Radio Emissions of Anomalous X-ray Pulsars

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Anomalous X-ray Pulsars (AXPs) have not yet been extensively studied using radio telescopes, and so there is a lack of knowledge regarding their emissions and locations. Studying neutron stars such as AXPs assists scientists in the development of almost all components of the Theory of Everything. This project studied AXPs at radio wavelengths to learn more about their emissions and map their precise locations, which can help illuminate how they form and evolve and why they develop their unusual characteristics. Radio data on 15 AXPs was collected remotely using the 20m radio telescope in Green Bank, West Virginia. Fifteen prepfold plots were made, and two objects with Dispersion Measures (DM) were detected. The project mapped four AXPs in the Milky Way Galaxy for what appears to be the first time. DMs extracted from the prepfold plots allowed for mapping of two of the objects, while values from the ATNF Pulsar Catalogue were used to map the other two. A classification scheme was devised for use in future research to differentiate observations with Radio Frequency Interference (RFI) based on the utility of the data. This study determined that AXP emissions data with RFI is still useful and showed that it is possible to observe AXPs in radio wavelengths with a relatively small telescope dish, a surprising finding given the lack of AXP radio emissions detected by astronomers previously.

Awards Won: