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# Filamentary H $\alpha$ structure in the milky way

Andrew J. Walker  
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# FILAMENTARY H $\alpha$ STRUCTURE IN THE MILKY WAY

A thesis submitted in fulfilment of the  
requirements for the award of the degree

DOCTOR OF PHILOSOPHY

from

THE UNIVERSITY OF WOLLONGONG

by

ANDREW J. WALKER

Department of Engineering Physics

2006

## Abstract

The first part of this thesis presents the first results of a search for new optical supernova remnant candidates and other filamentary objects on films produced by the Anglo-Australian Observatory/UK Schmidt Telescope H $\alpha$  Survey. Sixty-one fields, or 26 percent of the Galactic plane survey fields, have been visually examined. This resulted in the detection of four new large diameter filamentary structures, and the discovery of extensive new optical emission in two previously known optical supernova remnant candidates.

The second part of this thesis presents results of a study we made using the FLAIR instrument on the UK Schmidt Telescope to obtain optical spectra of several filaments in RCW 114, a filamentary nebulae of about 250 arcmin diameter. These confirm that the emission is being produced by the interaction of the shock wave of a supernova remnant with the surrounding interstellar medium. We also obtained narrow-band H $\alpha$ + [N II] and [S II] images to examine the spatial variation in ionisation structure.

The third part of this thesis gives the result of a search using films from the UKST H $\alpha$  Survey where the locations of 86 Galactic supernova remnants were examined for optical emission. From these we had likely detections of 8 objects and possible detections of 4 others. We have discovered a new loop of emission nebulosity, 10 $^\circ$  in diameter, which we have named the Coalsack Loop.

## Acknowledgements

Firstly thanks must go to my supervisor Bill Zealey, who first encouraged my interest in Astronomy as a work experience student and then got me interested in supernova remnants for my Honours project. Throughout the years he has provided much valuable advice in all areas of astronomy and help keep me focussed along the long road to the completion of this thesis.

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## Publications

- Chapter 2: Walker, A.J., Zealey, W.J. & Parker, Q.A., 2001, **Filamentary Shell Structures from the AAO/UKST H $\alpha$  Survey**, PASA, 18, 259
- Chapter 3: Walker, A.J. & Zealey, W.J., 2001, **Multifibre Spectroscopy of the Supernova Remnant Candidate RCW 114**, MNRAS, 325, 287
- Walker, A.J. & Zealey, W.J., 1998, **Searching For Supernova Remnants**, PASA, 15, 79

## **Certification**

I certify that the work presented in this thesis is my own, except where stated and or referenced as otherwise.

Andrew Walker

July 2006

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