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GDIGS: Surveying Ionized Gas in the Inner Galactic Plane

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We present an overview of the Green Bank Telescope (GBT) Diffuse Ionized Gas Survey (GDIGS) and the GBT Diffuse Ionized Gas Survey at Low Frequencies (GDIGS-Low). Both GDIGS surveys trace ionized gas in the Galactic midplane by observing radio recombination line (RRL) emission. GDIGS observes RRLs in the 4-8 GHz range and GDIGS-Low maps RRL emission at 800 MHz and 340 MHz. The nominal survey zone for both surveys is $32.3° > \ell > -5°$, $|b| < 0.5°$, with extensions above and below that latitude limit in select fields as well as coverage of the areas around W47 ($\ell \simeq 37.5°$), W49 ($\ell \simeq 43°$), and Cygnus X ($\ell \simeq 80°$). The goal of these surveys is to better understand the planar Diffuse Ionized Gas (DIG), including its physical properties, its dynamical state and distribution, its relationship with HII regions, and the means by which it is ionized. We discuss an analysis of the DIG around the HII region complex W43 (Luisi et. al. 2020) and a study of discrete sources of emission in the GDIGS survey area (Linville et. al. 2023). We also discuss how we will use GDIGS data to determine the ionic $^4He^+/ H^+$ abundance ratio (y+) in the DIG and how we will combine RRL observations from GDIGS and GDIGS-Low to calculate the electron density of the DIG.