

Abstract Submitted
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HII Region Ionization of the Warm Interstellar Medium: A Case Study of NGC 7538 MATTEO LUISI, L. D. ANDERSON, West Virginia University, DANA S. BALSER, National Radio Astronomy Observatory, T. M. BANIA, Boston University, TREY V. WENGER, University of Virginia — The warm interstellar medium (WIM) is a low-density diffuse ionized component of the interstellar medium. Its ionization is likely maintained by photons from O-type stars, which are surrounded by spheres of fully ionized hydrogen, their HII regions. In order to ionize the WIM, these photons must escape through the photo-dissociation region (PDR), the boundary between the HII region within and the neutral medium surrounding it. Using data from the Green Bank Telescope, we analyze the ionizing radiation that is escaping through the PDR boundary of the HII region NGC 7538. We define the location of the PDR boundary, finding extended radio continuum and radio recombination line emission outside the PDR toward the north and east of the region. This suggests a non-uniform PDR morphology that is affecting the amount of radiation leaking through the PDR. We quantify the leaking photon fraction along the line of sight, and use a numerical model to estimate the leaking photon fraction in three dimensions of both radio continuum and H-alpha (656 nm) emission. We detect carbon emission near the PDR and find a decrease in the helium-to-hydrogen ionic abundance ratio with increasing distance from the central position. This indicates a softening of the radiation field within the PDR.

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