Observations with the Robotic Telescope of the Terskol Observatory

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Abstract. The Institute of Astronomy is working on the development of robotic monitoring systems to solving a wide range of astrophysical problems since 2014. In 2019, a robotic telescope was created on the basis of the serial 14-inch telescope Meade LX200 GPS. The special software has been developed. This software allows make observations in automatic mode without operator. Robotic telescope IRT-35 is located on the The International Observatory at Terskol Peak. Photometric observations of variable stars and searching of optical transients are carried out on the telescope in a test mode.

Keywords: telescopes; methods: observational

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1 Introduction

Since 2014, the Institute of astronomy of the Russian Academy of Sciences has been developing robotic optical monitoring systems to solve a wide range of astrophysical problems. In 2019, a fully functional robot telescope IRT-35 was created based on the tube of the serial telescope 14-inch Meade LX200GPS. The advantage of such systems is the ability to perform observation tasks either completely without operator involvement, or with minimal human intervention in the observation process. Especially valuable is the use of robotic surveillance systems in hard-to-reach places, for example, high in the mountains or in places with difficult weather conditions. The International Observatory at Terskol Peak (altitude 3150 m) is just the right place to install such a system. The low content of water vapor and the transparency of the atmosphere in high altitude conditions make the observatory at Terskol Peak one of the best observation sites in Russia.

2 Robotic Telescope IRT-35

The robotic telescope IRT-35 (INASAN ROBOTIC TELESCOPE 35 cm) consists of a Meade 14 LX200 GPS telescope with a focus reducer, mount Sky-Watcher EQ8 Pro, Atik 460EX CCD camera with a UBVR filter wheel and a focuser FLI Atlas. Parameters of the Meade LX200 telescope with focus corrector: aperture - 356 mm, focal length - 2100 mm, effective focal ratio with focus reducer - f/6.26. Parameters of the Atik 460EX CCD camera: chip size - 12.5×10 mm, pixel size - 4.54 um, chip capacity - 2749×2199 pixels, image scale - 0.42 arcsec/pixel. The field of view of the telescope with the Atik 460EX camera is 19×15 arcsec. Additionally, the filter wheel has a low-resolution slitless grism spectrograph. The robotic telescope IRT-35 is housed in an automated Carl Zeiss Jena dome with a diameter of 5 m.

3 Photometric Observations with IRT-35

The robotic telescope IRT-35 is usually used for photometric observation of variable stars and optical transients (Dzaparova et al. 2019). The telescope carries out photometric studies of objects up to 16^m with an exposure of 45 s and with SNR = 50 (V). In this case, the photometric observation accuracy is less than 0.01^m. As a result of IRT-35 operation in 2019 - 2020, long-term observation series of RW Tri, ET Dra, LO Peg, UV Cet, BZ Cam, FK Com, GPX-TF23-4171, GPX-TF16E-48 were obtained (Krushinsky et al. 2020). In 2020, within the framework of the project "Support and Development of the Center for Shared research facilities "Terskol Observatory" of the Institute of Astronomy of the Russian Academy of Sciences (project 05.621.21.0020)", the robotic telescope will be upgraded. The robotic telescope will be equipped with a wide-angle telescope RASA 11 with a ZWO ASI6200MM Pro camera. The RASA 11 telescope parameters: aperture - 279 mm, focal length - 620 mm, focal ratio - f/2.2. The wide-angle telescope passed tests at the Zvenigorod observatory of INASAN showed excellent quality of stellar images (FWHM = 1.6-1.9 arcsec.) Over the entire field of view, which is 3°×2° with the new camera. The installation of the second telescope will allow the IRT35 robot telescope to be used both as a survey instrument for searching for optical transients and for photometric studies of selected objects.

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