

An ALPACA Survey of Radio Recombination Lines in the Galactic Plane

Loren Anderson (WVU; loren.anderson@mail.wvu.edu), Dana Balser (NRAO), William Armentrout (GBO)

Diffuse ionized gas in the mid-plane known as the "Warm Ionized Medium" (WIM) makes up ~20% of the Milky Way gas mass and >90% of its ionized gas. It is the last major component of the interstellar medium (ISM) to be studied at high spatial and spectral resolution, and therefore many of its fundamental properties remain unclear. We recently completed a project called the GBT Diffuse Ionized Gas Survey (GDIGS) that maps the WIM distribution from $32^{\circ} > l > -5^{\circ}$, $|b| < 0.5^{\circ}$ using C-band radio recombination line (RRL) measurements. These data allow us to study for the first time the inner-Galaxy WIM unaffected by confusion from discrete HII regions. A complementary prime focus survey of the WIM at 300 MHz and 800 MHz is currently underway with the GBT (GDIGS-Low, PI: Salas). We here propose to use ALPACA to provide RRL maps at L-band. RRLs are also ubiquitous tracers of HII regions, and this survey will probe the HII Region "turnover frequency", marking the transition between optically thick and optically thin emission. With multiple RRL frequencies, we will be able to better investigate the density and temperature of the diffuse ionized gas of the Galaxy.