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SEARCHING FOR THE CARRIER OF THE ANOMALOUS MICROWAVE EMISSION WITH GTC

S. Iglesias-Groth[1]

Several recent experiments have shown evidence for the existence of a new microwave emission process in our Galaxy (in the range 10-60 GHz) that may affect the ability to infer cosmological parameters from the Cosmic Microwave Background with the aimed precision of 1%.

This emission process has been identified in the Perseus Molecular Complex, in dark clouds (like LDN 1622) and as a diffuse component at high Galactic latitudes (Fernández-Cerezo et al. 2006). The carrier of this emission process is not identified yet. It could possibly be related to hydrogenated carbon molecules (PAHs and/or fullerenes) fast rotating in those environments and emitting electric dipole radiation (Iglesias-Groth 2005, 2006). The detection of optical and infrared transitions associated to these molecules may contribute to their identification. We plan to obtain optical spectroscopy with GTC (OSIRIS) of selected hot stars located behind regions where clear anomalous emission have been detected. Our aim is to detect transitions associated to the carrier. In addition, with CANARICAM and PACS (Herschel satellite) we aim to characterize the possible thermal and far infrared emission lines of the carrier in several dark clouds. The detection of diffuse interstellar bands and thermal infrared emission lines in regions where anomalous microwave emission is dominant will provide key information to establish the nature of the responsible particles.

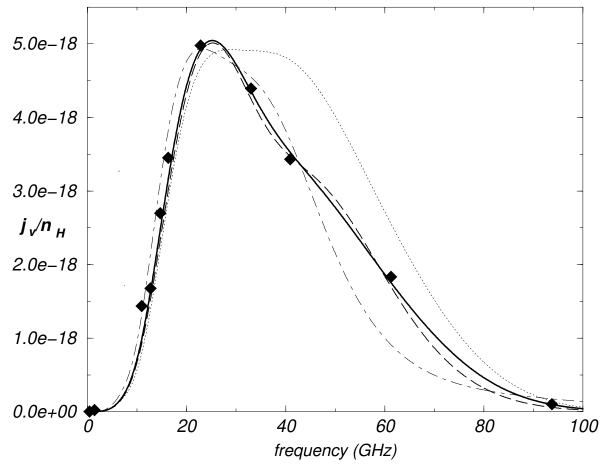

Fig. 1. Observations of Perseus anomalous microwave emission by Watson et al. 2005 (filled diamonds) and predicted rotational emissivity per H (Jy cm^2 sr^{-1} H^{-1}) of a mixture of fulleranes and hydrogenated buckyonions in CNM conditions (dotted and dotted-dashed line) and a combination of CNM and WIM conditions (dashed line and solid line). See Iglesias-Groth (2005) for details.

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[1]Instituto de Astrofísica de Canarias, Vía Láctea s/n, 38200 La Laguna, Tenerife, Spain (sigroth@iac.es).