

[초IGR-01] IGRINS Design and Performance Report

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The Immersion Grating Infrared Spectrometer (IGRINS) is the first astronomical spectrograph that uses a silicon immersion grating as its dispersive element. IGRINS fully covers the H and K band atmospheric transmission windows in a single exposure. It is a compact high-resolution cross-dispersion spectrometer whose resolving power R is 40,000. An individual volume phase holographic grating serves as a secondary dispersing element for each of the H and K spectrograph arms. On the 2.7m Harlan J. Smith telescope at the McDonald Observatory, the slit size is 1" x 15". IGRINS has a plate scale of 0.27" pixel⁻¹ on a 2048 x 2048 pixel Teledyne Scientific & Imaging HAWAII-2RG detector with a SIDECAR ASIC cryogenic controller. The instrument includes four subsystems; a calibration unit, an input relay optics module, a slit-viewing camera, and nearly identical H and K spectrograph modules. The use of a silicon immersion grating and a compact white pupil design allows the spectrograph collimated beam size to be 25mm, which permits the entire cryogenic system to be contained in a moderately sized (0.96m x 0.6m x 0.38m) rectangular Dewar. The fabrication and assembly of the optical and mechanical components were completed in 2013. From January to July of this year, we completed the system optical alignment and carried out commissioning observations on three runs to improve the efficiency of the instrument software and hardware. We describe the major design characteristics of the instrument including the system requirements and the technical strategy to meet them. We also present the instrumental performance test results derived from the commissioning runs at the McDonald Observatory.