Observational astronomy at the Astronomical Institute of the Slovak Academy of Sciences (Slovakia)

Martin Vaňko & Jan Budaj

YETI/TTV/Mammut f2f workshop on "Young Planetary Systems", November 15-17, 2007, Jena

Astronomical Institute – 3 departments

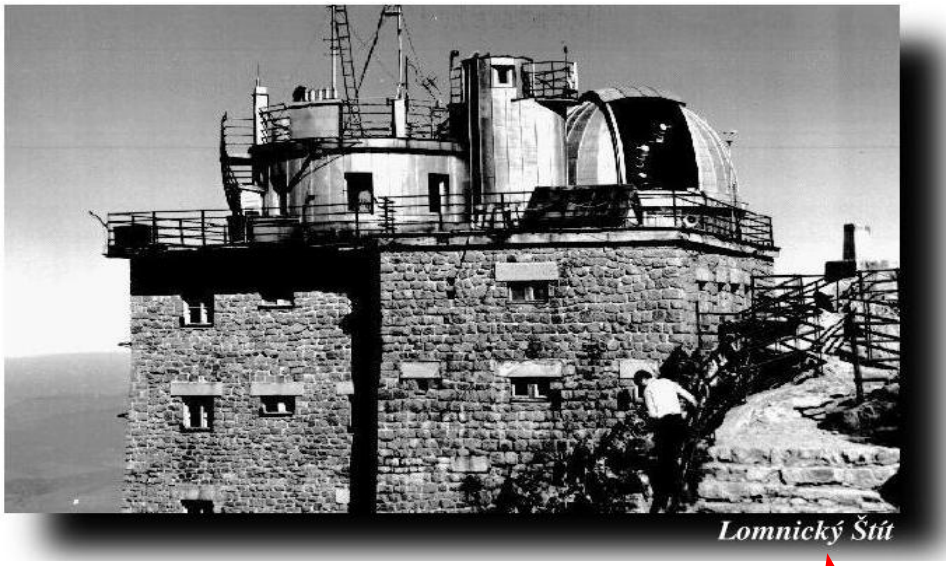
- Interplanetary matter depart.

(i) 60 cm reflector – CCD photometry of comets (ii) all – sky camera -> meteors – bolids detection

- Solar Depart.

(i) Double Coronograph: D = 20 cm, f = 4 m; (ii) Horizontal Spectrograph – observation of Sun's photosphere

- Stellar Depart. ....



altitude - 2 632m above sea level

altitude - 1786m above sea level

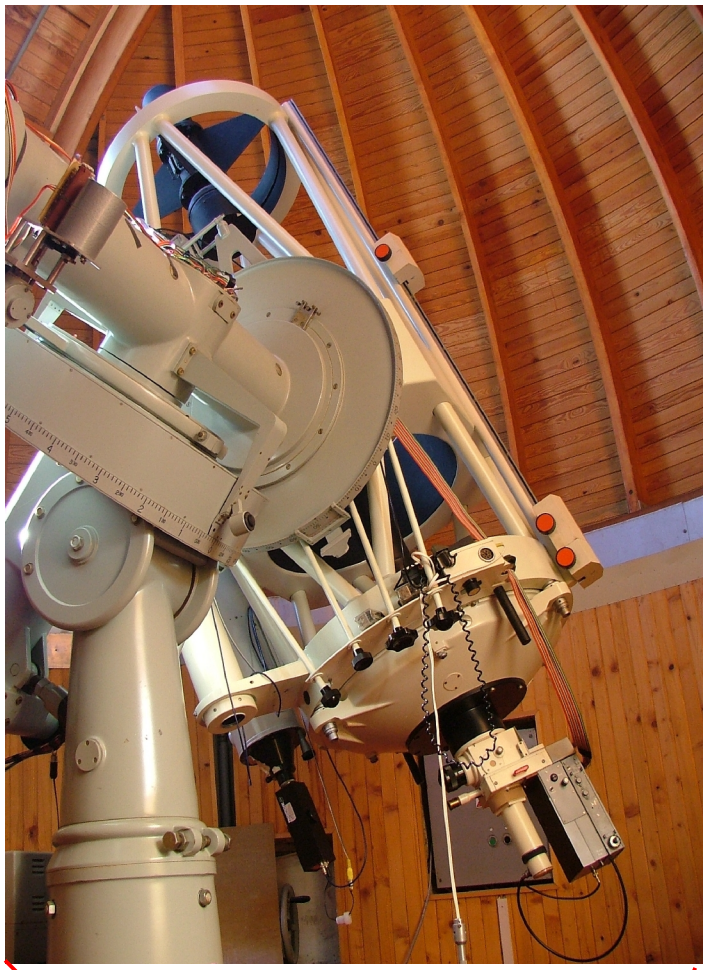
altitude - 785m above sea level – Stara Lesna Observatory

Telescope: 60 cm (24 inch) Zeiss Jena Cassegrain refl. (f=750 cm)

Detectors:

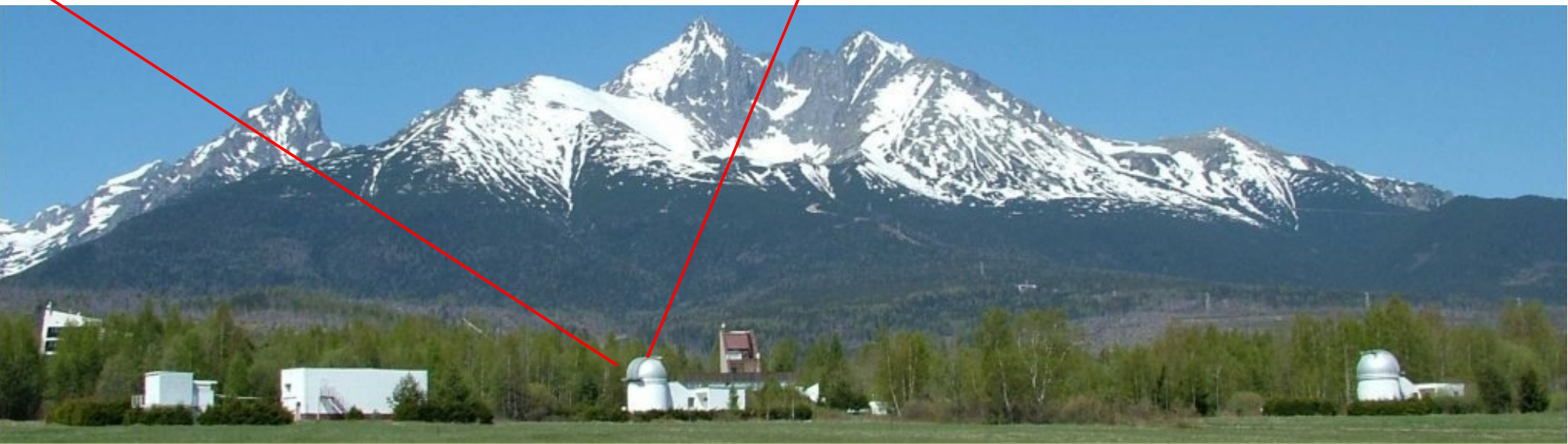
(i) Photoelectric photometer: EMI 9789 Q photomultiplier UBV filter sets;

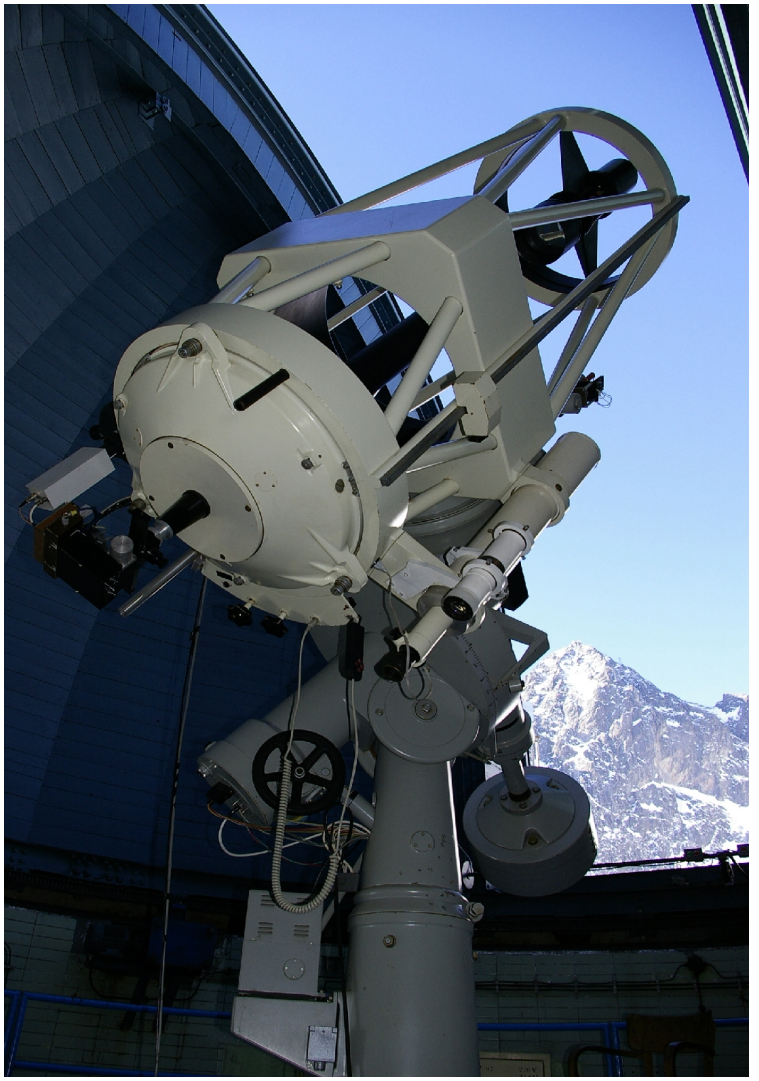
(ii) CCD TK1024 back-illuminate SITe; the sensor size: 24.6 x 24.6mm, 1024x1024 pixels, each 24 μmx24μm; *BVRI* Bessel filter sets



Telescope: 50 cm Newton reflector (f=250 cm)

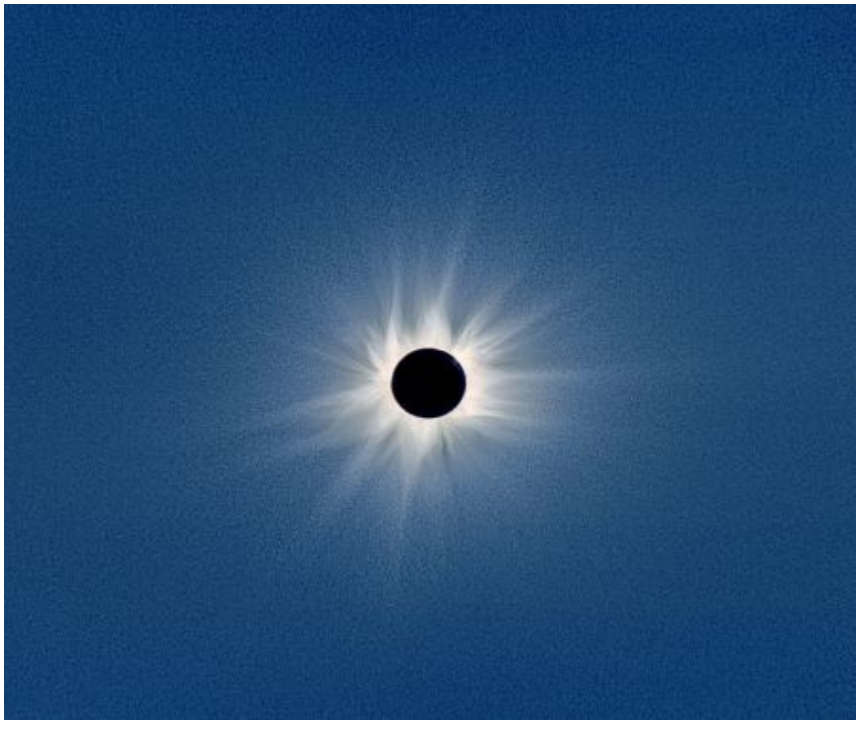
Detector: CCD camera SBIG ST10 MXE, $UBV(RI)_C$ & uvby filter sets





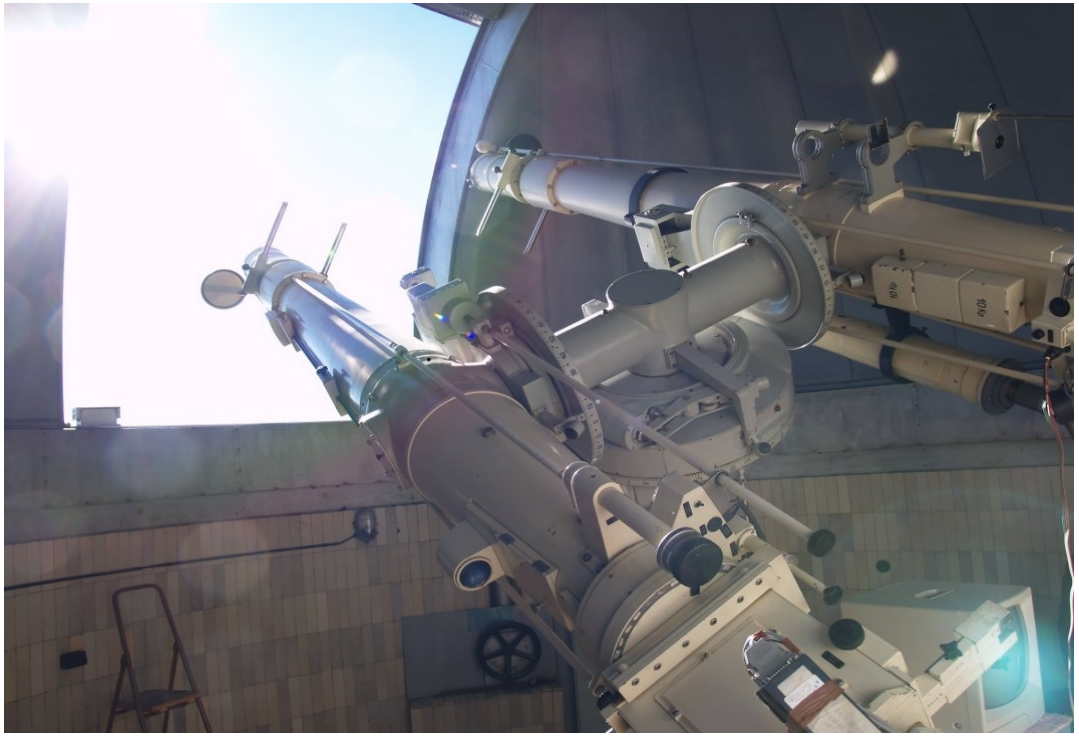
Telescope: 60 cm (24 inch) Zeiss Jena Cassegrain reflector (f=750 cm)

Detector: Photoelectric photometer: OPTEC SSP-5, HAMAMATSU R4457 photomultiplier, UBVR & uvby filter sets



Telescope: Telescope: Double Coronograph: D = 20 cm, f = 4 m, dispersion of the spectrograph = 0.8 nm/mm

Neutron Monitor of cosmic rays: Institute of experimental physics, Slovak Academy of Sciences, Košice, Slovakia



Research in the stellar department

- Transiting Planets – project YETI (Budaj, Vaňko);
- Dynamics and orbital stability of transiting exoplanet systems (Jakubík, Vaňko)
- Close binary and multiple systems of stars, T Tauri systems (Pribulla, Vaňko)
- Symbiotic stars and novae (Skopal, Chochol)
- Cataclysmic variables (Chochol, Hric)
- Low mass stars, synthetic stellar spectra (Budaj)
- Active late-type stars (Zboril)
- Department has 2 telescope operators

Cooperation

- Kolonica Observatory, 1m telescope (Vihorlat mountains, Slovakia), 1m telescope, 2-channel photometer, low-dispersion spectrograph planned
- Mt. Suhora Observatory
- Osservatorio Astronomico di Capodimonte (Napoli, Italy)
- David Dunlap Observatory, Canada
- John Moors University, Liverpool
- SAO, Caucasus Mountains, Russia
- Rozhen Observatory, Bulgaria
- Ondrejov Observatory, Czech Republic
- Toruń Center for Astronomy, Nicolaus Copernicus University, Toruń, Poland
- Institute of Physics/IGAM, University of Graz, Austria
- Astrophysikalisches Institut und Universitäts-Sternwarte, Jena, Germany

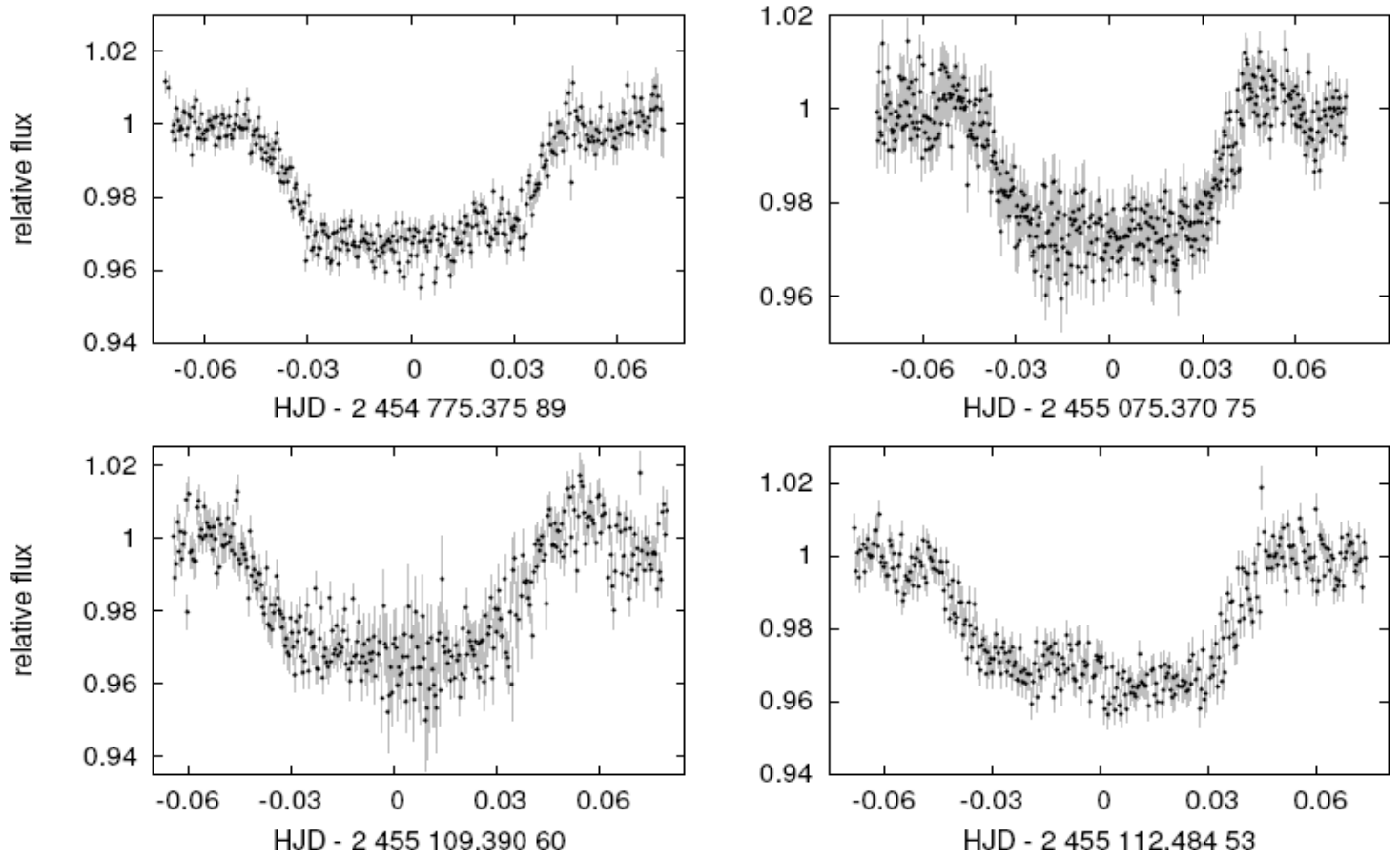
Transiting Planets at the Stara Lesna Observatory

Project YETI (Young Exo-planet Transit Initiative)

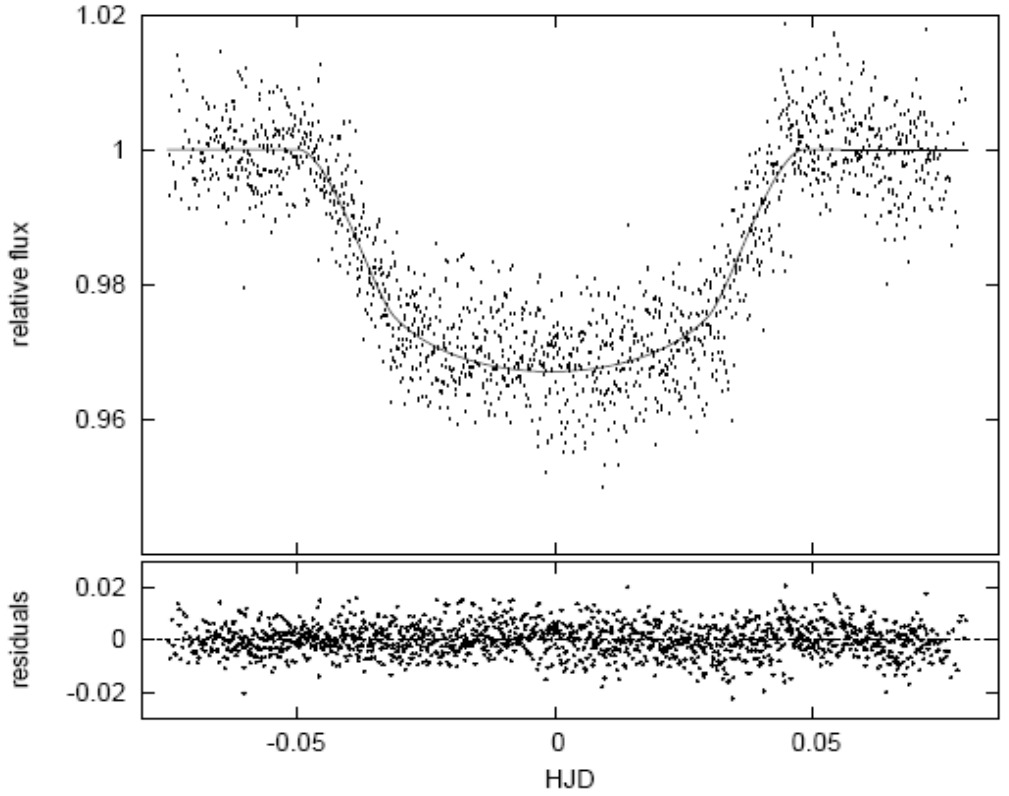
CCD TK1024 back-illuminated SITe; the sensor size: 24.6 x 24.6mm, 1024x1024 pixels, each 24 μmx24μm; *BVRI* Bessel filter sets – the camera lent by Jena University Observatory for project YETI

Transiting Planets at the Stara Lesna Observatory

Photometric observations of transiting exoplanet WASP-10b: *Krejčová, Budaj et al. 2010*



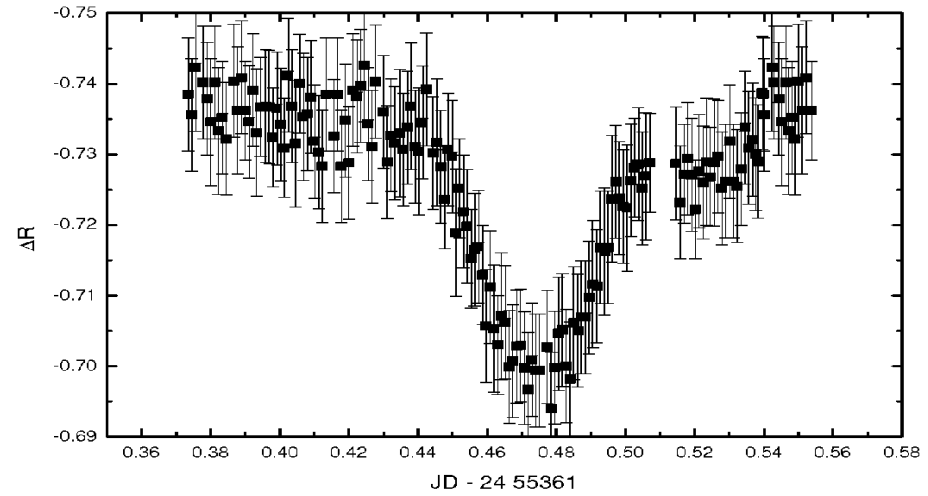
Composition of 1533 data points from all 4 nights

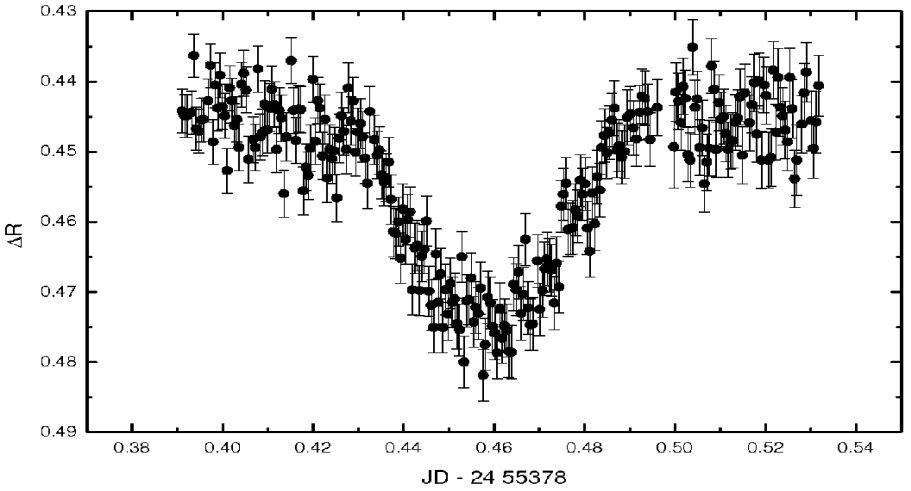


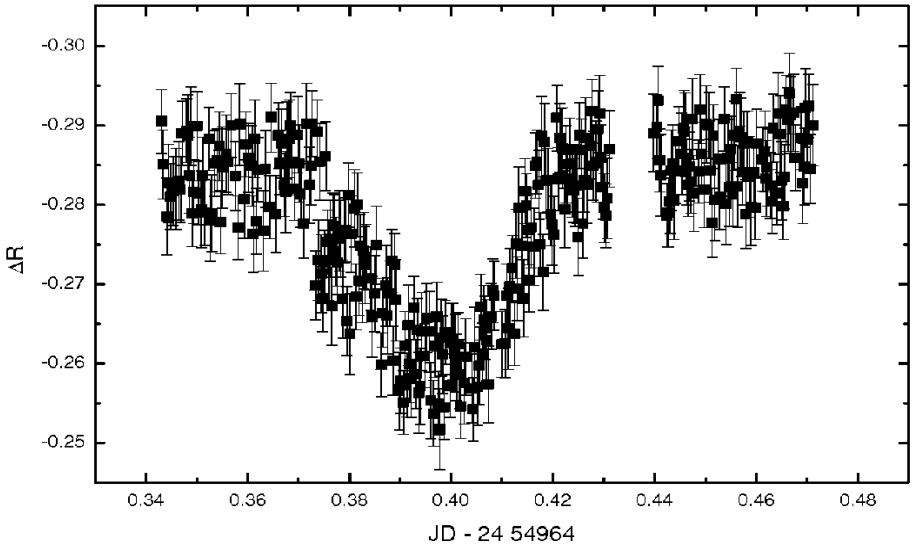
Results:

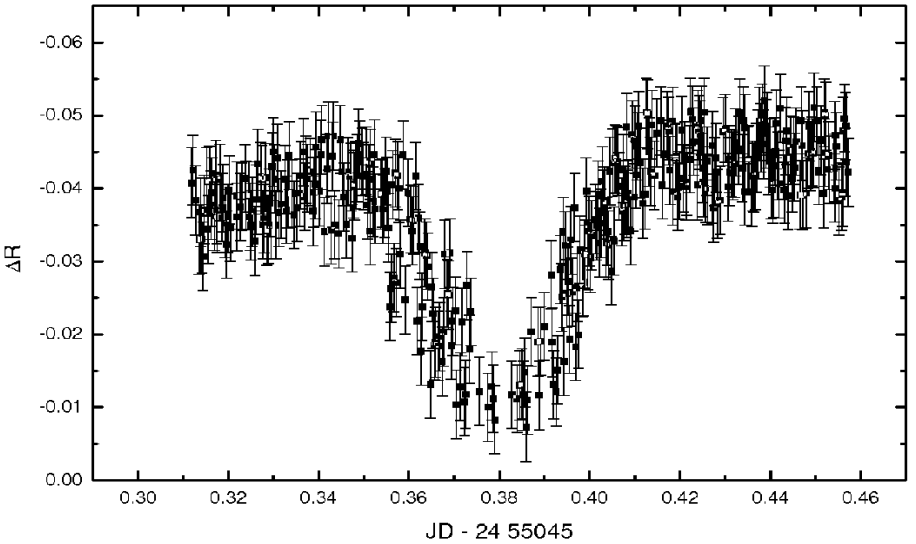
- Improvement of the orbital period
- The Rp – significantly larger than the latest estimate of Johnson et al. (2009)
- One of the possible expl.: additional alternative mechanism is required to enlarge the planet size ?

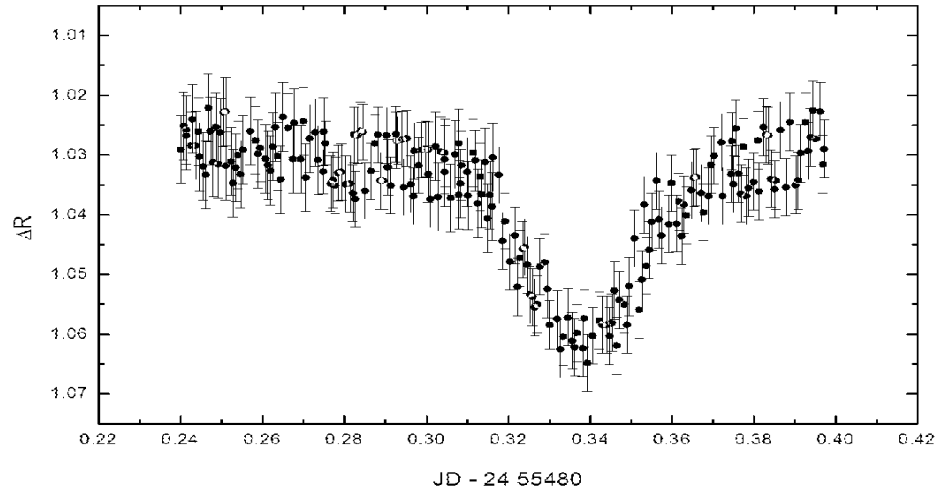
Parameter	This work	(Christian et al. 2009)	(Johnson et al. 2009)
$R_{\rm p}/R_*$	0.168 ± 0.001	$0.170\,3 \pm 0.002\,9$	$0.159\,18^{+0.000\,5}_{-0.001\,15}$
R_*/a	0.094 ± 0.001	—	0.086 ± 0.009
i [deg]	87.3 ± 0.1	$86.9^{+0.6}_{-0.5}$	$88.49^{+0.22}_{-0.17}$
$P_{\rm orb}$ [days]	$3.092\,731 \pm 1 \times 10^{-6}$	$3.092\,763\,6^{+0.000\,009\,4}_{-0.000\,021}$	—
$R_{\rm p}$ [$R_{\rm J}$]	1.22 ± 0.05	$1.28^{+0.077}_{-0.091}$	1.08 ± 0.02
R_* [$R_\odot$]	0.75 ± 0.03	$0.775^{+0.043}_{-0.040}$	0.698 ± 0.012
$T_{\rm D}$ [days]	$0.097\,4 \pm 8 \times 10^{-4}$	$0.098\,181^{+0.001\,9}_{-0.001\,5}$	$0.092\,796^{+0.000\,33}_{-0.000\,28}$



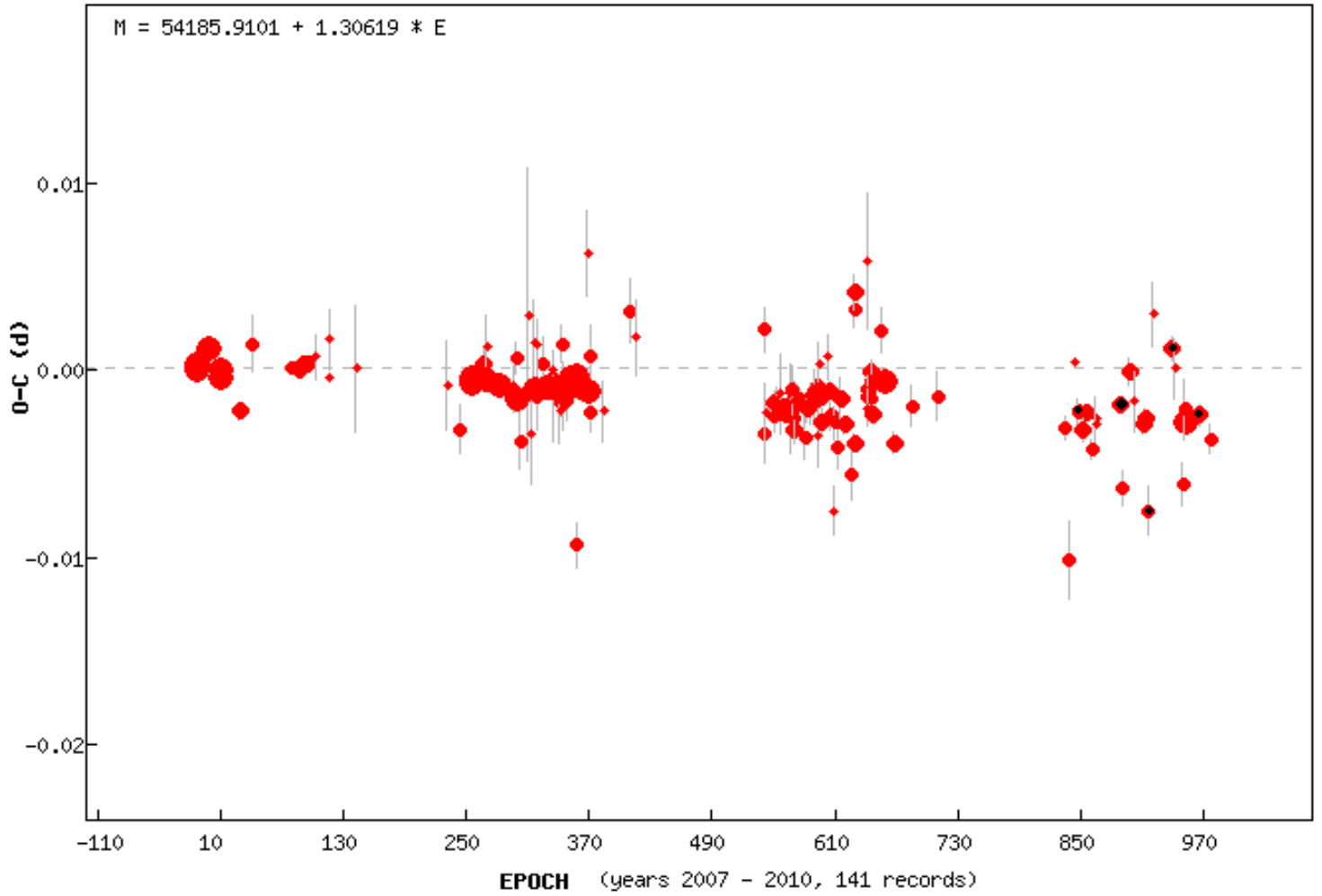








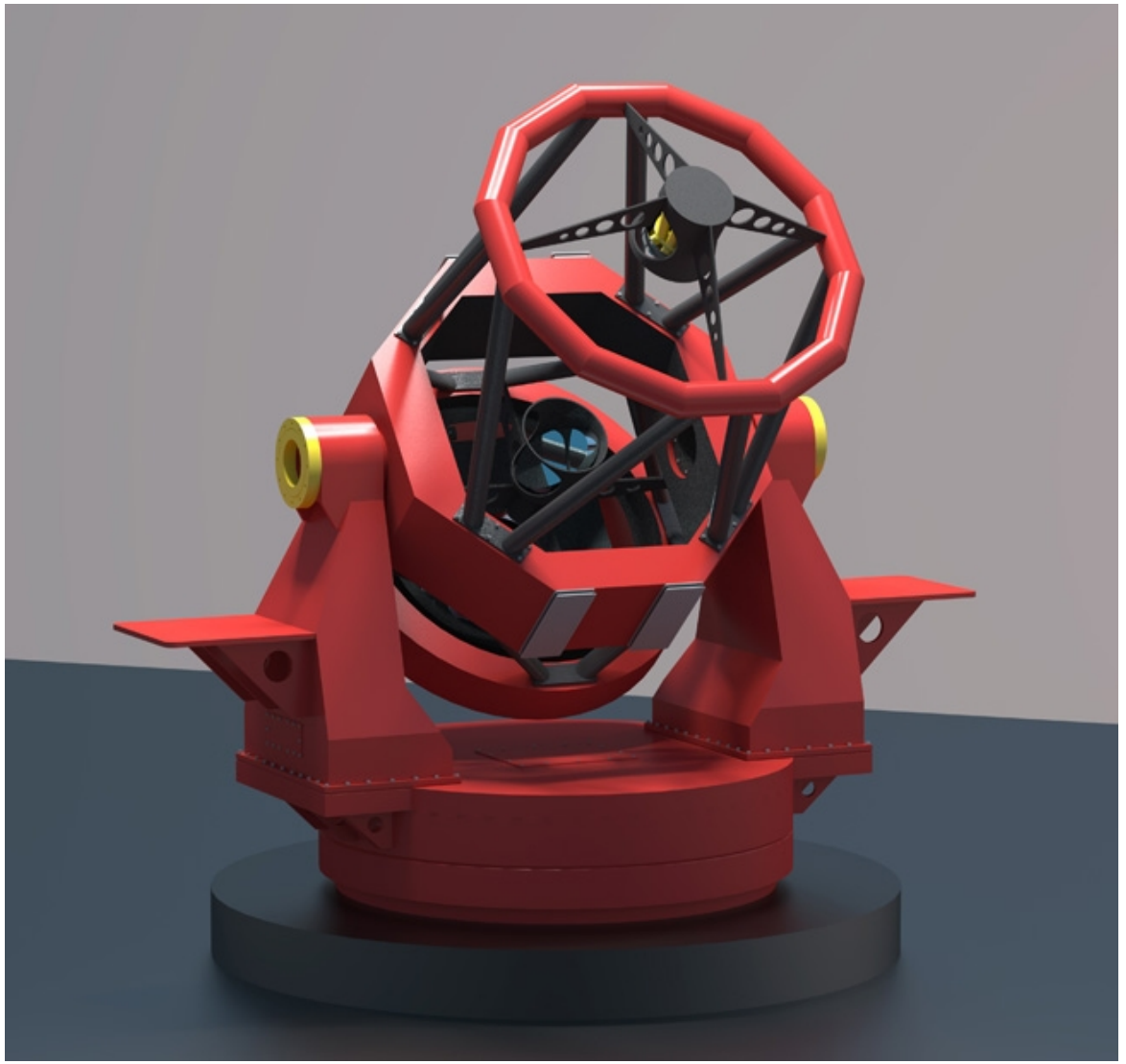
- TrES-3b – observations in 2009 and 2010 at the Stara Lesna Observatory



- Timing residuals of TrES-3b; the residua determined from last 5 light curves are denoted as blue points
- Additional 3 transits are of worse quality, will be added later with the smaller weight + 6 new residua from University Obs. - Kolonica (14 timing residuals in total) - TTV analysis is in the process – *Vanko & Budaj, 2011, in prep.*

Plans and projects

- Building medium-size robotic telescope (1.3m in diameter) equipped with high-dispersion spectrograph and large-format CCD camera – EU funds



- Building of educational center including planetarium and congress center

- 1.3m Cassegrain – Nasmyth configuration
- System focal length 10400 mm
- Max. telesc. FoV ~ 0.5 degr.
- Location – Skalnate Pleso Observatory, altitute 1786m
- First light – Summer 2013:)

Thank You !