

Jason A. Moore

PERSONAL DETAILS

Address 9/33 Frederick St, Taringa QLD 4068 Australia (home)
Department of Physics, University of Queensland, Brisbane QLD 4072 Australia (work)

Phone +61 (0) 7 3371 6185 (home)
+61 (0) 7 3346 7981 (work)
+61 (0) 405 707 440 (mobile)

E-mail jmoore@physics.uq.edu.au

Website <http://www.physics.uq.edu.au/people/jmoore>

DOB 22 November, 1982

EDUCATION

University of Queensland, Brisbane, QLD Australia **2005-Present**
Doctor of Philosophy (in Physics)
Thesis: *Star Formation & Galaxy Morphology in the Supercluster Environment*
Expected completion date: March 2008

University of New South Wales, Sydney, NSW Australia **2001-2004**
Bachelor of Advanced Science (in Physics & Computing Science)

Southern Cross K-12 School, Ballina, NSW Australia **1988-2000**
NSW Higher School Certificate

AWARDS & SCHOLARSHIPS

Joint Research Scholarship, University of Queensland **2005-Present**
Summer Vacation Research Scholarship, University of NSW **2003**

TEACHING EXPERIENCE

Teaching Assistant – to Dr. K. Pimblet & A/Prof. M. Drinkwater in “Stars, Galaxies and the Cosmos” (UQ’s first year Astrophysics course) **2005-Present**
Assisted in course development, held weekly tutorial sessions, met with students upon request, and graded written assessments.

Outreach Participant – “Astronomy on the Go!” outreach program run by the UNSW School of Physics (to coincide with the IAU General Assembly) **2003**
Assisted in tour organization, and presented astronomy talks & workshops for students in Sydney and country NSW high schools.

Physics Tutor – for Warrane College, UNSW **2002**
Met with students upon request, usually on a weekly basis, to help with exam preparation for UNSW’s first year Physics courses.

PUBLICATIONS & PAPERS

"Supercluster 266: Galaxy Properties in Inter-Cluster Filaments" 2008

Moore, J. A., Pimbblet, K. A., Drinkwater, M. J., Colless, M., & Blake, C., in preparation

"Mathematical Morphology: Star/Galaxy Differentiation & Galaxy Morphology Classification" 2006

Moore, J. A., Pimbblet, K. A., & Drinkwater, M. J., PASA, 23(4), 135

RESEARCH SKILLS

Computing:

- Extremely proficient in C/C++ programming.
- Proficient in Perl, FORTRAN, MATLAB, Java, LaTeX and HTML.
- Experienced with both Linux and Windows environments.

Astronomy:

- Observing with the ATCA (4 days) in Narrabri and the AAT (4 nights) in Siding Spring.
 - Developing reduction & calibration pipelines for wide-field photometric data.
 - Radial velocity & equivalent width analysis of multi-object spectroscopic data.
 - Manipulation of large multi-wavelength data sets.
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MEMBERSHIPS

Student Member of the Astronomical Society of Australia

2005-Present

REFERENCES

Dr. Kevin A. Pimbblet
(primary Ph.D. supervisor)

Department of Physics, University of Queensland
Brisbane QLD 4072 Australia
+61 (0) 7 3346 9037 (w)
pimbblet@physics.uq.edu.au

A/Prof. Michael J. Drinkwater
(secondary Ph.D. supervisor)

Department of Physics, University of Queensland
Brisbane QLD 4072 Australia
+61 (0) 7 3365 3428 (w)
m.drinkwater@uq.edu.au

Dr. Chris Blake
(research collaborator)

Centre for Astrophysics and Supercomputing
Swinburne University of Technology
PO Box 218, Hawthorn VIC 3122 Australia
+61 (0) 3 9214 8624 (w)
cblake@astro.swin.edu.au

STATEMENT OF RESEARCH INTERESTS

My research interests cover two broad areas: (1) to find better ways in which to quantify galaxy morphology, and (2) to understand the role that environments play in the evolution of galaxy properties. Over the past 3 years, my Ph.D. research has touched on these two areas.

Automated Galaxy Morphology Classification

I am keenly interested in finding the most robust methods to separate stars from galaxies in astronomical images and cleanly distinguish between all major classes of galaxy morphologies. This is a challenging problem in astronomical image analysis today, but an important one with larger imaging surveys producing the need for fast processing and classification by automated means.

After an in-depth review of current methods used to classify astronomical objects, I applied the tools of Mathematical Morphology (MM, a branch of digital image processing used to analyse the geometric structure of an image) to this problem. I published the results in a 2006 issue of PASA, showing the competitiveness and advantages of MM against the more commonly used techniques for star-galaxy differentiation (in both CCD and photographic imaging) and galaxy morphology classification.

It is my aim over the next few years, beyond my Ph.D., to correlate the MM analysis of galaxy populations with more meaningful physical parameters, such as disk structure and star formation. Through January and February, I have co-supervised a summer vacation research student on a project towards this aim.

The Supercluster Environment

I have become increasingly interested in the physics of galaxy clusters, particularly the questions still to be answered of their role in star formation suppression and morphology evolution. A number of physical mechanisms have been proposed to explain the trends in galaxy morphology and star formation with the surrounding environment, for example, ram pressure stripping due to the intra-cluster medium, harassment due to neighbouring galaxies, or strangulation due to the cluster potential. Many spectroscopic studies since have attempted to solve the puzzle of which mechanism is responsible for, or at least dominant in, evolving the star-forming/spiral galaxies found in the field into the passive/elliptical galaxies found in cluster cores.

Galaxy clusters are often regions of intense dynamic activity, both within the cluster core and at the outskirts. Quite often, neighbouring galaxy clusters interact with each other through a complex arrangement of inter-cluster 'filaments'. These filaments of galaxies are the perfect regime for studying galaxy evolution processes, as they provide a wide range of galaxy environments as well as the particular environments where processes begin to occur. They also indicate the preferred directions by which surrounding mass is accreted into the cluster potential. In the past, studies had not considered a non-isotropic accretion of galaxies when producing such results as the 'morphology-density relation'.

As part of my thesis research, we have undertaken a wide-field optical imaging and spectroscopic program using the MSSSO 40" telescope and the AAOmega instrument, selecting and studying the filamentary structures of a local supercluster and the galaxies that populate them. The principle science objective was to determine the effect that environment has on star formation and morphology, concentrating on the role of inter-cluster filaments, with an overall goal of better understanding the physical mechanisms involved. The analysis of the survey is nearing completion, and the results of this work are in preparation to be published along with my thesis submission.

In collaboration with Dr. Chris Blake (Swinburne) we have also completed a sensitive high-resolution radio continuum program using the VLA, to further probe the star-forming galaxies within this local supercluster, providing an avenue for future work to be undertaken in the study. I have also forged a collaboration with Dr. Somak Raychaudhury (University of Birmingham) probing the star forming galaxies within the filaments of the 2dFGRS catalogue. It is my aim over the next few years to maintain that partnership in order to further investigate the role that filaments play in cluster growth and galaxy evolution, and continue the work towards a paper that is already in preparation.