Anomalous Microwave Emission: high resolution observations of **RCW175 and 3C396**

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Caption: CSIRO's Parkes radio telescope. Credit: David McClenaghan, CSIRO

Abstract

We have observed the HII region RCW175 and the SNR 3C396 with the 64-m Parkes telescope at 8.4 GHz, 13.5 GHz, 18.6 GHz and with polarization capability, at 21.5 GHz. High angular resolution ranging from 1' to 2.4', high sensitivity, and polarization capability enable us to perform a detailed study of the different constituents of the observed regions. We confirm the presence of anomalous microwave emission (AME) from RCW175 and find that the bulk of emission arises in particular from one of the source components with some additional diffuse emission. For RCW175 we have derived a microwave excess map whose origin cannot be ascribed to free-free or synchrotron emission. We have modeled and cross-correlated our results with sub-mm and *IR data as well as with the DustEM-derived parameters maps.*

In the analysis of 3C396 we also used data taken with other experiments and telescopes including unpublished observations performed with the GBT at 31.2 GHz. Our results show a SED dominated by synchrotron emission with partial contribution due to free-free emission. We find no evidence for AME arising from the core of the SNR and debate the possibility of diffuse thermal dust emission correlated with microwave emission.

Observations

The observations were conducted at four different frequency bands with the 64-m Parkes Radio Telescope, **NSW** Australia:

- The 8.4 GHz observations were conducted with the MARS receiver. T_{svs} = 30K •
- The 13.5 GHz observations have been conducted with the Ku receiver. T_{svs}= 150K •
- The 18.6 GHz observations have been conducted with the 13mm receiver. T_{svs} = 90K ۲
- Polarization observations have been conducted with the 13mm receiver at 21.5 GHz performing 1-d scans •

Receiver	Frequency	Resolution	Sensitivity	Map rms	Polarization
MARS	8.4GHz	2.4'	0.7mJy/beam	22mJy/beam	no
Ku	13.5GHz	1.7'	4mJy/beam	18mJy/beam	no
13mm	18.6GHz	1.4'	3mJy/beam	32mJy/beam	no
13mm	21.5GHz	1.1'	0.2mJy/beam	5.4mJy/beam	yes

RCW175: maps







-0.2

-0.3

-0.4

-0.5

-0.6

-0.7