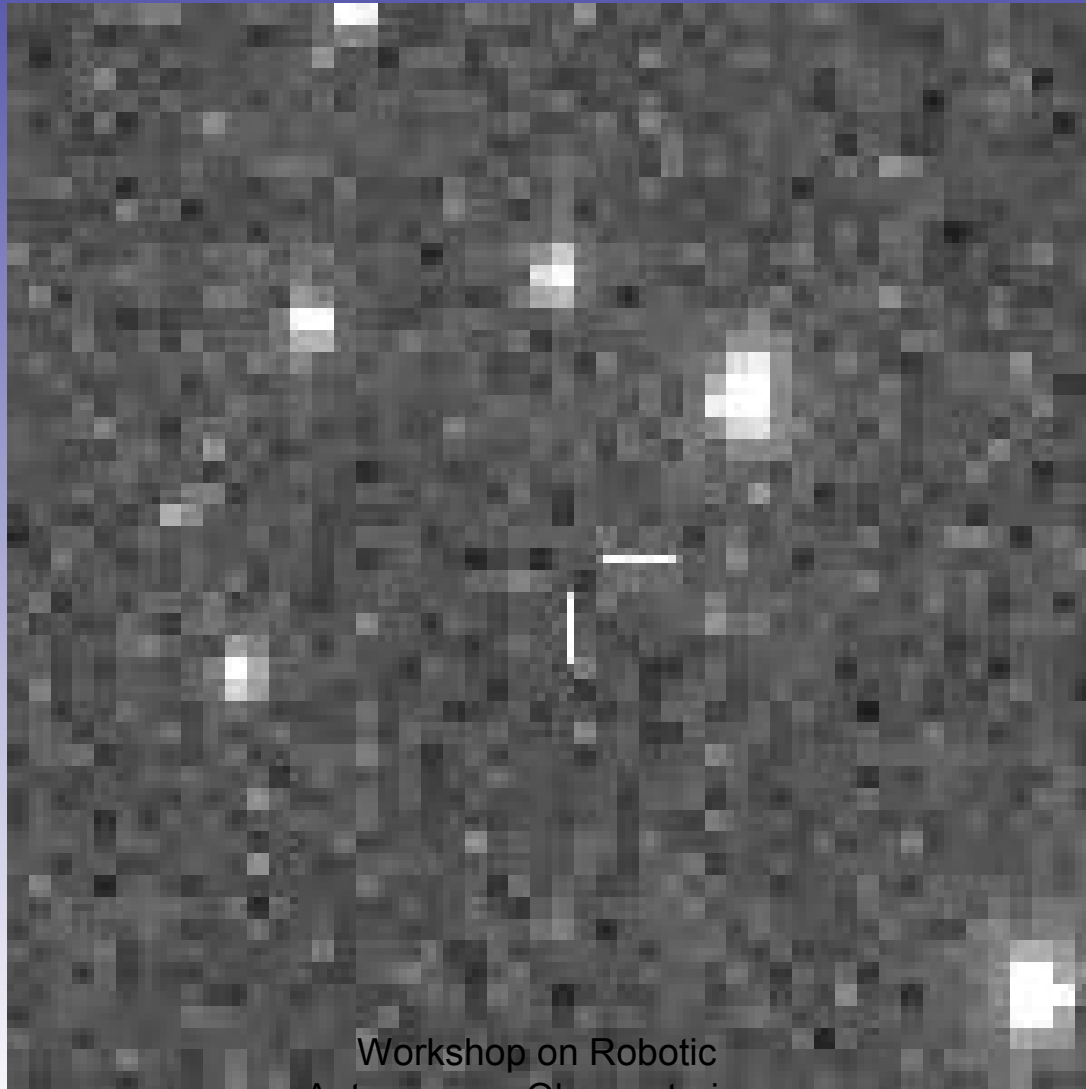
Dec = +52d 42' 45.1"



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ИСЗ «Молния»

30 ноября 2008 г.



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Наземный эксперимент сложнее космического... или сегодня утром в Иркутске.


Файл Правка Вид Журнал Закладки Инструменты Справка

http://81.18.119.127/



Самые популярные Начальная страница Лента новостей Fermi Trigger Informat...

Games Products Subtitles Search News Weather IP-lookup ControlBar config

Gmail - Гра... Gmail - Тис... Интернет... Дискуссии... MASTER R... MASTE... x Fermi Trigg... GCN Circul... Шевченко: ... Коллокви... Сборная Р... MASTER-W...



Very Wide Field Camera
FOV (max) = 25.5 x 39.8 = 1015 square degrees
Time resolution up to 150 ms, CCD 11 Mpix
Longitude = 104,316237 E; Latitude = +52,219024 Altitude 505 m
2009 March 28 06:30:16

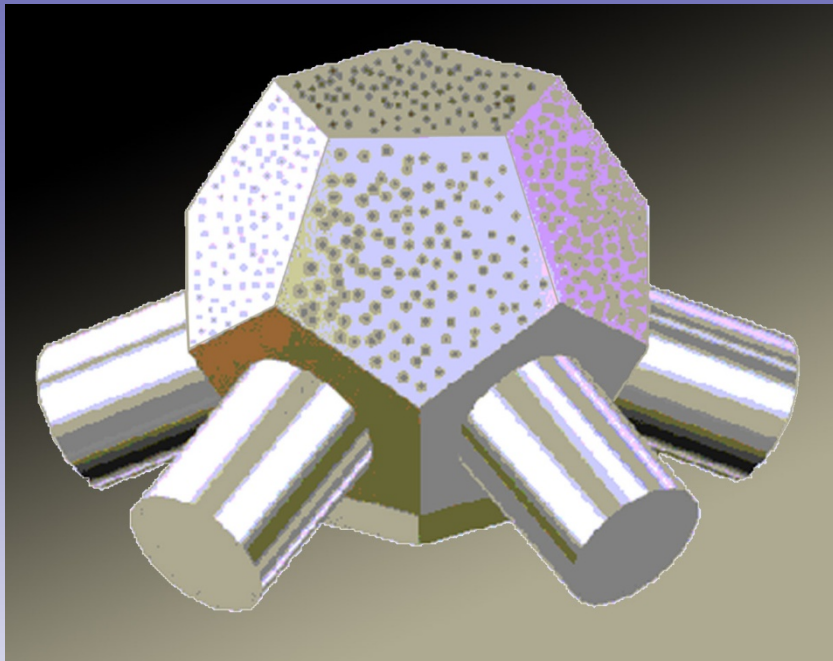
Weather & Roof status				Web-camera	Last image
Sky	Dew	Amb	Status	06:47:29 2009/03/28	185132
-19.3	-3.7	3.3	Cloudy Calm Dry		
Last socket data obtained: Mar 28 06:29 UTC					
Sun Alt: 37.9 deg					
<u>Camera direction:</u>					
00 OK dec=-830853. ra=015047.					
Roof status: 00 OK roof=closed					
camera 1: 00 OK STATUS=READY Count=0					
camera 2: 00 OK STATUS=READY Count=0					

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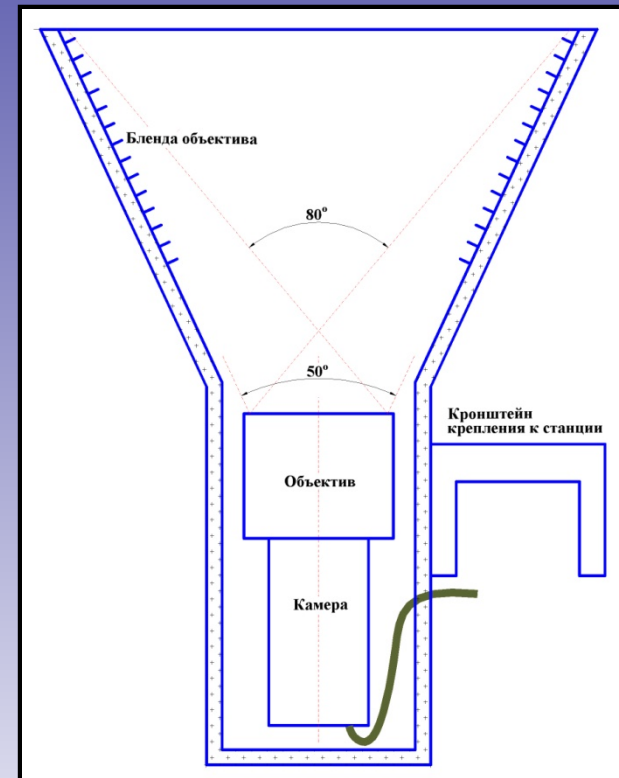
RU Рабочий стол 10:05

Gamma-skope

Russian gamma satellite with MASTER VWF on board



**Широкоапертурный
гамма-телескоп**



**Широкопольная
камера МАСТЕР**

МАСТЕР-СЕТЬ



MASTER
January 2006



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Main results of the MASTER NET from 2008Nov

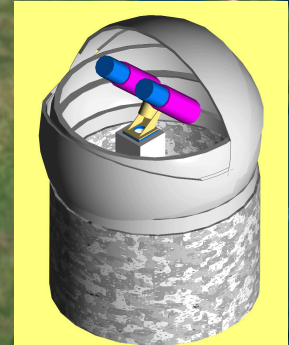
- MASTER VWF: 5 GRB prompt observations (3Caucas & 2 Irkutsk) during ½ year
- MASTER II Testing
- Optic is very good
- Mount is very good
- Systems will started after 1 month
- Some problems with roof at Russian winter

PLAN

2009: Irkutsk+Blagoveshensk



MASTER
January 2006



Workshop on Robotic
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- **MASTER goal**
 - **>1000 SNIa per year**
 - **prompt polarimetric and multicolor GRB observations**
 - **orphan flare**
 - **exoplanets**
 - **danger asteroids**
- **Fundamental problems**
 - GRB Mystery
 - Dark Energy
 - New type SNe
- **- First objects in Universe**
- **Applied problems**
 - near cosmic control

MASTER wants come
everywhere

Thank you