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Filamentary Hα structure in the milky way

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Walker, Andrew J., Filamentary Hα structure in the milky way, PhD thesis. Department of Engineering Physics, University of Wollongong, 2006. http://ro.uow.edu.au/theses/ 726

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FILAMENTARY Hα 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 Hα 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 Hα+[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 Hα 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° 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.

I'd also like to thanks the many staff I have been involved with at the University of Wollongong during my time as a student, who may have at some stage been my lecturer or provided other forms of help: Peter Anthony, Peter Fisher, Carey Freeth, Peter Ihnat, Michael Lerch, Roger Lewis, David Martin, Jagdish Mathur, Glen Moore, Paul Nulsen, Anatoly Rozenfeld, Phil Simmonds, George Takacs, Rodney Vickers and Chao Zhang.

Thanks must also go to the many other students at the University of Wollongong who have provided assistance over the years with observing, data reduction, general computer usage and many other areas. These include fellow astronomy students Stacy Mader, Vincent McIntyre and Erik Muller, along with Richard Baker, Duncan Fisher and other fellow lab demonstrators.

Special thanks also must go to the staff at the UK Schmidt Telescope, Quentin Parker, Fred Watson, Paul Cass, Malcolm Hartley and Ken Russell who provided great assistance during my observing runs and also my stay during 1998. I also thank the staff at the AAT and AAT lodge. In addition thanks goes to Mike Bessell, Anne Green, Brian Gaensler and Miller Goss who have all provided assistance and advice, and the anonymous referees who have provided feedback on my papers.

Finally I'd like to thank my family who have shown patience and given support through the years, and help me fulfill my ambitions of completing this work.

Publications

- Chapter 2: Walker, A.J., Zealey, W.J. & Parker, Q.A., 2001, **Filamentary Shell Structures from the AAO/UKST Hα Survey**, PASA, 18, 259
- Chapter 3: Walker, A.J. & Zealey, W.J., 2001, **Multifibre Spectroscopy of the Supernova Remnant Candidiate 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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