

Adaptive Optics Available at CSU Fresno Observatory

By Greg Morgan

Distortions within Earth's atmosphere tend to soften and blur stellar images and thus reduce resolution. Santa Barbara Instrument Group (SBIG) manufactures a device called the AO-7. It has been specifically designed to stabilize stellar images and thus enhance resolution. The AO-7 system has a high speed tip-tilt mirror that makes corrections for the displacement distortions within Earth's atmosphere. The tip-tilt corrections are relatively simple to make and will correct for up to 80% of the Earth's total atmospheric distortions. The last 20% require very sophisticated mirror warping technologies that are very expensive. The tip-tilt mirror continually adjusts the telescopes light cone to hold a guide star on a designated pixel on a guide chip during the exposure. The tip-tilt mirror movements are dramatically faster and more precise than conventional telescope drive corrections. The result, if all goes well, is a sharper stellar image and more clearly defined nebular or galactic features. California State University Fresno Observatory has an AO-7 adaptive optics device. It is just one of the many state-of-the-art instruments available at the campus observatory.

Figure 1: NGC 3628 in Leo. This classic edge on galaxy shows off a distinct dust lane. This image is a 35 minute exposure through a clear IR blocking filter. The use of the SBIG AO-7 allowed for atmospheric displacement disturbances to be corrected for at a rate of 10 Hz during this exposure (that's 21,000 corrections!). The end result of using adaptive optics is to help stabilize stellar images and enhance resolution.

