

COST
Short Term Scientific Missions
Report – 15 December 2013

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Home Institution: INAF – Osservatorio Astrofisico di Torino (OATo), Italy

Host Institution: Astronomical Institute Slovak Academy of Sciences, Tatranska Lomnica (SK)

Contact Scientist: Jan Rybak,

Period: 13 – 26 October 2012/3

STSM Title: Polarimetry of the solar corona with the Turin-filter at Lomnický Observatory

Scientific Report

Background and Objectives of the STSM

The overarching goal of this STSM was to assess the possibility of integrating the liquid crystal Lyot filter developed by the INAF - Turin Astrophysical Observatory, Italy, to the ZEISS coronagraph of the Lomnický Peak Observatory, Astronomical Institute of the Slovak Academy of Sciences (AISAS), in Tatranská Lomnica, Slovakia. A positive result of this integration test would make possible to implement a long-term observation plan (1 year at least), to carry out spectro-polarimetric observations of the coronal “green-line” emission (FeXVI, 530.3 nm). The science goal of these observations is to study the coronal magnetic fields that drive the dynamics of the solar wind.

The Turin coronal magnetograph (CorMag) is a four-stage Lyot filter with an electro-optically tunable bandpass. The full width at half maximum of the filter is 0.15 nm. The center wavelength of the bandpass is tuned by using nematic liquid crystal variable retarders (LCVR's). A separate LCVR, in tandem with the filter, is used for the polarimetric measurements. Mechanical adaptation of OATo Lyot filter for Lomnický coronagraph.

For the detailed plan of this STSM see Fineschi's report. Here, the work is reported of the integration of CCD camera detector and of Lyot filter driving electronics, and the activity is described for the installation on the PC at Lomnický of the Lyot-filter/camera control & data acquisition (C&DAQ) s/w.

Instrument Control, Data Acquisition and Data Storage System

The architecture of the data acquisition, instrument control and data storage is schematized in Figure 1. The devices parts of the CorMag instrument (CCD Camera and Liquid Crystals Tunable Filter) are connected to the control computer (ICC) throughout a 30 meters long fiber optics using the USB/FO extender. The ICC is the computer controlling the instrumentation, acquiring data and responsible for the temporary data storage. This computer is remotely connected to the Remote Computer (RC). The data acquired will be downloaded everyday on the Data Storage(DSAISAS) hosted by the Astronomical Institute of the Slovak Academy of Science. A copy of this data will be downloaded with the same frequency on the Data Storage (OAToDS) hosted by the Astronomical Observatory of Torino. From the OAToDS the dataset will be available.

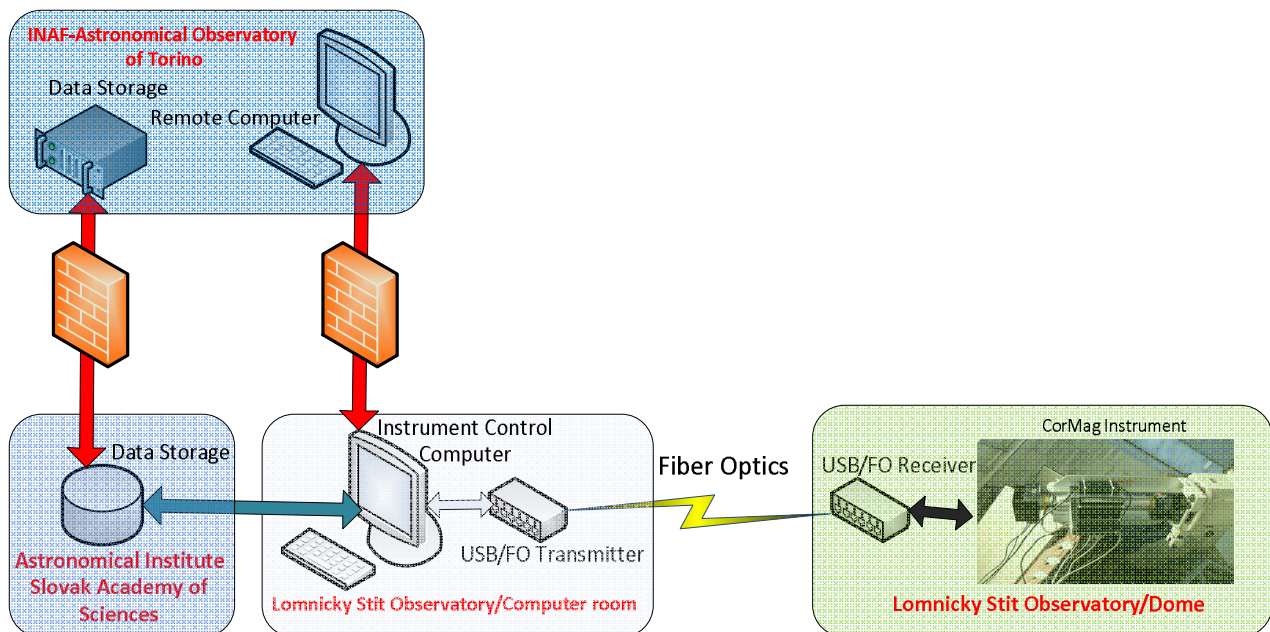


Figure 1 - Schematic view of the instrument control, data acquisition and data storage architecture.

The instrument control and the data acquisition software is a review of the one developed for the CorMag instrument used during the 2010 Total solar eclipse. The actual review of the software is the 2.03. The screenshot and a picture during the data acquisition process at Lomnický Štít Observatory are shown in Figure 2 and Figure 3. The database architecture has been defined and the implementation activities are in progress.

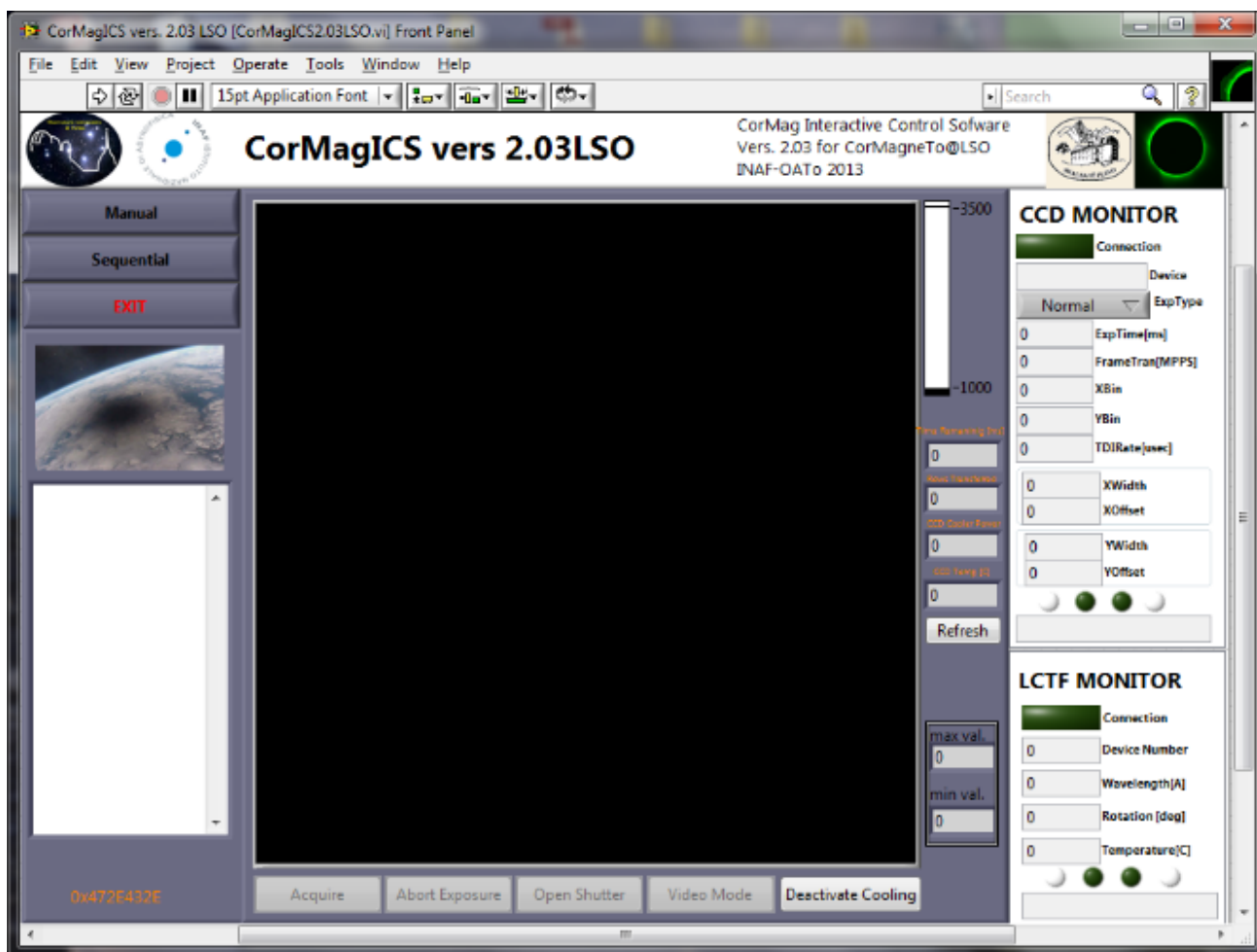


Figure 2 – Screenshot of the instrument control and data acquisition software.

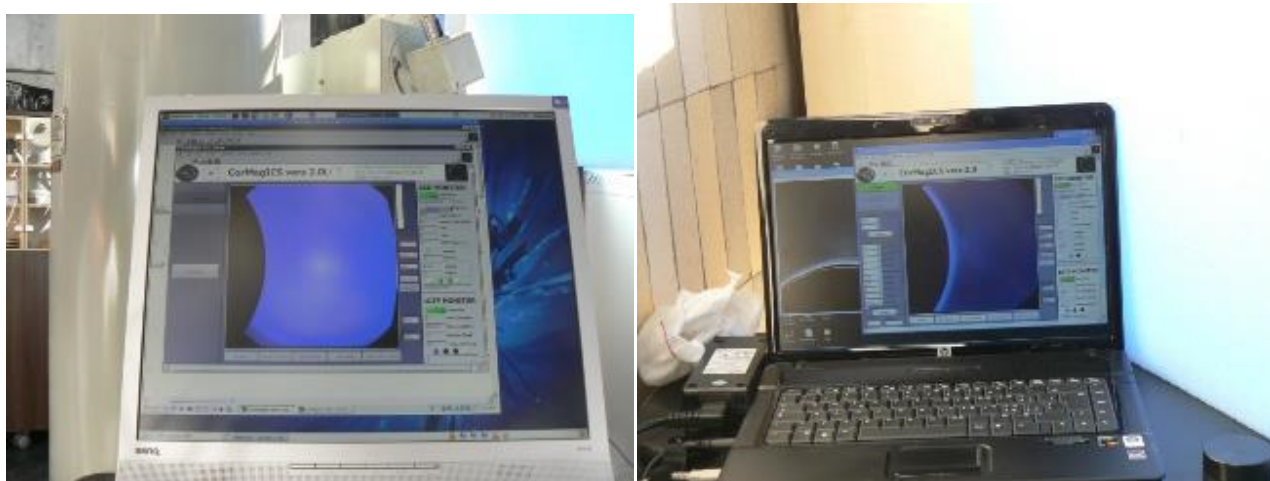


Figure 3 – Pictures of the data acquisition process.

The following figures show additional images of the Turin CorMag installed in the 20-mm Zeiss Coronagraph at Lomnický Stit Observatory.

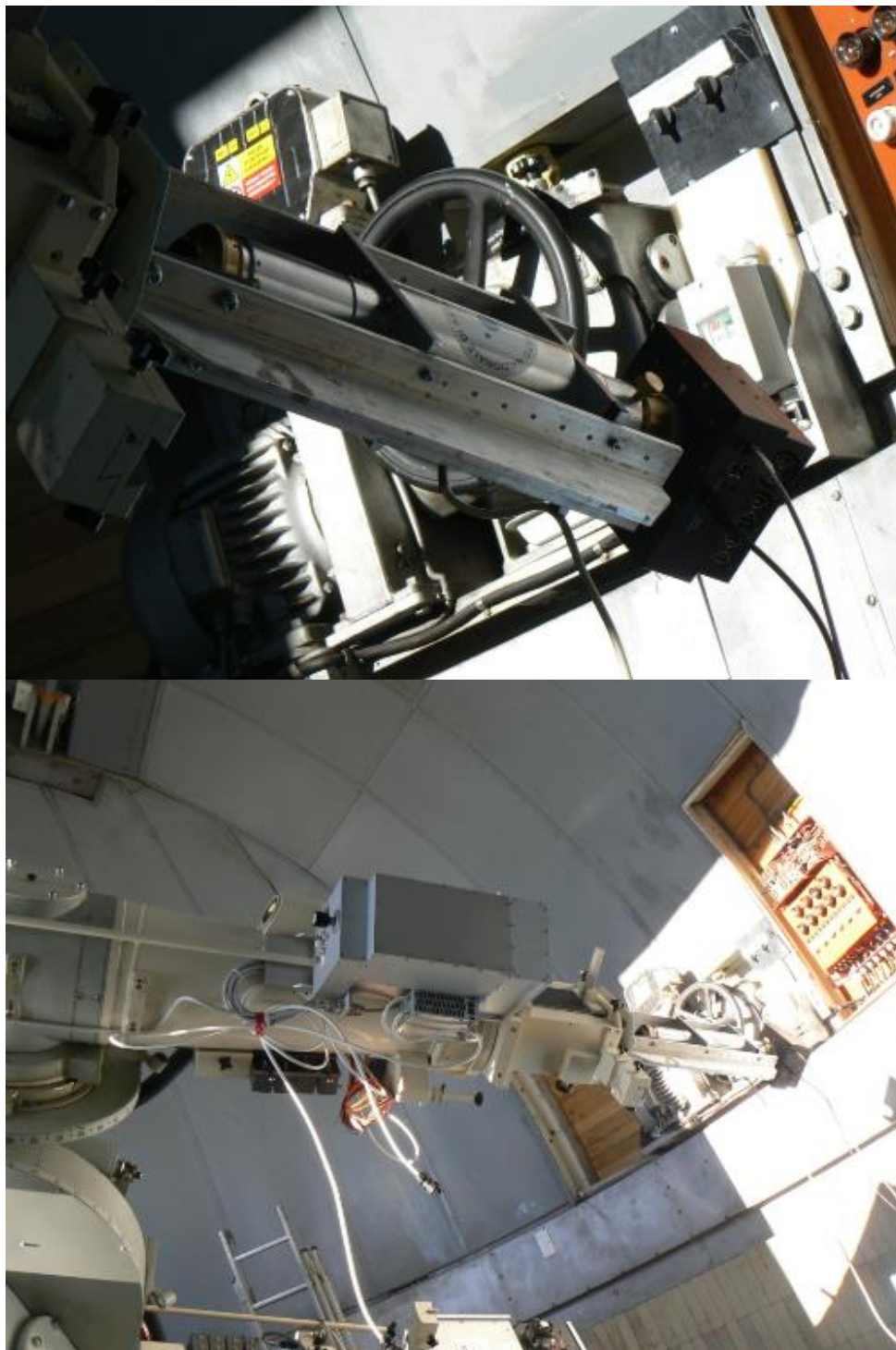


Figure 4 – Pictures of the CorMag installed on the Lomnický Stit Observatory coronagraph (2)

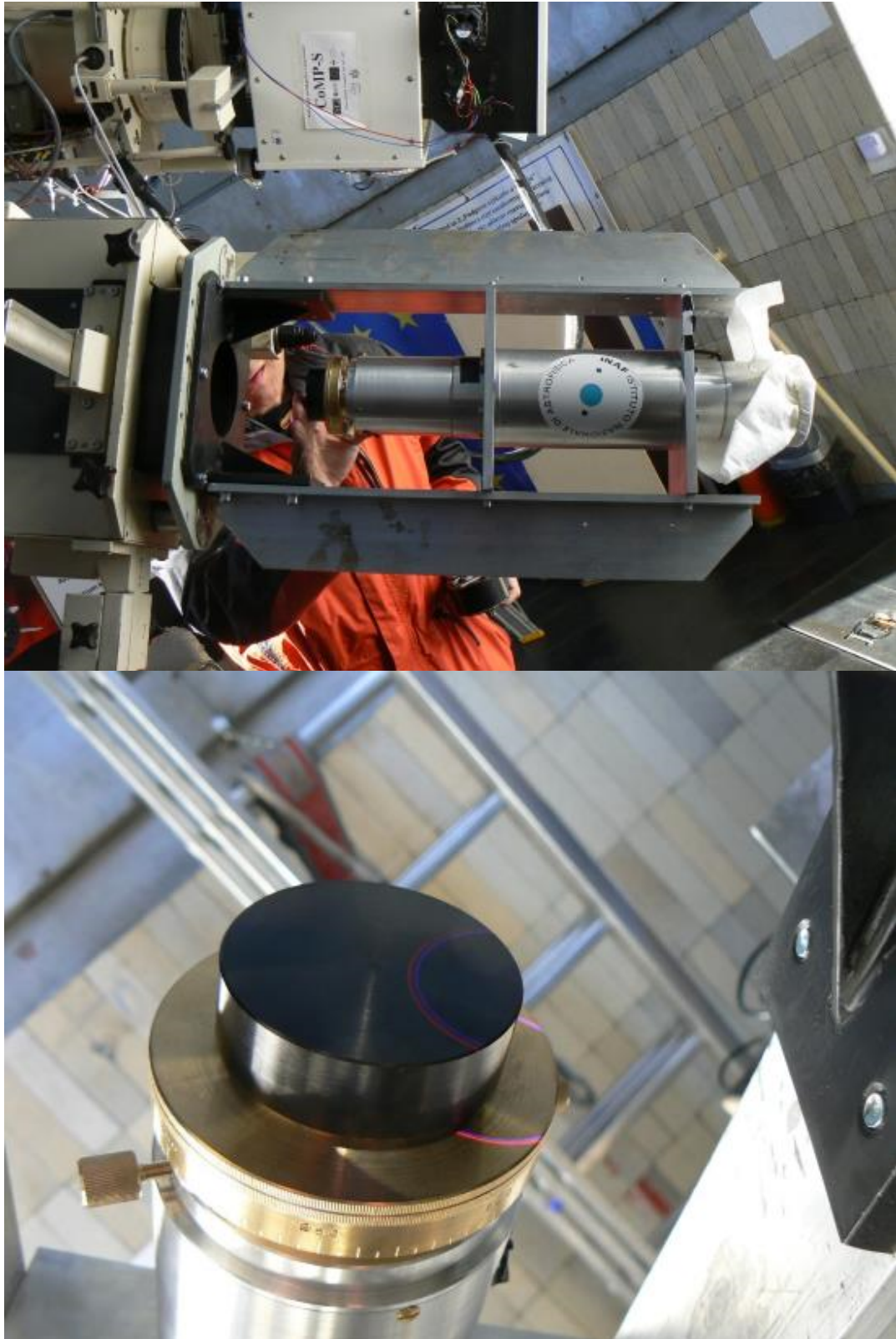


Figure 5 – Details of the CorMag installation on the Lomnick Stit Observatory coronagraph (1)

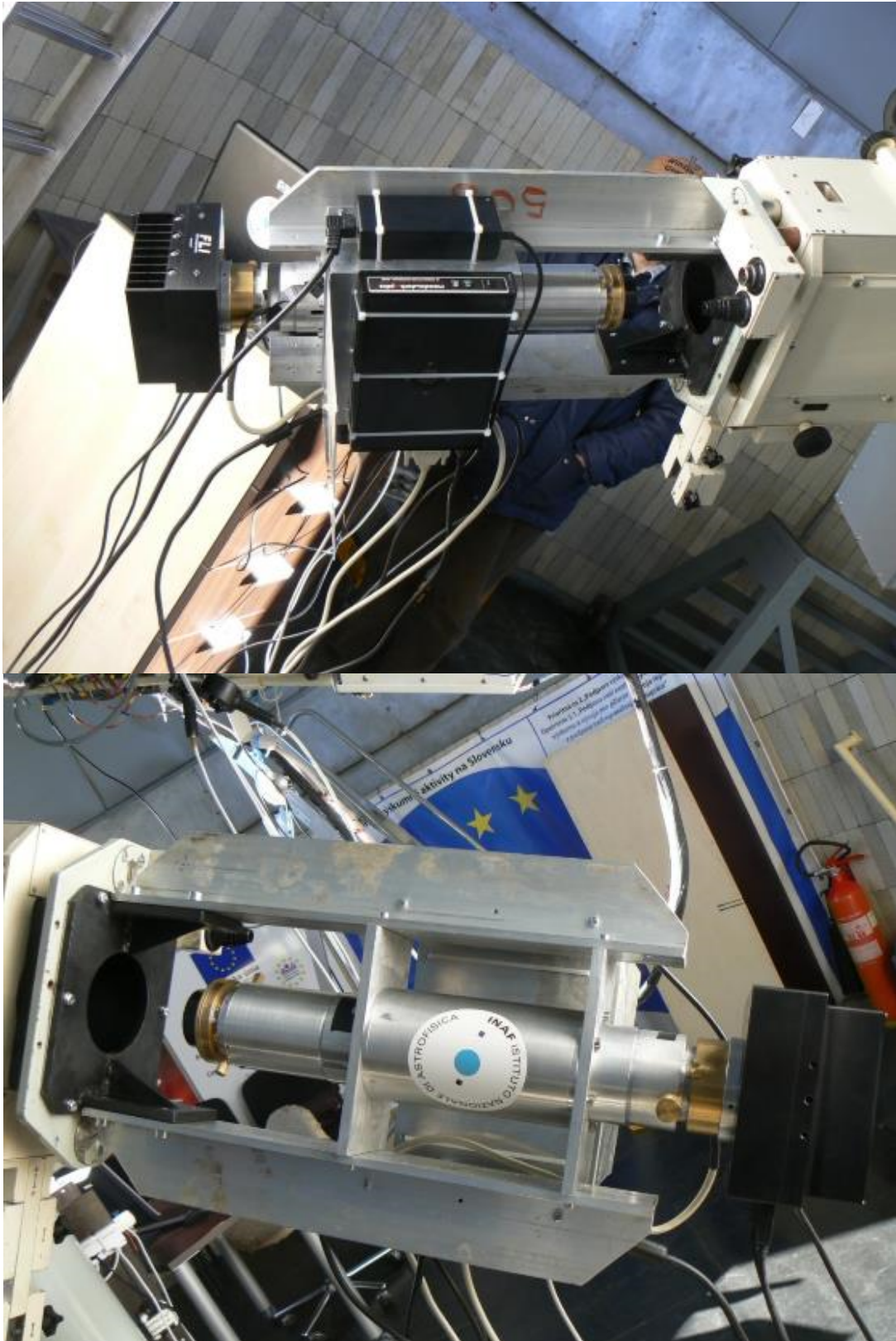


Figure 6 - Details of the CorMag installation on the Lomnický štít Observatory coronagraph (2)

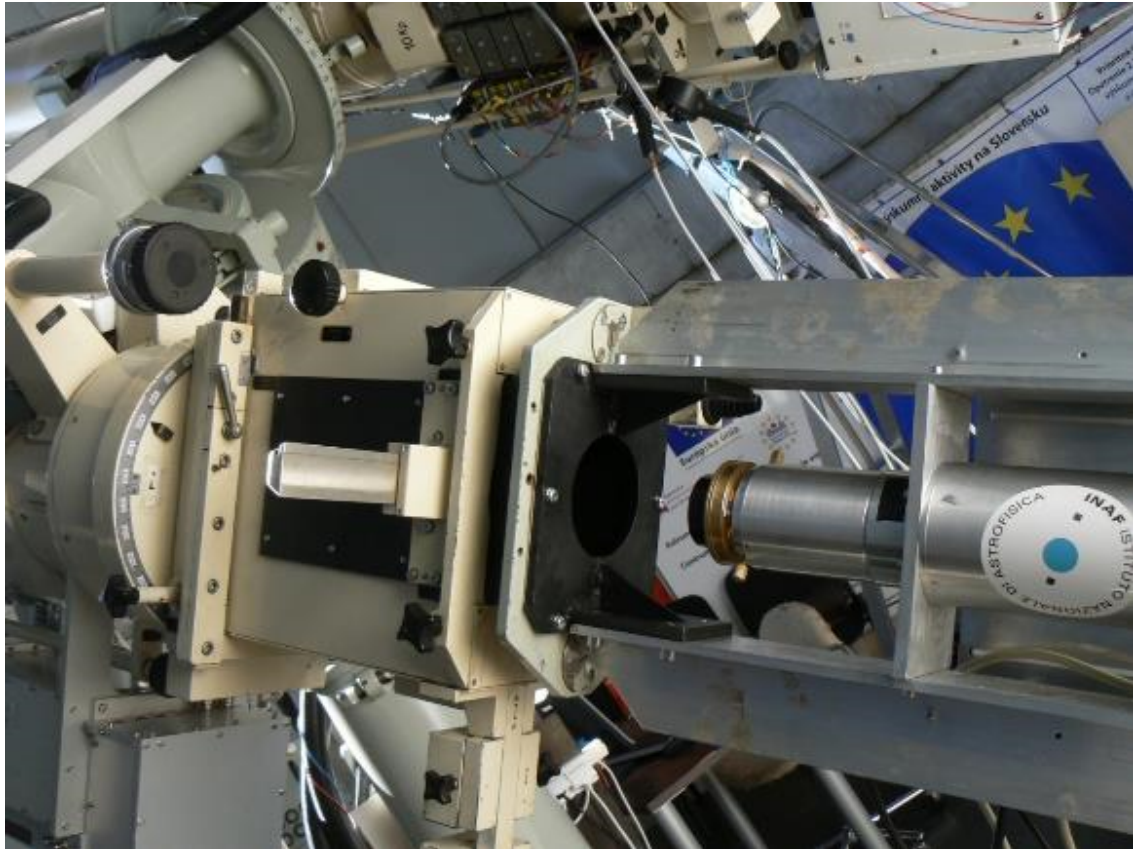


Figure 7 - Details of the CorMag installation on the Lomnický štít Observatory coronagraph (3)

The first light and a preliminary instrument calibration has been performed. A data set of more than 500 images was acquired during the STSM activities.