A1455 2000-May-31_16:08:56

Technical Page

Proposal Type:	Regular
General Category:	Astronomy
Sub-Category:	Spectroscopy
Observation Category:	Zeeman Observations
Total Time Requested:	40 Hours

Proposal Title: First Measurements of the Zeeman Effect in CH

ABSTRACT:

The Zeeman effect in the 700 MHz lines of CH ia a potential probe of magnetic field strengths in dense star-forming regions. Turner and Ziurys (1986) used Arecibo to detect these lines, and conclude that they trace gas with densities $\sim 10^6$ cm^{-3}. Both theoretical and empirical evidence imply that the field at that kind of density should at least several hundred microgauss. Given CH's molecular structure (which is similar to OH), its Zeeman splitting should be significant, and detecting a one hundred microgauss field in CH at Arecibo should take just a few hours. The density regime $> 10^4$ cm^{-3} is *most* relevant to the formation of individual stars or small star clusters, but we currently have *no* way to measure the magnetic field in that regime in a just a few hours. We believe CH offers a quick way to measure fields, and that the magnetic field database created by this proposal and its descendants will elucidate the role of magnetic fields in dense star-forming gas.

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I NA want to do remote observing.

Instrument Setup

610

Atmospheric Optical Instruments:

Special Equipment or setup: We have consulted with Edgar Castro about filters that will be required to observe the CH lines at 701.677 and 724.788 MHz, and he is planning to acquire these filters pending approval of this proposal. Also, some modification of the "600 MHz" antenna may be necessary in order to accomodate dual-polarization 700 MHz observations. Further details are included in the justification.

RFI Considerations

Frequency Ranges Planned

701-725 MHz