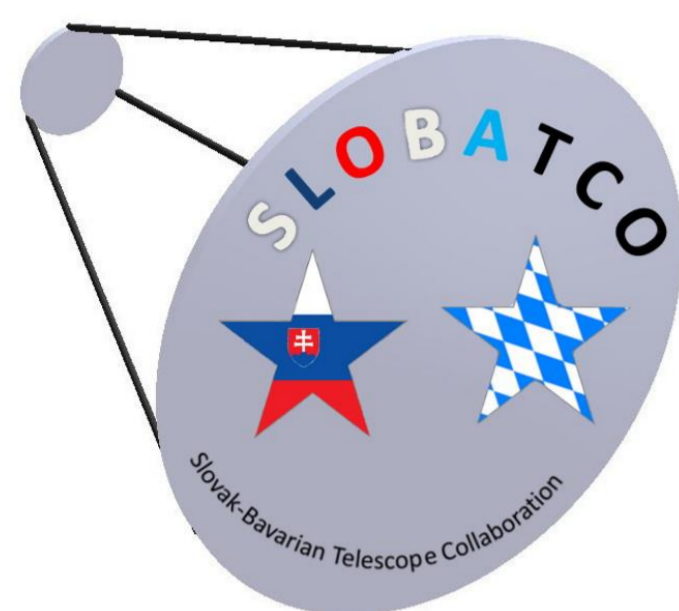


Segmented infrared filters for the 1.3m telescope in the Slovak Tatra Mountains

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Logo of the SLOBATCO project

Abstract

Since 2015, the Astronomical Institute of the Slovak Academy of Sciences (AI SAS) is operating a modern EU-funded reflecting telescope with a 130 cm primary mirror, located in the Skalnaté Pleso Observatory in the Tatra Mountains at an altitude of 1783 m. In 2018, the funding agency BAYHOST granted the proposed project SLOBATCO to Aschaffenburg University of Applied Sciences. The cooperation project pursues the development of astronomical NIR filters, which are designed for the atmospheric transmission windows in the infrared spectral range. In order to avoid a complex cryogenic filter wheel for the NIR CCD camera operated at low temperatures, the observations should be realized through a segmented filter using precise shifts of the image field. The bi-national cooperation project and the specification of the infrared filter combination are presented in this poster contribution.

Introduction

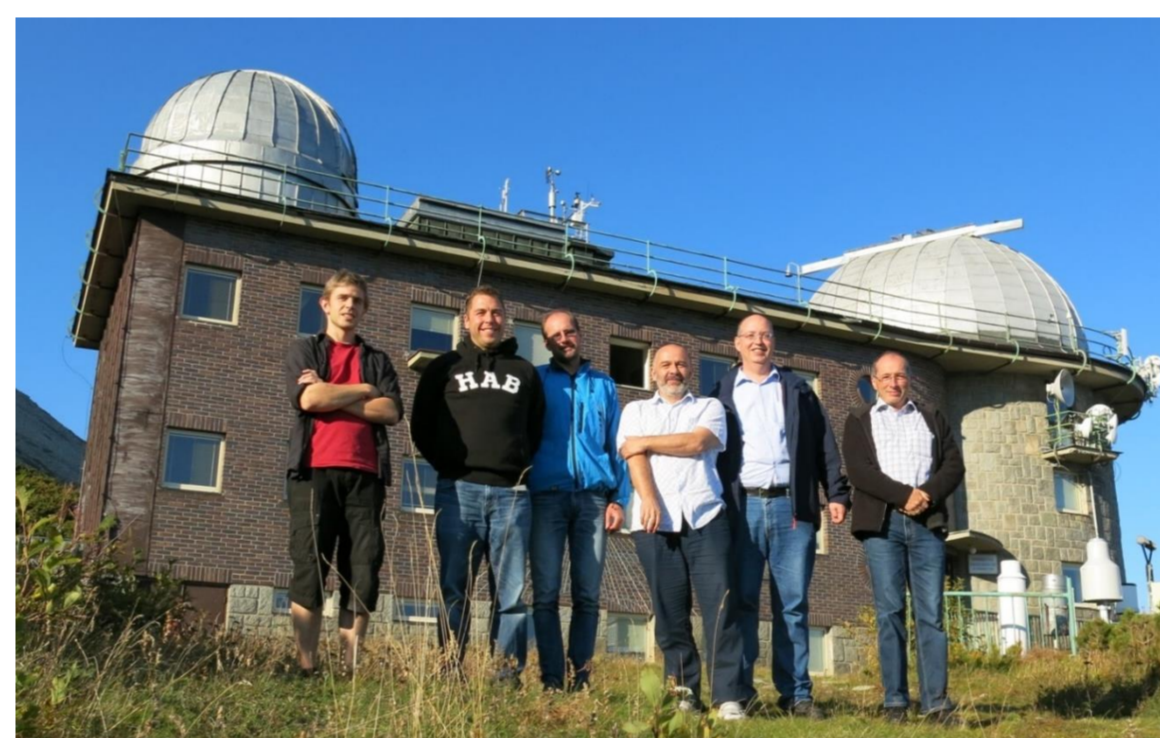


The new 1.3 m telescope

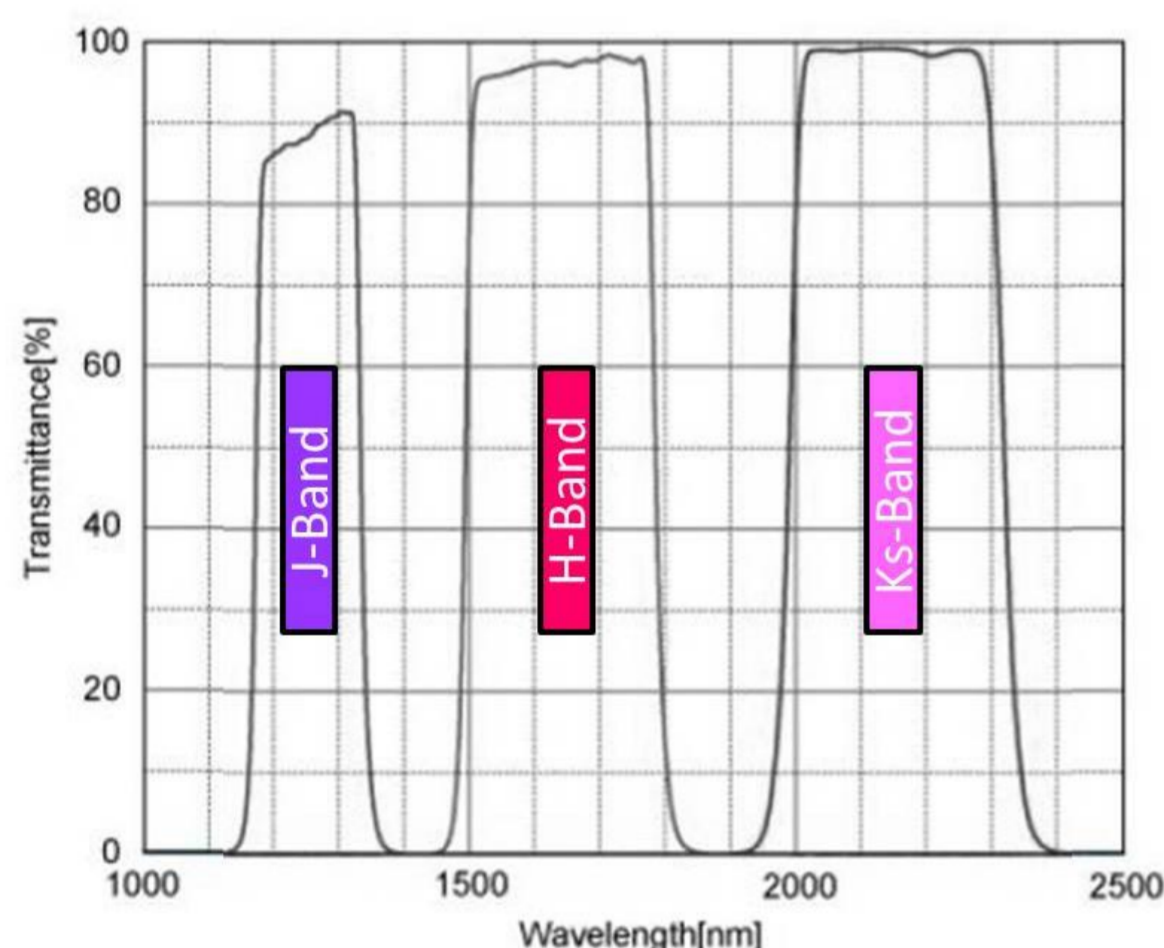
Thanks to the European Regional Development Fund (ITMS No. 26220120029) the Skalnaté Pleso observatory in Slovakia got a new Ø1.3 m telescope. The Stellar department of the Astronomical Institute of the Slovak Academy of Sciences (AI SAS) is currently installing this alt-azimuth Nasmyth-Cassegrain telescope (first light was in 2014) at its mountain observatory at Skalnaté Pleso. The telescope can be operated in a fully remote-controlled mode requiring minimum manpower. Corresponding advanced focal instruments for the telescope are being developed as well.

Programmatic context

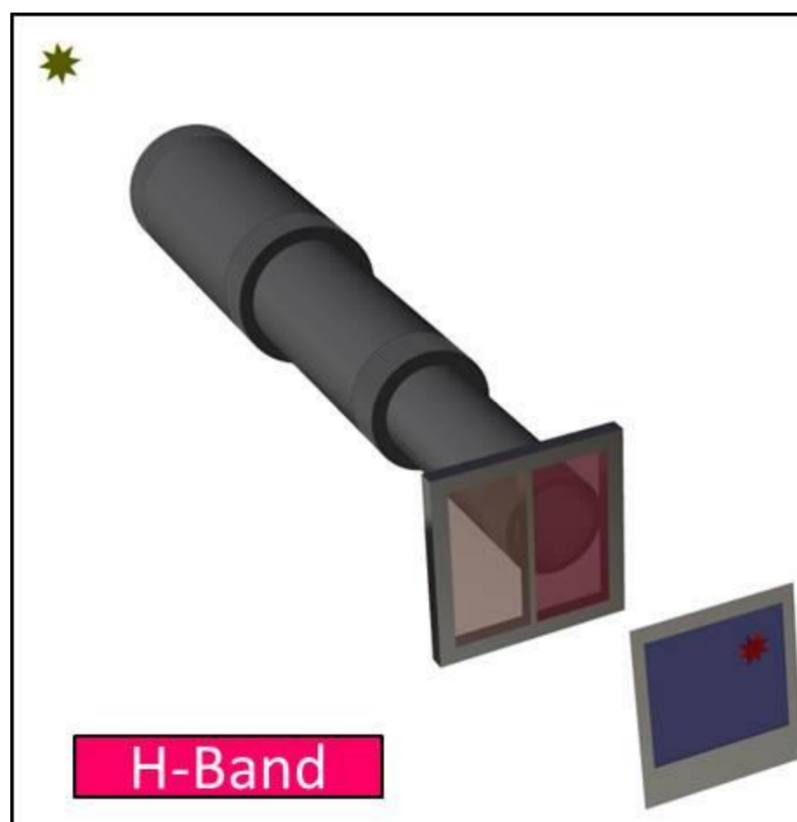
The aim of the project SLOBATCO (Slovak-Bavarian Telescope Collaboration) is the effective combination of experience, expertise and instrumentation of the AI SAS and Aschaffenburg University for the development and commissioning of a new astronomical telescope and the corresponding scientific instrumentation. The project is funded by the Bavarian Academic Center for Central, Eastern and Southeastern Europe (BAYHOST).



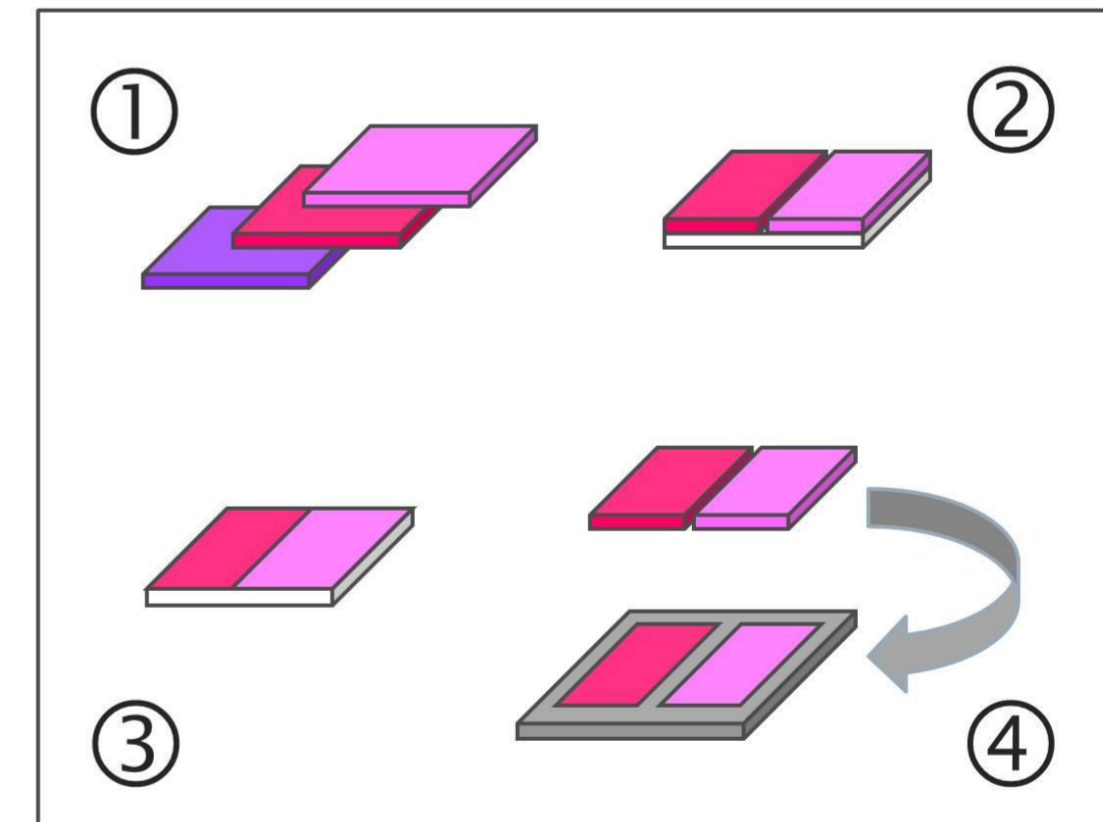
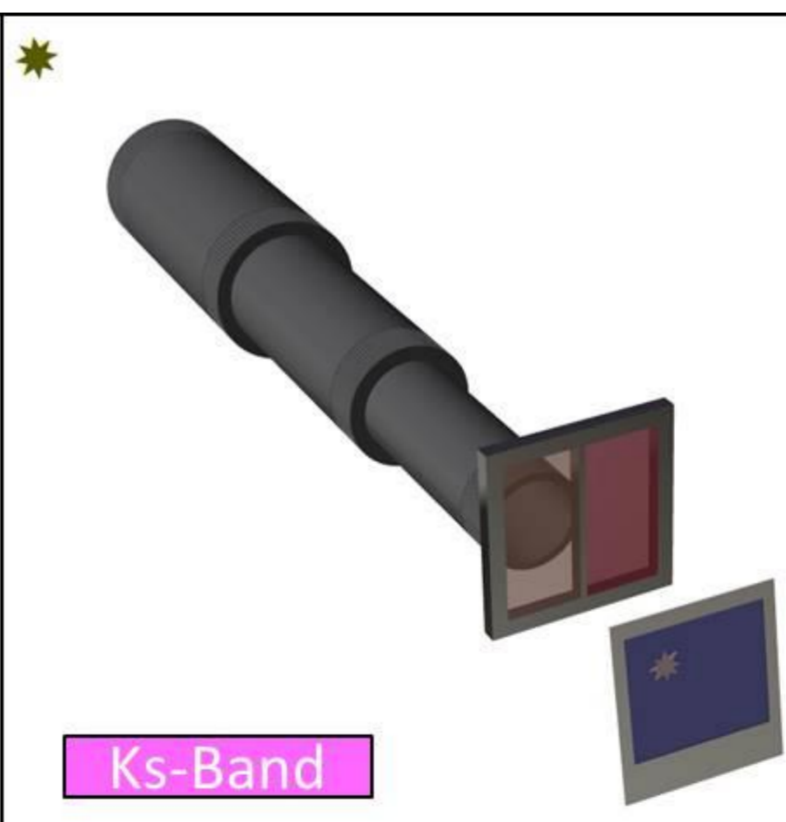
The SLOBATCO team in front of the observatory



NIR filter bands of astronomical interest



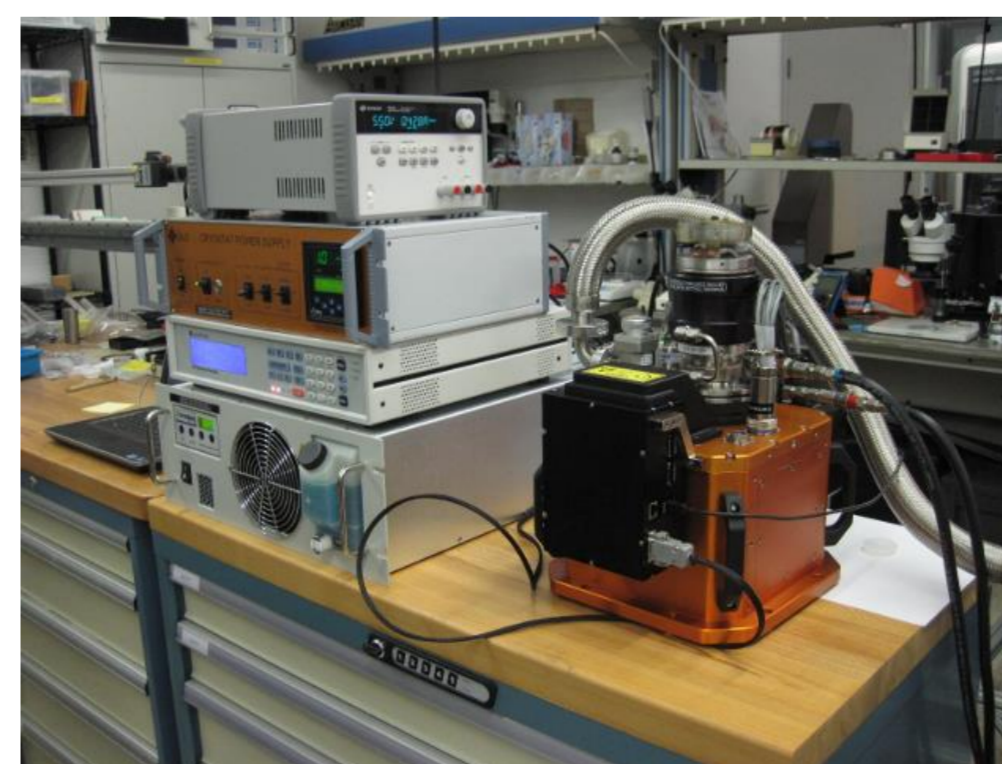
Measurement principle selecting different NIR filter segments by a precise shift of the image field



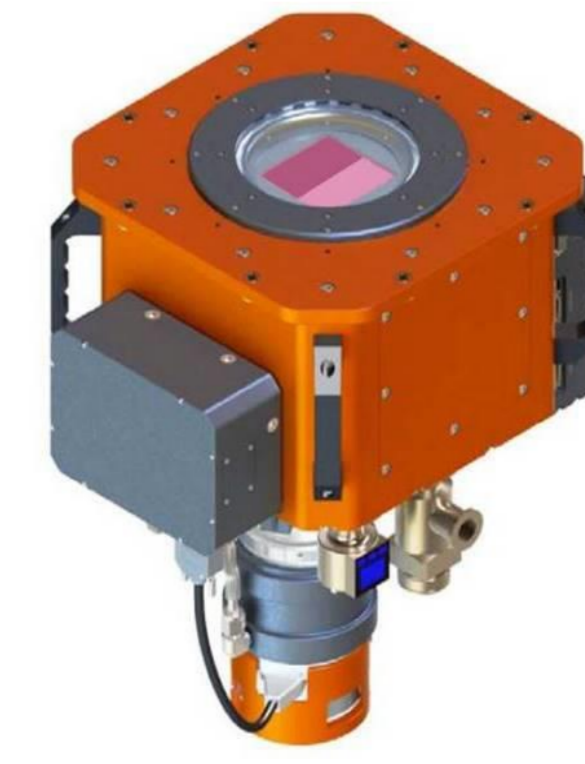
Technical options for the filter installation inside the NIR camera

Segmented filters for infrared astronomy

The extension of the wavelength range of astronomical observations to the near infrared would allow the study of cold stellar objects (brown dwarfs) and cold objects in our solar system (planets, asteroids, comets, trans-Neptunian objects). Beyond the already available J-Band filter, in addition observations in the H-Band and in the Ks-Band are of astronomical interest. In order to avoid a complex cryogenic filter wheel for the NIR CCD camera operated at low temperatures, the observations should be realized through a segmented filter using precise shifts of the image field. Four different mounting options for the filter installation inside the NIR camera have been evaluated. The mounting of two small filter segments inside a metal frame are most cost effective. However, also the poor IR reflectivity of the three telescope mirrors need to be considered. The re-coating of at least M2 and M3 with protected silver or with gold instead of aluminum may be a solution here.



Picture of the NIR camera in the observatory laboratory



Scheme of the NIR camera with a segmented filter

References

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