

The Impact of HII Regions on the Interstellar Medium of our Galaxy

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The interstellar medium (ISM) of galaxies like the Milky Way contains low-density diffuse ionized gas (DIG). High-mass stars emit large amounts of ionizing radiation and it is believed that a fraction of this radiation escapes from their HII regions and into the ISM where it is responsible for maintaining the ionization of the DIG. The goal of this dissertation work is to better understand how the radiation produced by high-mass stars is able to leak from the HII regions, how the radiation field changes during this process, and how the radiation affects the ambient ISM. Using Green Bank Telescope (GBT) pointed radio recombination line (RRL) data of a subset of Galactic HII regions and fully-sampled RRL maps from the GBT Diffuse Ionized Gas Survey (GDIGS), we show that the morphology of the photodissociation region surrounding an HII region strongly affects the amount of leaking radiation. We also show that physically large HII regions affect the surrounding ISM out to larger distances from the region. This indicates that giant HII region complexes may have a greater effect on maintaining the ionization of the DIG. We find a correlation between dust temperature and integrated RRL intensity, suggesting that the same radiation field that heats the dust also maintains the ionization of the DIG.