

Preparing VYSOS 5 for Remote Operation

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Abstract

The Variable Young Stellar Object Survey (VYSOS) will use four telescopes, two in the northern hemisphere and two in the southern hemisphere, to survey star forming regions along the Galactic plane. I helped get the first of the four telescopes, a Stellarvue 135mm apochromatic refractor (VYSOS-5), up and running. VYSOS 5 is located at the Mauna Loa Observatory.

Introduction

The VYSOS project will offer the first long term, systematic observations of early stellar evolution. VYSOS will uncover rare phenomena among young stars that other limited and random studies have failed to identify. VYSOS aims to identify major accretion events, young eclipsing binaries, rotational periods and angular momentum evolution towards the main sequence, occultation by orbiting circumstellar disks, pulsations of young stars, and magnetic flares statistics in young stars. VYSOS will also play a serendipitous role in studying asteroids, novae, eclipsing binaries, pulsating variables, and extra-solar planets.

Concept

The VYSOS project will obtain these systematic observations of the entire Galactic plane through the use of four telescopes. Two telescopes will be located in the northern hemisphere at the Mauna Loa Observatory in Hawaii, while the other two telescopes will be located in the southern hemisphere at Cerro Armazones, Chile. Each pair of telescopes will consist of a small telescope with a large field of view to survey the Galactic plane, and a larger telescope, with a smaller field of view, to follow up with more in-depth observations of targets found with the smaller telescope. I helped VYSOS-5 become fully remotely

operational. The observations started out as remote operated, but all four telescopes will eventually be robotically operated. The telescopes must operate robotically in order to get continuous year round data.

Methods

VYSOS-5 was the first telescope to be fully remotely operational, and is located on Mauna Loa. In order to prepare VYSOS-5 for operation several steps were taken. The first of which was to convert old target lists from the previous VYSOS-16 (which was taken out of service due to damage in an earthquake). The target list needed to be converted because VYSOS-16 had a much smaller field of view than VYSOS-5 does, which means if we point VYSOS-5 in the right spots we can reduce the number of images needed dramatically. I converted the target list by creating a program in IDL. The program plotted all the targets, along with a box representing the old field of view and the new field of view. I manually adjusted the box that represented the new field of view until it covered as many of the targets as possible; the final positions of the boxes representing the new field of view provided the new coordinate list for the targets.

Once I converted the target list over to the new telescopes I moved on to creating a website for the VYSOS project. Currently, the

website is internal and contains information for the motivation for the project, information on each of the telescopes, the target list, and a gallery of photos. The website will eventually be made public and will contain up to date information on the entire VYSOS project.

The first steps taken in preparation for remote observation on Mauna Loa involved the VYSOS-5 dome. I helped Josh weather proof and install web cams in the dome in order to securely observe remotely. Unfortunately, during this process some dome slippage was discovered. Due to an assembly problem in the tensioning system the dome would sometimes slip on its track and freeze. Josh and I fixed this by simply assembling the tensioning system correctly. Once that problem was fixed, Josh and I found that the dome sometimes froze at the home position. This was caused by a faulty interlock switch, which we fixed by placing an additional wire inside the interlock switch.

In conjunction with the dome preparation, Josh and I set up the VYSOS-5 software and established polar alignment. One of the pieces of software being used, Astronomers Control Panel (ACP), has the ability to create a web page for the telescope. We set up this web page so that the telescope could be controlled over the Internet. In the process of setting up the software we brought the web cams online in order to allow for monitoring the telescope from a remote location.

While we were preparing VYSOS-5 for remote observation we were also taking science images. I reduced some of the first science images in order to test the photometry.

Results

I successfully established current target lists for both VYSOS-5 (north) and VYSOS-6 (south). I set up the website for VYSOS internally; it is currently awaiting additional information in order to be made public. Josh and I successfully prepared the VYSOS-5 dome and software for remote observations. The science images we took with VYSOS-5 showed that the telescope can indeed detect fine variations in brightness over time. Remote observations with VYSOS-5 were

made without any major problems, and remote observations have continued since.

Conclusions

We established remote observation for VYSOS-5 enabling us to detect the variability of young stars. Within the next year the other three VYOS telescopes should be fully operational. Soon the VYSOS project will have a database of early stellar evolution that will provide insight on many rare phenomena among young stars.

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References

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