Recent Activities of Observational Cosmology Group at University of Tokyo

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1st China-Japan-Korea Joint Workshop on Cosmology and Galaxy Formation (November 9-12, 2005)

Recent Activities of Observational Cosmology Group, University of Tokyo (1)

- **SDSS galaxy and quasar statistics**
  - genus statistics and phase correlation of SDSS galaxies (Hikage et al. 2003, 2004,2005; Hikage, Matsubara, and Suto 2004; Park et al. 2005)
  - 3pt correlation functions of SDSS galaxies (Kayo, Suto, Nichol et al. 2004)
  - widest-separation lensed quasar from SDSS (Inada et al. 2003; Oguri et al. 2004)
  - 2pt correlation functions of SDSS quasars and cosmological constant (Yahata et al. 2005)
  - constraints on the deviation from Newton's law of gravity from SDSS galaxy power spectrum (Shirata, Shiromizu, Yoshida & Suto 2005)
  - testing the Galactic dust map against SDSS galaxy number counts (Yahata et al. in this workshop)

My collaborators (1)

Yahata, K
矢幡和浩

Matsubara, T
松原隆彦

Shimizu, M
清水守

Inada, I
稲田直久

Kayo, I
加用一者

Yoshida, N
吉田直紀

Hikage, C
日影千秋

Oguri, M 大栗真宗

Recent Activities of Observational Cosmology Group, University of Tokyo (2)

- **Dark halo and galaxy cluster**
  - triaxial modeling of dark matter halos (Jing & Suto 2002; Oguri, Lee & Suto 2003; Lee, Jing & Suto 2005)
  - highest-angular resolution SZ maps in submm and mm (Komatsu et al. 1999, 2001; Kitayama et al. 2004)
- **Warm/hot intergalactic medium (WHIM)**
  - a proposal of oxygen emission line search with DIOS (Yoshikawa et al. 2003, 2004)
  - feasibility of an absorption line search with XEUS along a GRB afterglow (Kawahara et al. 2005)
- **Spectroscopy of transiting extrasolar planets**
  - constraints on planetary atmosphere (Winn et al. 2004; Narita et al. 2005)
  - first detection of the spin-orbit misalignment in an extrasolar planetary system using the Rossiter effect (Ohta, Taruya & Suto 2005; Winn et al. 2005)

My collaborators (2)

Jing, Y.P.
景益鵬老師

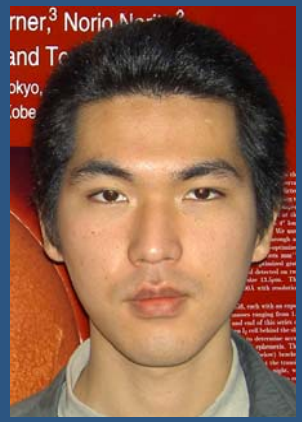
Kitayama, T
北山哲

Taruya, A
樽家篤史

Yoshikawa, K
吉川耕司

Lee, J
李貞勳

Ohta, Y
太田泰弘



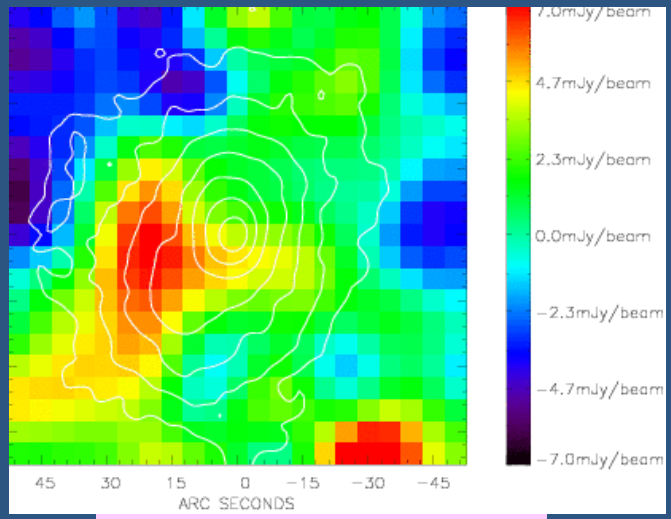
Narita, N
成田憲保

Komatsu, E
小松英一郎

Observation of the Sunyaev-Zel'dovich effect

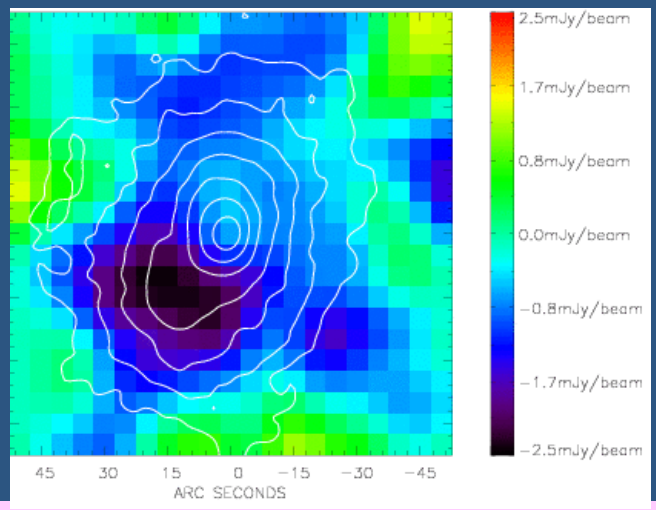
the most luminous X-ray cluster: RX J1347.5-1145

The ***first submm*** SZ map with SCUBA, JCMT

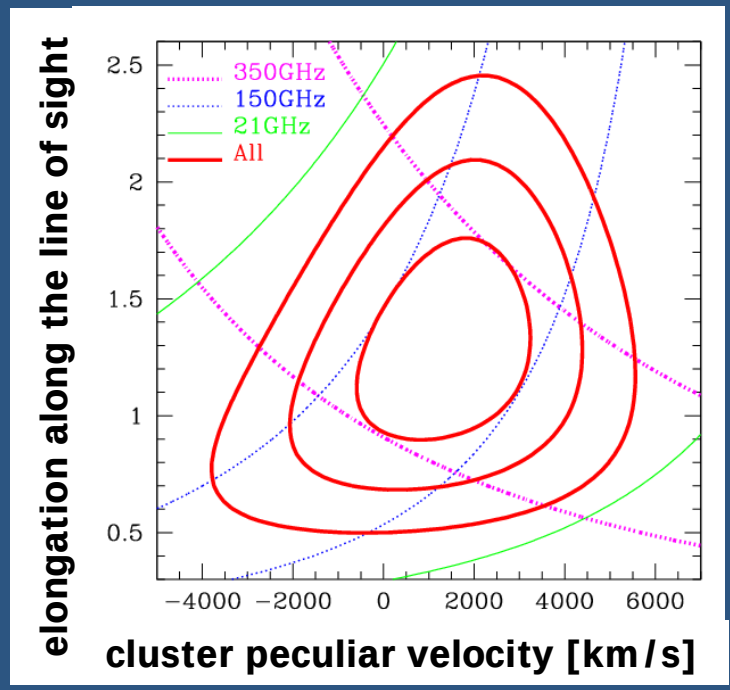


submm SZ map

The ***highest angular resolution*** (σ_{FWHM}=13") mm SZ map with NOBA, Nobeyama

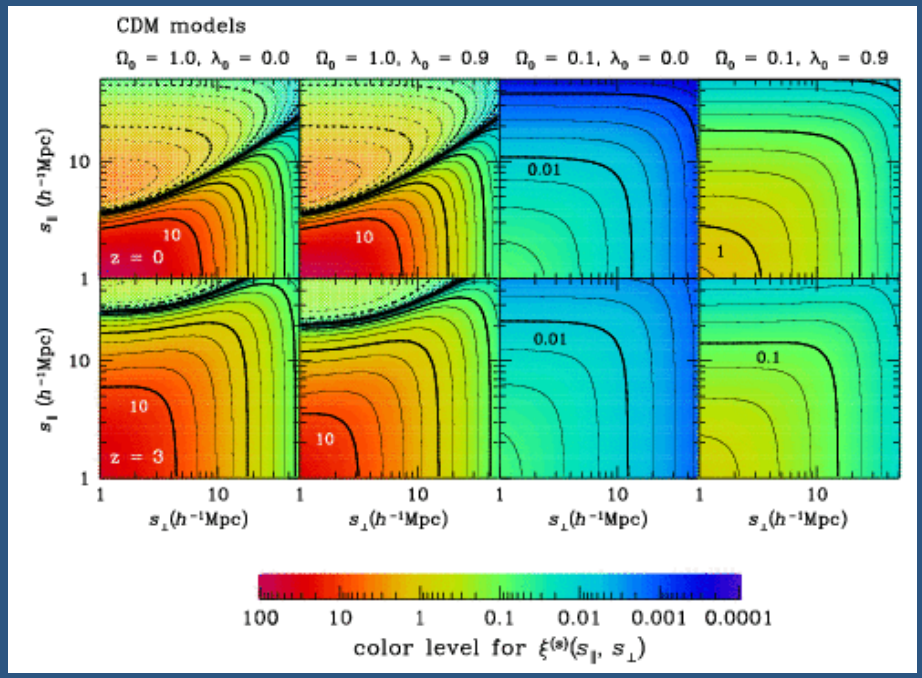


mm SZ map: discovery of substructure

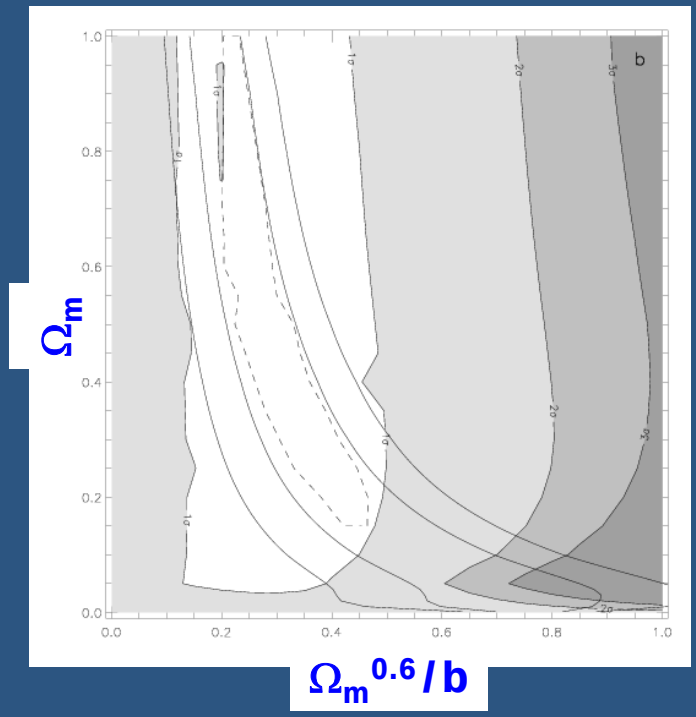


Komatsu et al.
ApJ 516 (1998) L1
PASJ 53 (2001) 57
Kitayama et al.
PASJ 56 (2004) 17

Cosmological redshift-space distortion



Matsubara & Suto (1996)



Hoyle et al. MNRAS 332(2002)311

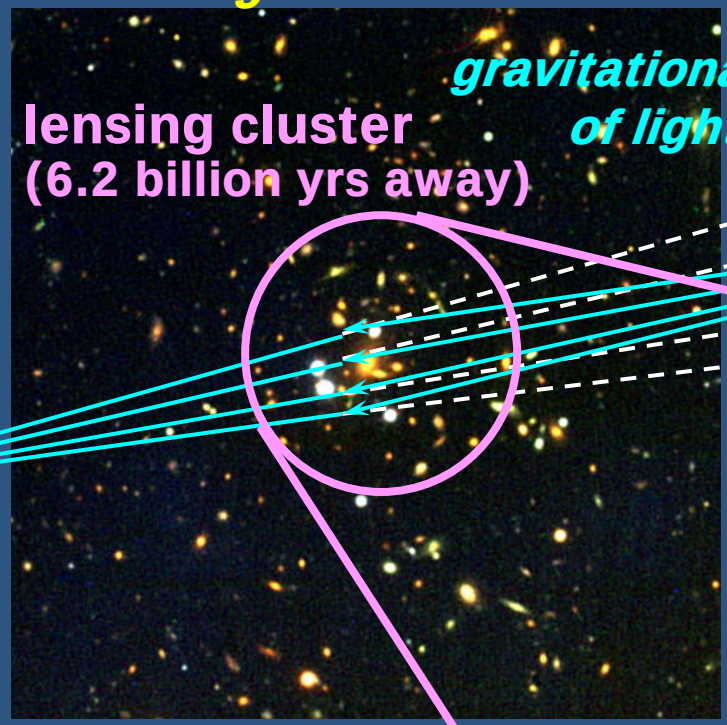
- predicted the general-relativistic distortion in the clustering pattern of high-redshift objects to constrain the cosmological constant (Matsubara & Suto 1996)
- already applied to 2dF QSO data (Hoyle et al. 2002)
- application to SDSS QSO data in progress (Yahata et al. 2005)

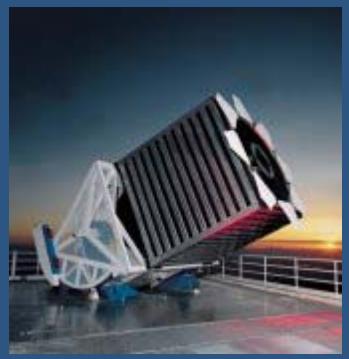
Widest-separation lensed quasars

Inada, Oguri et al. (2003)

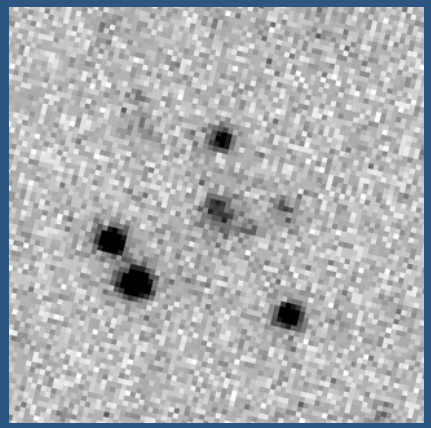
Subaru 8.2m telescope

Subaru image





SDSS 2.5m telescope



SDSS image

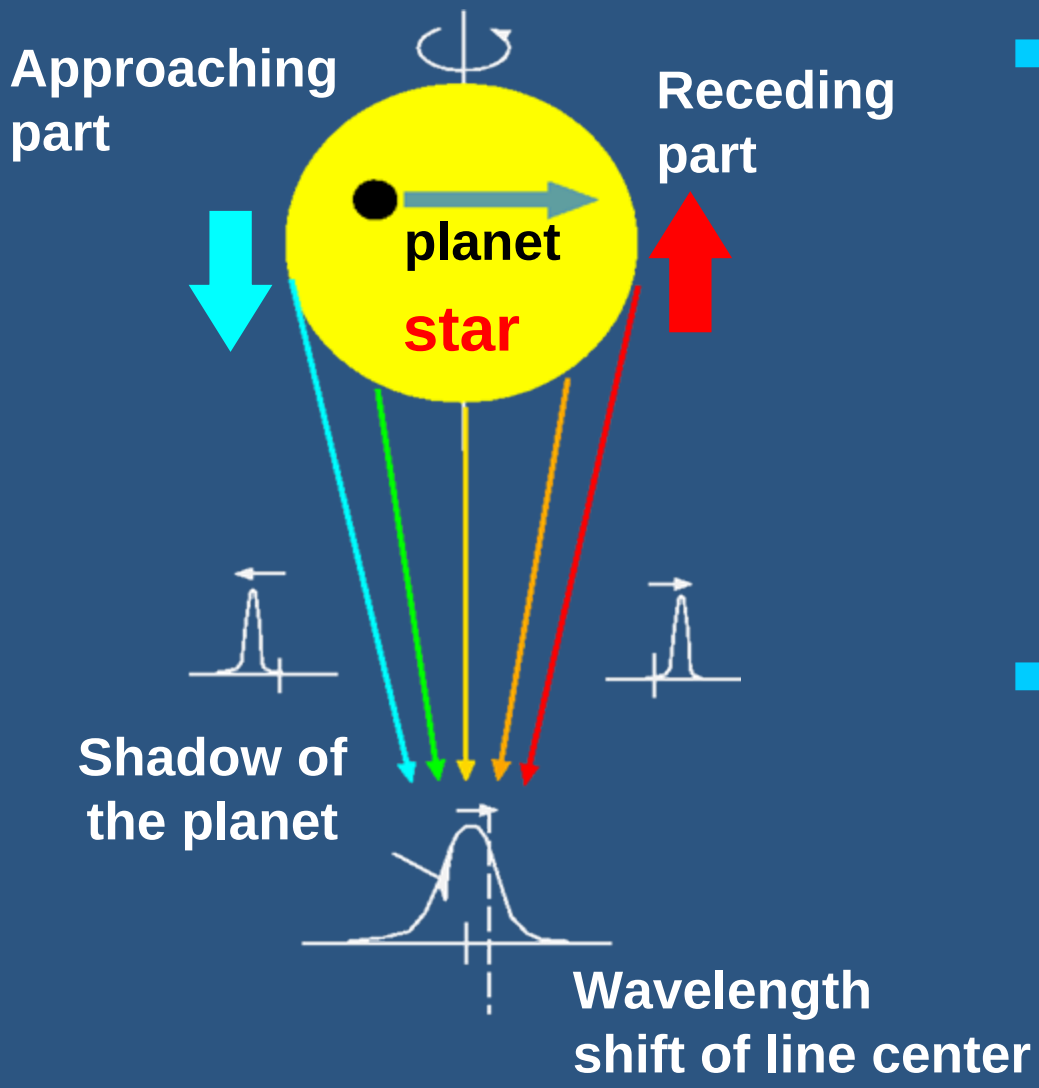
Zoomed Subaru image

Measurement of Spin-Orbit alignment in an Extrasolar Planetary System

- Joshua N. Winn (CfA→MIT), R.W. Noyes, M.J. Holman, D.B. Charbonneau, Y. Ohta, A. Taruya, Y. Suto, N. Narita, E.L. Turner, J.A. Johnson, G.W. Marcy, R.P. Butler, & S.S. Vogt
  - ApJ 631(2005)1215 (astro-ph/0504555)



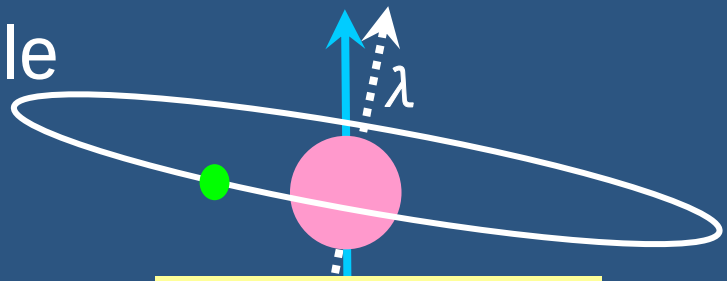
Spectroscopic transit signature: the Rossiter-McLaughlin effect



- Time-dependent asymmetry in the stellar Doppler broadened line profile
  - an apparent anomaly of the stellar radial velocity
- originally discussed in eclipsing binary systems
  - Rossiter (1924)
  - McLaughlin (1924)

Precision analysis of the Rossiter-McLaughlin effect for HD209458

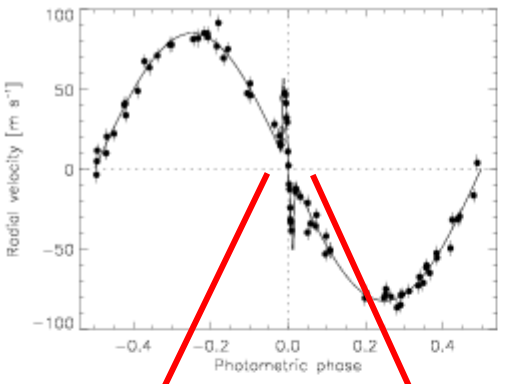
- Ohta et al. (2005) stimulated Josh Winn
- Winn et al.(2005) re-examined HD209458 with the best data available
  - radial velocity data (Keck)
  - optical photometry (HST)
  - infrared photometry (Spitzer)

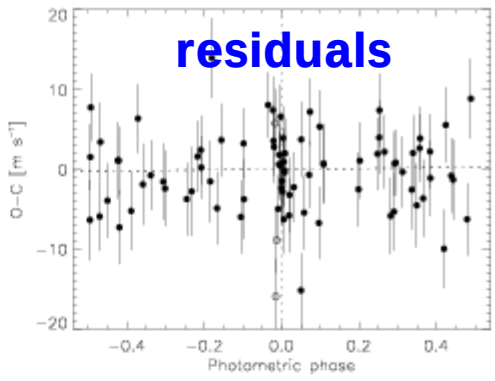


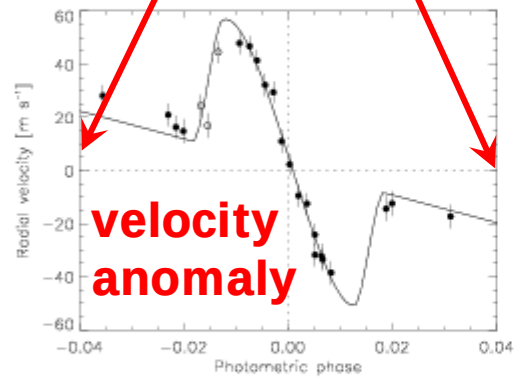
$\lambda = -4^{\circ}.4 \pm 1^{\circ}.4$

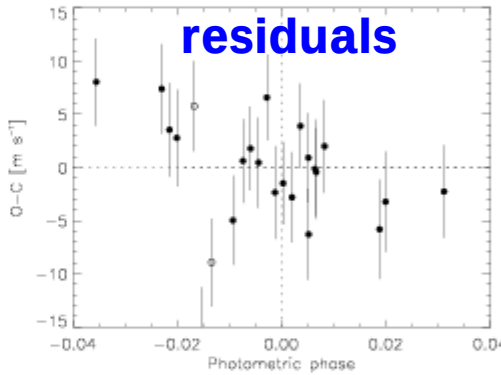
- **the first detection of the misalignment between the stellar spin and the planetary orbital axes by (−4.4±1.4)deg**
  - more than an order-of-magnitude improvement of the previous error-bar (maybe useless but impressive result !)
  - c.f., 6 degree misalignment for the Solar system

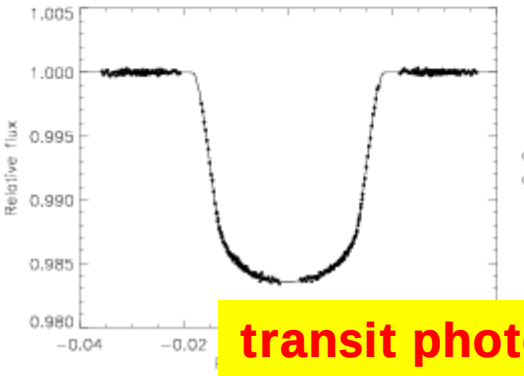
radial velocity (Keck)

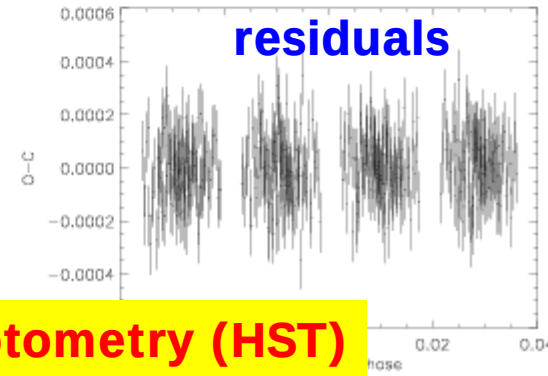






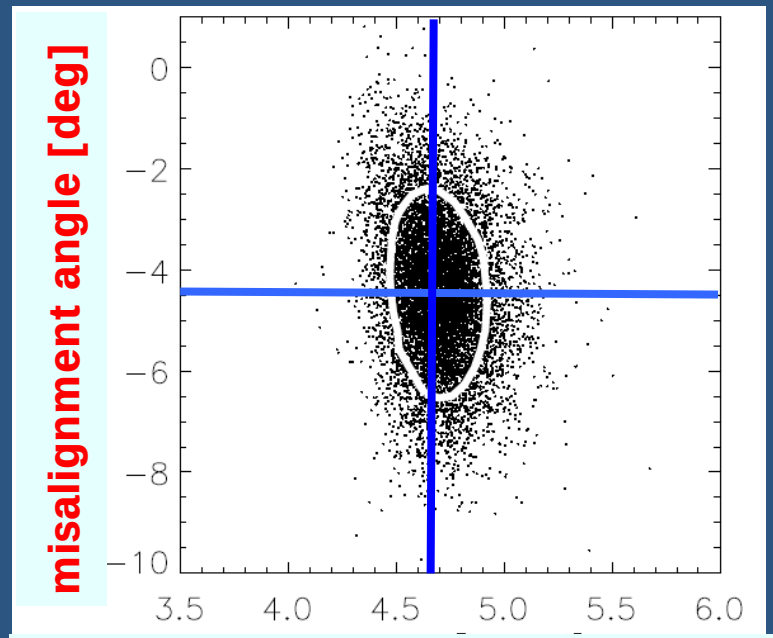






transit photometry (HST)

first detection of non-zero λ !



$$\lambda = -4^{\circ}.4 \pm 1^{\circ}.4$$

3 σ detection !

Winn et al. astro-ph/0504555 ApJ 631(2005)1215


乾杯！
乾杯！


2004/ 5/11