

MEASUREMENT OF THE SOLAR DIURNAL AND SIDEREAL MUON WAVES WITH MACRO

Stuart L. Mufson and The MACRO Collaboration

Indiana University.

`mufson@astro.indiana.edu`

We have analyzed 45M single muons collected by MACRO from 1991-2000 in 2,145 live-days of operation. We have searched for the apparent sidereal, antisidereal, and solar diurnal waves by computing hourly deviations from 6 month averages. We find evidence for statistically significant modulations at the solar diurnal and the sidereal periods. The amplitudes of these modulations are $< 0.1\%$, and are at the limit of the MACRO statistics. The detection of the solar diurnal modulation has not been reported previously, and the solar diurnal modulation is consistent with results reported by other experiments. Although of low significance, the antisidereal modulation is consistent with the earth's motion in the solar system. Using the method of Farley and Storey we have made corrections to the apparent sidereal modulation and determined the true sidereal modulation.