Spectral lines – OH

ALPACA Mapping of Faint OH Emission of M31 and M33

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We are requesting 100 hours of time to map M31 (60 hours) and M33 (40 hours) in 18cm OH to compare with archival CO and HI data to ascertain the dark molecular gas content of these nearby galaxies. Because of the large angular size and mapping footprint of the ALPACA, mapping of the faint 18cm OH emission of these galaxies will be possible for the first time ever. With a single pixel, such mapping experiments would require a prohibitive amount of time (~2500 hours). With 10 hours per pointing, the GBT noise floor would be near an ultra-sensitive 1 mK per channel. Such sensitivity has been shown to reveal a faint OH component of the ISM, likely part of the transition from atomic and molecular gas in galaxies. This faint molecular gas phase is usually hard to observe in CO due to the lack of collisional excitation. We can finally complete our picture of the diffuse molecular medium and the intersection of atoms and molecules in the Galaxy by observing this important dark molecular gas tracer in these analogue galaxies.