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The Galactic HII Region Luminosity Function at Radio and Infrared Wavelengths

**J. Mascoop¹, L. Anderson, Z. Makai, W. Armentrout, D. Balser,
T. Wenger, T. Bania**

¹West Virginia University, Morgantown, WV

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We determine the form of the Galactic HII region luminosity function (LF) at multiple infrared and radio frequencies. The HII region LF has been extensively studied in external galaxies, but has not received as much attention in the Milky Way. Investigations of the Galactic HII region LF have historically been limited by small sample sizes and incompleteness at lower luminosities. We find that our sample of 797 first Galactic quadrant HII regions is complete for all HII regions ionized by single O9.5 stars, and therefore provides an excellent dataset to use for extragalactic comparisons. The data are best fit by a single power law with an index of -1.73. There is little variation in the power law index with frequency. We find agreement between our result and previous studies in $H\alpha$, and therefore expect that future LF studies at wavelengths less affected by extinction should find similar results to those done in $H\alpha$. Many extragalactic LF studies suggest that a more general form of the HII region LF is a double power law. Such a form may reflect two physically distinct subpopulations; previous studies suggest the break in the double power law occurs at the transition between ionization- and density-bounded regions or regions ionized by single and multiple stars. We find that the Galactic LF is best fit by a single power law, even when it is divided into subsets by heliocentric distance, Galactocentric radius, angular size, and location relative to the spiral arms.