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Subject: Slitmasks and MARS - Some Notes

Here are some notes on the design constraints for nod-and-shuffle masks with MARS. There will soon be a new version of the slitmask design program and a new version of the instrument, but it is unlikely that either of these developments will affect your upcoming run. After all, this was supposed to be "Shared-Risk" (sigh).

The MARS CCD is a 1980 x 800 LBNL device with 15 micron pixels. The pixel scale in the spatial direction is roughly 0.86 arcseconds / pixel; the full MARS field of 5' lies between rows 204 and 555 on the CCD and the field center is located at row 379 (roughly). For nod-and-shuffle one needs to use the central 1/3 of the CCD as the imaging region (i.e., rows 266 to 533), and the remaining two regions for the sky spectrum and a storage buffer. Hence, the spectra of the objects must be restricted to the region between row 266 and row 533. On the masks, this corresponds roughly to a region truncated by roughly 7 mm and 2.7 mm from the two ends of the mask. The MSLIT program produces a graphical image of the mask as viewed from below the focal plane; on this figure, the nod and shuffle mode requires that the slits be restricted to the region between -19 and +14 on the x-axis. I know no way of doing this automatically in the MSLIT program and so one has to design the mask with this constraint in mind and then edit out objects from the input file and rerun MSLIT after restricting the PA range to be exactly the PA that is required (i.e., set PA1=PA2=PA).

As far as the other constraints are concerned, here is what i used last November for the input values to MSLIT:

'NDMARS03' 1 1.0 0.5 103.12 103.12 T 0.5 7 2000.0/

Something like that is what goes into the first line, and this corresponds to making one mask with slits of minimum half length 1.0" and a 0.5" inter-slit separation. The mask has a PA of 103.12 (actually

a PA between 103.12 and 103.12!). This resulted in 27 objects on the mask. I would refer you to the Multislit Manual for more information:

http://www.noao.edu/kpno/manuals/multisl/multisl.html

I have used interslit separations as small as 0.25" with mixed results (depends on whether you are happy with redshifts or actually want to get some relative flux calibration) and i have also successfully used slits of 1.8" in length. The constraint here is really the ability to accurately manufacture the slits of smaller length with the current technology rather than the seeing. I would not use slitlets of less than 1.8" in width for similar reasons. This may improve in the future.

Also, i would recommend that if possible, you choose a single PA for all your masks if you intend to use many slitmasks during the nights. Rotating the spectrograph is possible, but one can only do this at zenith and it is better not to deal with it if one can help it.

Hope this is useful and answers most of your questions. Let me know if you need any more clarification.

Cheers

Arjun

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