TERAHERTZ ASTRONOMY FROM THE SOUTH POLE: FIRST DIRECT DETECTION OF [NII] EMISSION

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We report the first direct detection of the 205 μm 3P1→3P0 [NII] line from a ground based observatory. The line was detected and mapped in emission from the Carina starformation region in the Galaxy using the South Pole Imaging Fabry-Perot Interferometer (SPIFI) on the Antarctic Submillimeter Telescope and Remote Observatory (AST/RO) at the South Pole. The [NII] line is an important coolant for the diffuse ionized ISM, and (together with the 122 μm [NII] line) is an excellent probe of gas density. The [NII] 205 μm line emission peaks at the Carina II HII region, and its strength indicates a low density (n < 30 cm-3) ionized medium. When compared with the ISO [CII] observations of this region, we find about half the [CII] line emission arises from this low density ionized gas as well. This is the first detection of the 205 μm emission line with an imaging spectrometer, and demonstrates the utility of Antarctic sites for THz spectroscopy.