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Goodman Spectrograph Gratings

Updated Mar 2021.

Up to three (3) gratings can be installed in the spectrograph at a time, in a linear stage which allows the rapid interchange of gratings. Installing different gratings is a day time operation. **No grating installations are done during the night.**

The grating complement includes **400, 600, 930, 1200, 1800, 2100 and 2400 l/mm** transmission VPH gratings.

NEW (Apr 2018):

New 600 and 1200 l/mm gratings were delivered to SOAR in April 2017. Based on tests at the telescope, we are offering the new gratings, with recommendations as follows:

- **600 line gratings:** The existing 600 l/mm grating is renamed as 600old, and is recommended for all observations from the UV up through 650nm, with either the Blue or Red Cameras. For programs requiring spectra in the far red (e.g., around the Ca II triplet), we recommend using the new 600Red grating + Red Camera.
- **1200 line gratings:** For observations in the UV use the 1200Blue grating + Blue Camera. Observations in the 450nm - 550nm range should use the 1200Blue grating, with either Blue or Red Cameras. For observations redward of ~600nm, use the 1200Red grating + Red Camera.

Configurations remain as listed in the table below.

Long Wavelength Limit for High Resolution Gratings

Because of limits in the camera rotation stage, it is not possible to use the 1800, 2100 and 2400 l/mm gratings beyond the central wavelengths indicated below:

- 1800 l/mm grating: Littrow mode centered at 760nm, spans 7200 Å - 8000 Å
- 2100 l/mm grating: Littrow mode centered at 650nm, spans 6185 Å - 6815 Å
- 2400 l/mm grating: Littrow mode centered at 565nm, spans 5395 - 5905 Å

The table below shows the dispersion and the wavelength coverage for observations in our set spectroscopic modes. Please note that the 1800, 2100, and 2400 l/mm gratings are operated in Custom mode (Littrow Configuration), in which the observer selects the central wavelength for their observations.

| Grating (lines/mm) | Dispersion (Å/pixel) | Coverage (Å) | Max R @ 550nm (3pix with 0.46" slit) | Blocking Filter |
|-----------------------|-------------------------|--|--|--|
| 400 | 1.00 | M1: 300-705 M2: 500-905 | 1850 | — GG-455 |
| 600 | 0.65 | UV: 301-569 Blue: 350-616 Mid: 435-702 Red: 630-893 | 2800 | -- — GG-385 GG-495 |
| 930 | 0.42 | M1: 300-470 M2: 385-555 M3: 470-640 M4: 555-725 M5: 640-810 M6: 725-895 | 4450 | — — GG-385 GG-495 GG-495 OG-570 |
| 1200 | 0.31 | M0: 302-436 M1: 350-485 M2: 420-550 M3: 490-615 M4: 555-685 M5: 625-750 M6: 695-815 M7: 765-880 | 5880 | — — — — GG-455 GG-455 GG-495 OG-570 |
| 1800 | 0.19 | 800 | 9610 | As needed |
| 2100 | 0.15 | 630 | 11930 | As needed |
| 2400 | 0.12 | 510 | 14280 | As needed |

The VPH gratings operate via Bragg scattering and their efficient operation requires Littrow or near-Littrow operation of the spectrograph. A grating rotation stage sets the incident angle to the desired value, which depends upon the line density of the grating and the central wavelength of interest. A concentric camera rotation stage must then be set to nearly twice this angle to intercept the diffracted beam. A set of fixed observing modes for each grating are given below, where applicable. **All gratings can be used in the Custom mode.**

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