

V29b An échelle spectrograph for the 1.5 meter telescope of Gunma Astronomical Observatory

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We describe an optical échelle spectrograph to be attached to a nasmyth focus of the 1.5 meter ($f/12.2$) reflector of Gunma Astronomical Observatory (GAOES). GAOES is expected to operate at resolving power up to 60,000 with thorough considerations given for the extension of slit length up to $5'$.

Taking into account sky brightness of the observatory site at Takayama (altitude of 860 meters) of $18 \text{ mag}/[']^2$ in V , typical seeing size of $2.0''$, and estimated visual extinction coefficient of about 0.2 magnitudes/air mass, the entire system peak efficiency of $\sim 10\%$ demonstrate the limiting visual magnitudes that can be attained would reach 15th magnitude for reasonable exposure times. S/N curves have been constructed by incorporating atmospheric, telescope spectrograph and detector parameters for several slit widths.

Several scientific projects to be undertaken with the above mentioned capabilities, would include high-resolution studies of early type and evolved stars, radial velocity and Doppler imaging studies of close binary systems and other variable stars. In the future the capability of long-slit observations can be utilized in studies of faint and diffuse astronomical objects, such as supernovae, planetary nebulae, active galactic nuclei, etc.