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Technical Summary: Millipol on the NRAO 12 meter telescope
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There were a number of minor items regarding the telescope system that were of some impact on our recent run with the Millipol polarimeter.

1) One channel of the 230 GHz receiver was much noiser than the other. The actual sensitivity difference was at least a factor of two and made use of the second channel effectively impossible.

2) The continuum system seemed unable to be calibrated using the hot load cal chopper. We don't know if this was due to inexperience of the operators in setting up the system, or if there is no way to keep the data from overflowing some buffer. It would be extremely useful to calibrate the system quickly, using the cal chopper, rather than slowly, using antenna tipping.

3) There does not seem to be any way to blank the continuum IF signal. This is necessary for determining the remnant DC offset generated in the backend system (IF amps + continuum receiver). Our ability to calibrate the data collected by our A/D system was hampered by not knowing how to short the IF system after the mixer to determine this offset.

4) Setting up the nutating subreflector to chop to its maximum throw ($\sim$ 6') seems to be a non-standard request, with only one of the operators knowing how to do the proper setup. The rest of the operators need to know how to perform this request or be able to advise the astronomers just what the real throw limits are and why. Also, there is usually a trade–off between chopper throw and chop rate, in the sense that if we were willing to suffer slower chopping, we could get larger throws. Is this the case on the 12 meter ? And will you advise the operators of the answer to this ?

5) The physical mounting of the polarimeter was very sturdy and well centered. Thanks are due to Bob Kingsley.

6) The measured instrumental polarization on Venus at two hour angles separated by 5 hours ($\sim$ 75 degrees) was less than 0.2 percent. Apparently the dish and receiver system is quite adequate for polarimetry.

7) There is a fair amount of 60 Hz in the output of the continuum receiver. We were able to reduce it significantly by disconnecting the 18 pin Bendix connector which routes the continuum output to the standard backend and chart recorder system. It was also necessary to disconnect the outputs of the continuum receiver going to the system

temperature box. In the rack containing the continuum receiver, the insulated ground for the output BNC to the system temperature box passes UNINSULATED through the top of the rack. This connection should be replaced with insulated BNC's and the rest of the cable run to the system temperature box checked for shorts between the analog ground and the chassis ground.

8) The front panel output of the continuum receiver was unacceptable for our system because of the frequent and severe oscillations in channel B. It often breaks into 1 MHz oscillations if the load impedeance is too high.

9) We were able to use the taps on the back of the continuum receiver which bypass the last stage of amplification and RC filtering, but we had to build an inverter circuit because the voltages from these taps are all negative with respect to the analog ground.

Our overall sensitivity in the one receiver channel which did work was about 19 Jy per root second, compared with the best beam chopped value of 5 Jy per root second measured by Barvainis with the system last year. Some of the loss is in our A/D system and some is due to losses in the polarimeter itself, but we suspect there may be some degradation in the receivers. A new measurement of the beam switched sensitivity is probably in order.

Even with the above problems and concerns, we were able to operate the polarimeter and collect data. We calibrated on the moon and planets and in addition to the low instrumental polarization found from observations of Venus, we were able to determine the phase offset of the polarimeter from observations of the moon to about 0.5 degrees. Our observations of the Orion region show that there is polarized dust there, and the position angles are quite similar to those measured at 270 microns.

Oh yes, did you know that your two feeds are 91, not 90 degrees apart ?