Serbian-Bulgarian activities in line with Gaia Alerts during 2018

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Introduction

- Global Astrometric Interferometer for Astrophysics - GAIA; surveying the full sky (astrometrically, photom.and spectroscopically). The Gaia DR2 at 25th April 2018, ~1.7 billion sources: ~1.3 with 5 param. for epoch J2015.5, plus ~0.4 faint sources. The ESA space astrometry mission or Gaia satellite (Dec.2013), astron.observations - at July 2014.
- Goal: catalogue of ~1 billon sources (in astrometry and photometry until V=20 mag) and ~150 million objects to 16 mag in spectroscopy. Optical Gaia celestial reference frame (Gaia CRF) in the future, QSOs based one; link Gaia CRF – ICRF via QSOs visible in optical domain.
- Near 2000 objects or Gaia Alerts from all over the sky per year (from Oct.2014). At 2013 the "Serbian-Bulgarian mini-network telescopes".

Mini-network (3 sites, 6 telescopes):

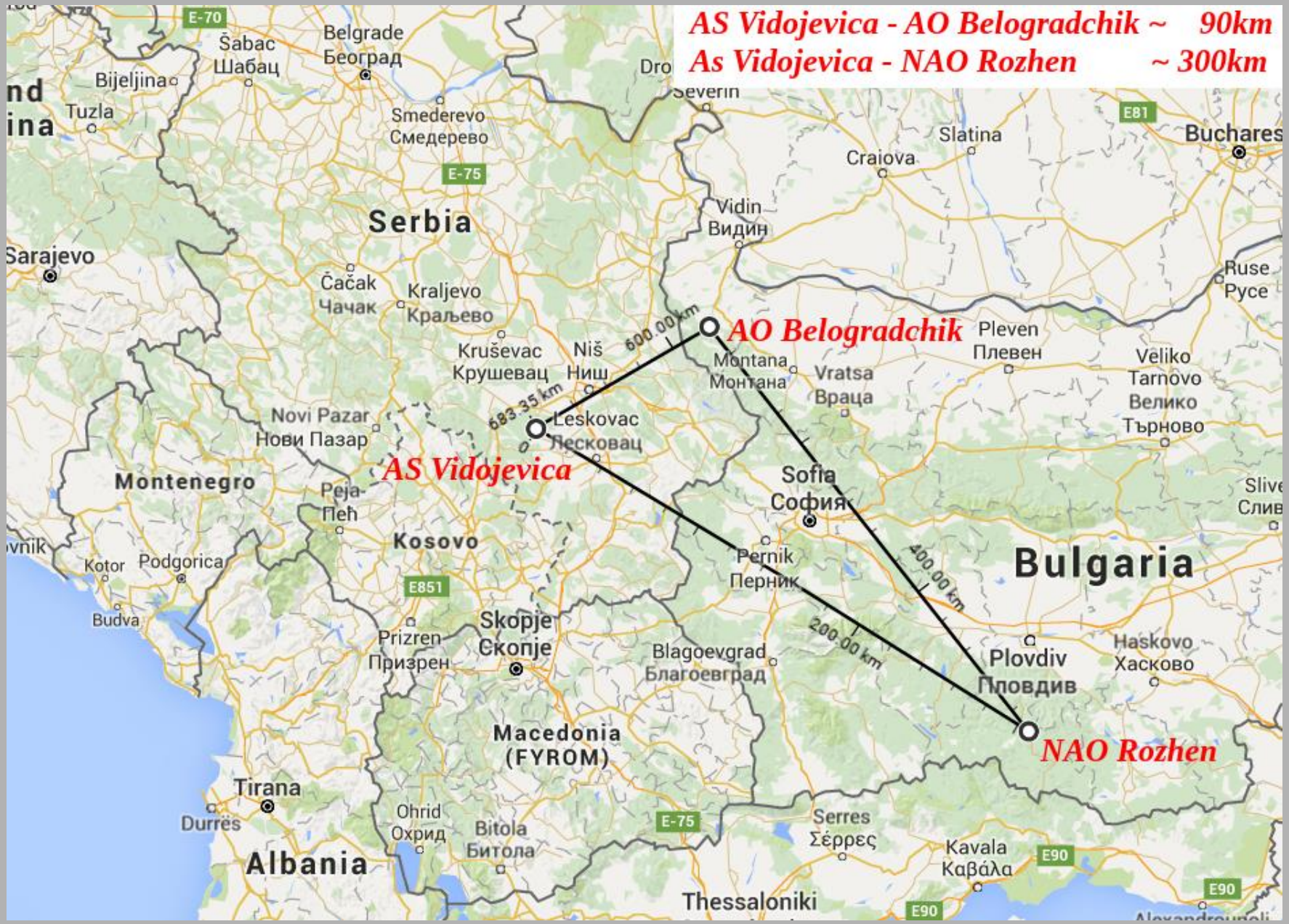
- 60 cm (at 2011) and 1.4 m tel. (since mid-2016) of Astronomical Station Vidojevica - ASV of Astron. Observatory in Belgrade - AOB (Serbia),
- 2 m, 60 cm and 50/70 cm Schmidt-camera at Rozhen National Astronomical Observatory (NAO) of Bulgarian Academy of Sciences (BAS),
- 60cm Belogradchik AO (Bulgaria).

And the 1.31m ARIES (Aryabhatta Research Institute of observational sciencES, India) tel.

Johnson UBV and Cousins RcIc filters.

The SASA-BAS joint research project "Study of ICRF radio-sources and fast variable astronomical objects" 2017-2019 (head-G.Damljanović).

ASV, Belogradchik and Rozhen



The instruments:

1) 60 cm Cassegrain (long.=21.5º, lat.=43.1º, h=1136m), CCD Apogee Alta U42 (E47), SBIG ST-10 XME, ASV (Serbia),

2) 1.4 m Ritchey-Chrétien (21.6, 43.1, 1143m), Nasmyth, bent Cassegrain, CCD Apogee Alta U42, Andor iKon-L, ASV (Serbia),

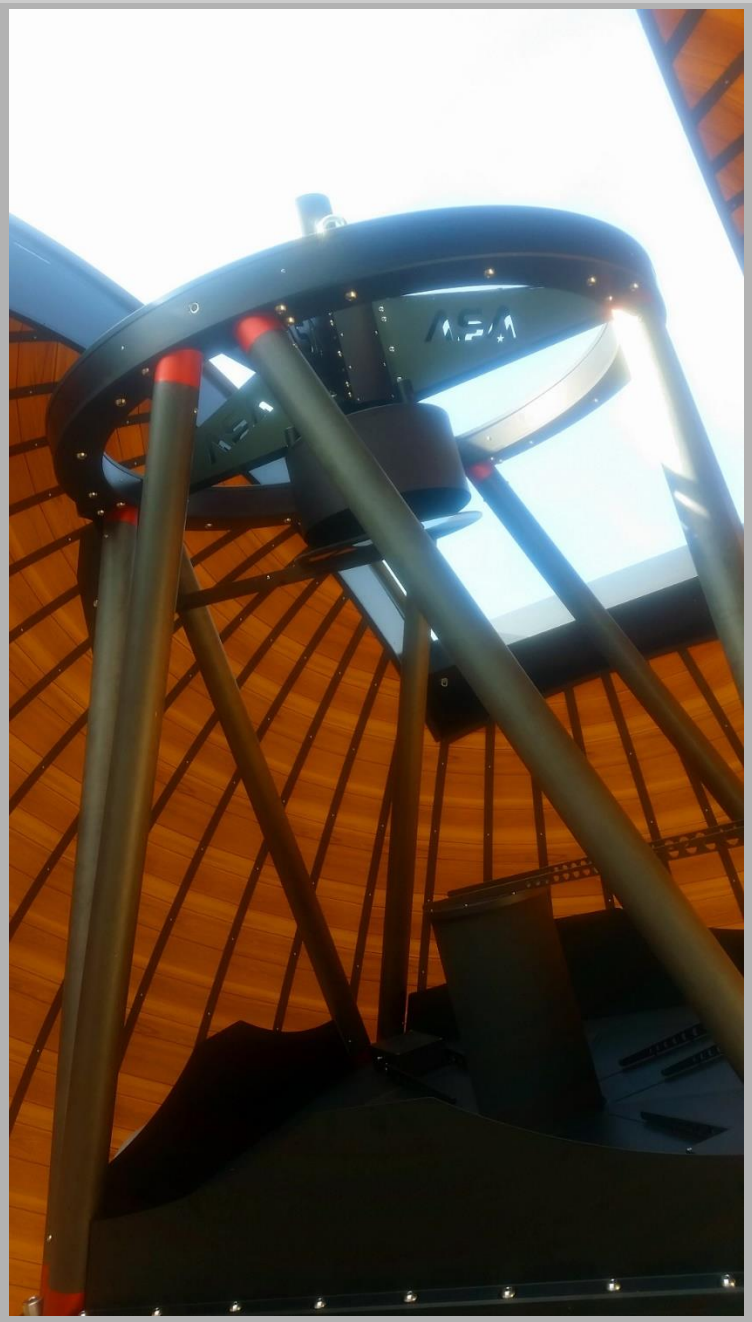
3) 2 m Ritchey-Chrétien (24.7º, 41.7º, 1730m), CCD VersArray 1300B, Andor iKon-L, Rozhen NAO (Bulgaria),

4) 60 cm Cassegrain (24.7º, 41.7º, 1759m), CCD FLI PL09000, Rozhen NAO (Bulgaria),

5) 50/70cm Schmidt-camera (24.7º, 41.7º, 1759m), CCD FLI-New PL16803, Rozhen NAO (Bulgaria),

6) 60cm Cassegrain (22.7º, 43.6º, 650m), CCD FLI PL09000, Belogradchik (Bulgaria).

The 1.4m ASV (Serbia), since mid-2016



BELISSIMA project, Ritchey-Chrétien, Nasmyth

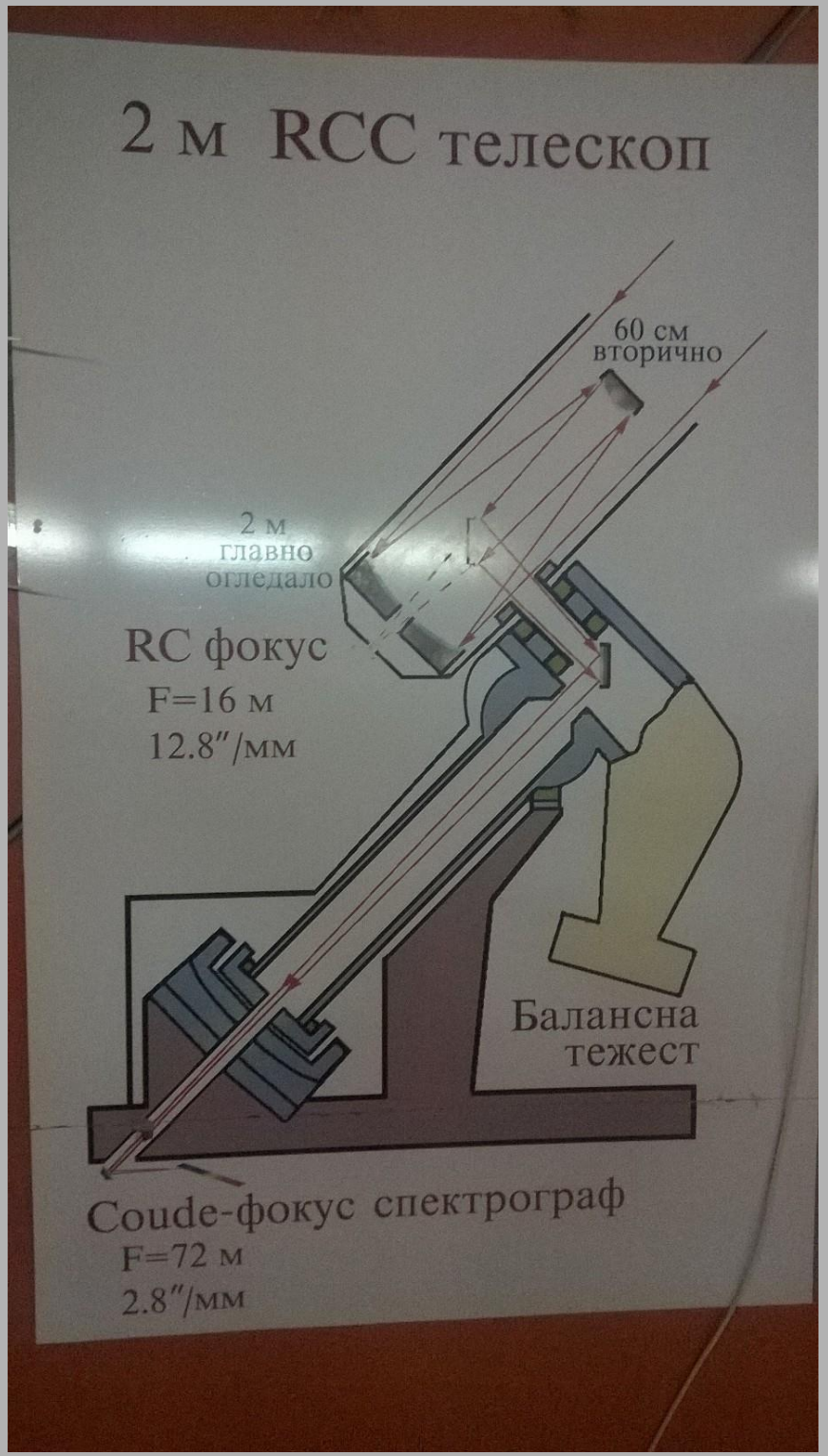
Optical observations of Gaia Alerts, Gaia-FUN-TO

1) The ASV (D/F=0.6/6m) tel. The CCD Apogee Alta U42 (2048x2048 pixels, pixel size is 13.5x13.5 μm, scale is 0.″465/pixel, FoV=15.8x15.8′) + E47 (1024x1024, 13.5x13.5 μm, 0.″446/px, 7.6x7.6′) + SBIG ST10 XME (2184x1472, 6.8x6.8 μm, 0.″23/px, 8.4x5.7′).

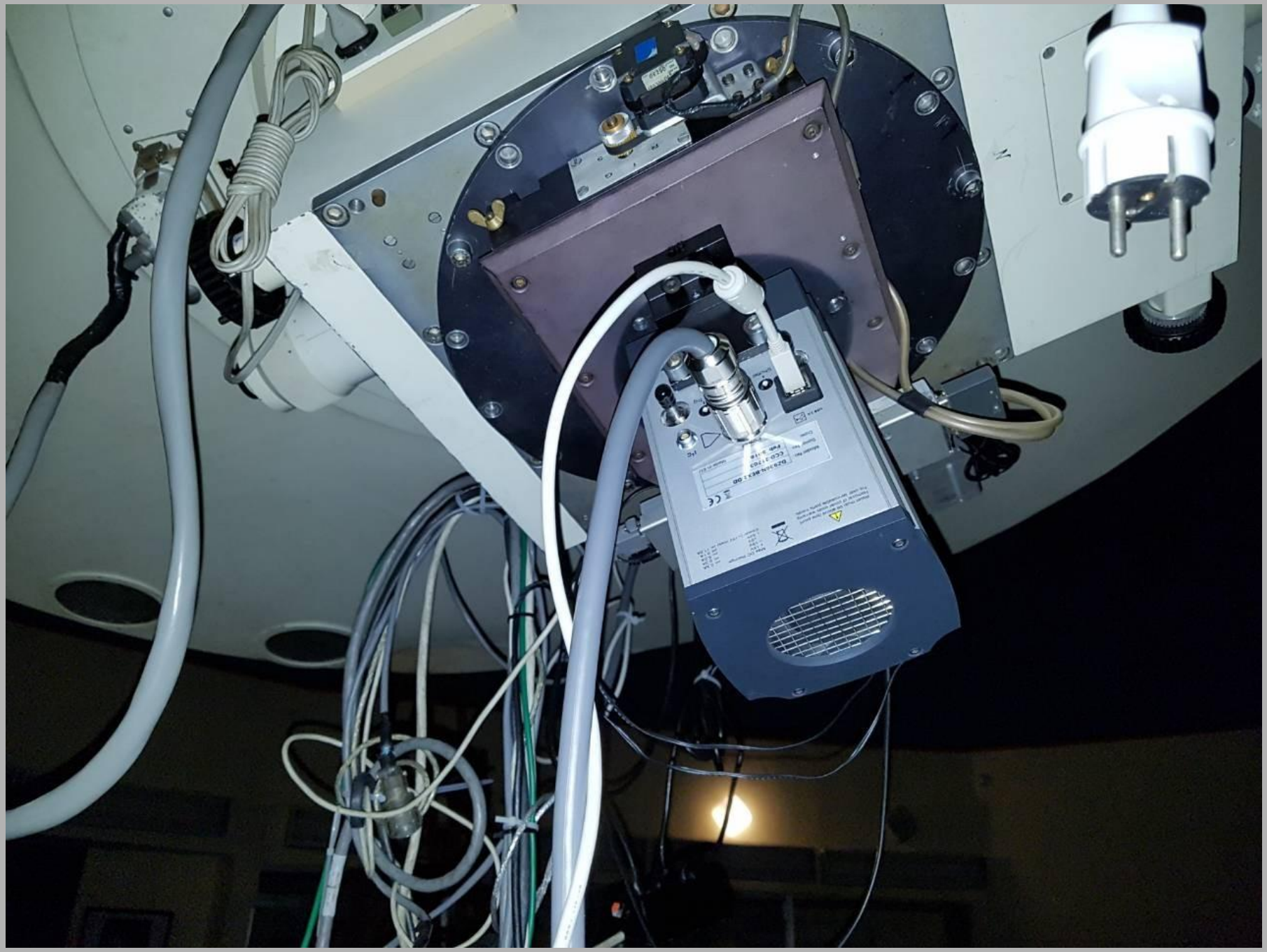
2) The R.C. (D/F=2/15.774m) tel. of Rozhen NAO BAS. The CCD VersArray 1300B: 1340x1300, 20x20μm, 0.″261/px, 5.6x5.6′. Since April 2018, Andor iKon-L: 2048x2048, 13.5x13.5 μm, 0.″176/px, 6.0x6.0′.

Schmidt-camera 50/70cm

Rozhen 60 cm


2 м RCC телескоп
60 см
вторично
2 м
главно
огледало
RC фокус
F=16 м
12.8″/мм
Балансна
тежест
Coude-фокус спектрограф
F=72 м
2.8″/мм

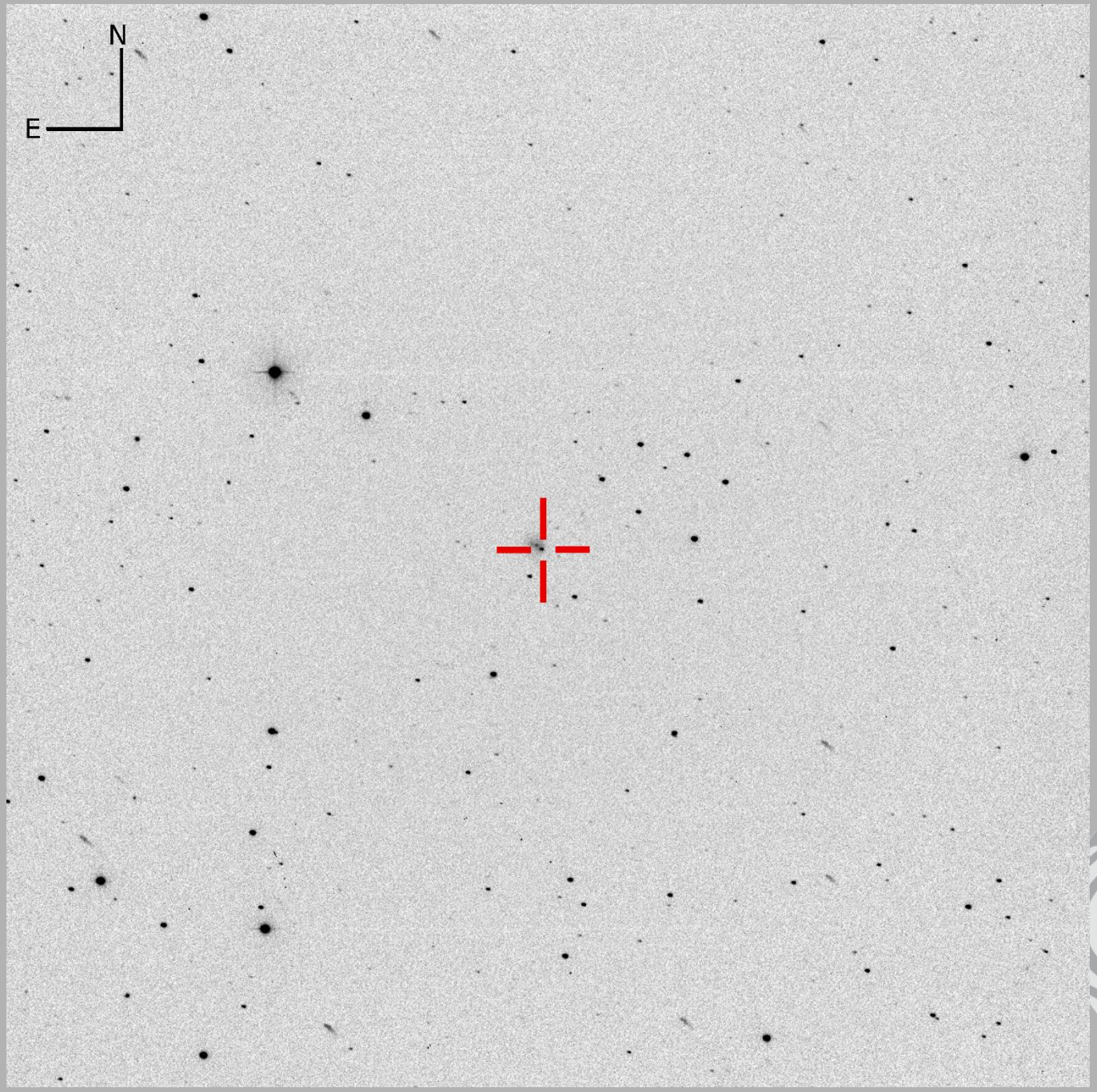
Telescope 2 m, Rozhen NAO BAS



3) The 60 cm Rozhen telescope (F=7.5 m).
The CCD FLI PL09000: 3056x3056, 12x12 μm, 0.″33/pixel, 16.8x16.8′; under reconstruction until mid-2018.
4) The 50/70 cm Schmidt-camera (F=1.72m), Rozhen NAO.
The CCD FLI PL16803: 4096x4096, 9x9 μm, 1.″08/pixel, 73.7x73.7′ .
5) The 60cm Belogradchik telescope (F=7.5 m).
The CCD FLI PL09000: 3056x3056, 12x12 μm, 0.″335/pixel, 16.8x16.8′.
6) The 1.4 m ASV (F=11.42 m) telescope, since mid-2016. The CCD Apogee Alta U42: 2048x2048, 13.5x13.5 μm, 0.″243/pixel, 8.3x8.3′. New CCD Andor iKon-L 936: 2048x2048 pixels, 13.5x13.5 μm, 0.″24/pixel, 8.3x8.3′.

Belogradchik 60 cm telescope (Bulgaria)

Gaia18bka–ATLAS18qqn-AT2018cow (B-filter, Exp.=240s), July11th2018, 60cm ASV/ Apogee Alta U42



Gaia18bka–ATLAS18qqn-AT2018cow
11thJuly - 9thSept. 2018

- **60 cm ASV (7), 2m Rozhen - FoReRo (1), Schmidt-camera 50/70cm at Rozhen (1);** cooperation with Rupak Roy (India),
- very powerful astronomical explosion at ~60Mpc associated with a galaxy CGCG 137-068, z=0.014, RA(J2000)=16:16:00.22 and Dec.(J2000)=+22:16:04.89, discovery mag 14.74,
- it was first detected on 16 June 2018 by the ATLAS-HKO telescope (the Haleakala Observatory in Hawaii),
- very unusual transient (supernova Ic ?),
- AT2018gep-ZTF18abukavn (the Zwicky Transient Facility), rapidly rising blue transient at r=20.5mag (rose 4mag in under 2 days), z=0.033, first discovered on 9th Sept.2018,
- **Schmidt-camera 50/70cm (2)** at 14th and 16th Sept.2018 (Dr. G.Latev, Bulgaria).

Observed objects(11), 1st Oct.2017-1st Oct.2018:

- **60 cm ASV (10)**: Gaia16aye(3), Gaia16bnz(2), Gaia17bts(3), Gaia17cpa(1), Gaia17cut(1), Gaia17cup(1), Kojimaevent(1), Gaia18arn(1), Gaia18axl(2), Gaia18bqa – ATLAS18qqn – AT2018cow(7) .
- **1.4 m ASV (-)**: aluminization, new dome (May-Sept.2018).
- **2m Rozhen - FoReRo (1):** AT2018cow(1).
- **50/70 cm Schmidt-camera at Rozhen (2):** AT2018cow(1), AT2018gep(2).
- **60 cm Rozhen (-):** - (under reconstruction until mid-2018).
- **60 cm Belogradchik (-)**: - (bad weather for observations).

Conclusions

- The Gaia-FUN-TO (11 objects Oct.2017-Oct.2018, 45 ones 2014-2017) using 6 telescopes, and BVRcIc filters; the seeing=1.″0 to 3.″5 (mean~1.″2 at ASV site, it could be 0.″7 at Rozhen and ASV).
- Oct.2017-Oct.2018, there are: ~270 CCD images using 60 cm ASV tel. (Serbia), 32 ones with Rozhen Schmidt-camera 50/70 cm, and 6 ones at 2 m Rozhen FoReRo (Bulgaria); sum ~ 310 images (~2000 ones from Oct.2014).
- It is possible to observe the objects until V~20mag by using 2 m Rozhen or 1.4 m ASV (Exp.time. ~5min), or until V~19mag with smaller instruments.
- The 1.4 m tel. at ASV site from mid-2016: new CCD Andor iKon-L 936 (also, for 2 m Rozhen since April 2018), new EMCCD Andor iXon 897 for lucky imaging, new dome. Aluminization at 2017 – 2 m Rozhen.

Thank you!