

Robert King

CONTACT INFORMATION

Astrophysics Group
School of Physics
University of Exeter
Exeter, EX4 4QL

Tel: 01392 725515
E-mail: rob@astro.ex.ac.uk
Alt. E-mail: king.robert.r@gmail.com
WWW: www.astro.ex.ac.uk/people/rob

RESEARCH INTERESTS

Star formation, stellar evolution, environmental effects on star and planet formation, the initial mass function and primordial stellar binarity.

The physics of ultracool dwarfs: their formation, atmospheres and evolution.

CURRENT RESEARCH

I have recently completed work on the nearby binary brown dwarfs ε Indi Ba and Bb. I reduced VLT photometry and spectroscopy from the optical through to the thermal-IR (0.6–5.1 μ m) which allowed a detailed comparison with atmospheric and evolutionary models of sub-stellar objects at intermediate age. The comparison with the Lyon atmospheric models has identified areas of the models where improvements can be made and also highlighted the problem of deriving inaccurate physical properties even for seemingly well-constrained systems. I am also involved in the astrometric monitoring of this binary which has allowed a preliminary determination of the total system mass and on-going absolute astrometry will determine the mass ratio and hence the individual masses. Together with the luminosity determinations, these observations will provide an extremely well characterised system which will tightly constrain future evolutionary models.

I am now using optical and near-IR observations along with *Chandra* X-ray observations to determine characteristics of stars in young stellar clusters. We hope to combine these multi-wavelength data for 10–20 clusters in massive star-forming environments, to consistently compare properties such as evidence of mass segregation, binarity and the form of the IMF, free of the problems associated with a myriad of selection techniques.

I am also using high-resolution spectroscopy of nearby FGK stars in an attempt to identify young stellar targets for follow-up planet searches with the next generation of high-contrast imagers

Finally, I am searching for and characterising substellar companions to young stars involving the characterisation of ~ 12 young L dwarfs by comparison of their near-IR spectra to synthetic stellar spectra. The existing measurements of these objects are being extended into the thermal-IR regime which will allow us to more accurately determine their luminosities and effective temperatures as well as allowing a probe of the L to T transition in young objects.

- EMPLOYMENT **University of Exeter**, Exeter, Devon, UK **Oct. 2009–present**
Associate Research Fellow
- EDUCATION **University of Exeter**, Exeter, Devon, UK **2005–2009**
Ph.D. completed December 2009
- Thesis Topic: *Low-Mass Stars and Brown Dwarfs: Optical/Infrared Photometry and Spectroscopy of Low-Mass Stars and Brown Dwarfs in the Field and Young Clusters*
 - Advisor: Prof. Mark J. McCaughrean
- University of St Andrews**, St Andrews, Fife, UK **2001–2005**
M.Phys Astrophysics (Hons.) First Class
- Project Topic: *Young Active Stars and their Position in Colour Magnitude Diagrams*
 - Advisor: Prof. Andrew Collier Cameron
- Clyde Valley High School**, Overtown, North Lanarkshire, UK **1995–2001**
Dux of Clyde Valley High School 2000
Recipient of the Ballantyne & Copland Prize 2000
Recipient of the David Colville Medal 2000
- PUBLICATIONS *ϵ Indi Ba, Bb: a detailed study of the nearest known brown dwarfs*
(2010, A&A 510, A99)
Robert R. King, Mark J. McCaughrean, Derek Homeier, France Allard, Ralf-Dieter Scholz and Nicolas Lodieu
- The highest resolution near-IR spectrum of the imaged planetary mass companion 2M1207b*
(2010, A&A 517, A76)
Jenny Patience, **Robert R. King**, Robert J. De Rosa, and Christian Marois
- The UKIDSS-2MASS Proper Motion Survey I: Ultracool dwarfs from UKIDSS DR4*
(2009, MNRAS 394, 857)
Niall R. Deacon, Nigel C. Hambly, **Robert R. King**, and Mark J. McCaughrean
- The UV-Excess survey of the Northern Galactic Plane (UVEX)*
(2009, MNRAS 399, 323)
Paul J. Groot and 43 others inc. **Robert R. King**
- IN PREP.
- The Effect of Stellar Density of Star-Forming Regions on Stellar Multiplicity* (in prep.)
Robert R. King, Richard Parker, Jenny Patience, and Simon Goodwin
- A Compendium of Near-IR Spectra of Young, Very Low-Mass Companions* (in prep.)
Jenny Patience, **Robert R. King**, Robert J. De Rosa, et al.
- Spatially resolved submm imaging of the HR8799 debris disk* (in prep.)
J. Patience, J. Bulger, **R. R. King**, B. Ayliffe, I. Song, C. Pinte, J. Koda, C. D. Dowell, A. Kovacs, and J. Carpenter
- Star formation and disk properties in Pismis 24* (in prep.)
Min Fang, Roy van Boekel, **Robert R. King**, Thomas Henning, et al.

Dynamical System Mass of ε Indi Ba, Bb: the relative orbit (in prep.)
Mark J. McCaughrean, Catia V. Cardoso, **Robert R. King**, et al.

Individual Dynamical Masses of ε Indi Ba and Bb: the absolute orbit (in prep.)
Catia V. Cardoso, Mark J. McCaughrean, **Robert R. King**, et al.

Deep wide-field near-infrared survey of the Carina Nebula (in prep.)
T. Preibich, T. Ratzka, H. Ohlendorf, **R. R. King**, S. Hodgkin, M. Irwin, J. R. Lewis, M. J. McCaughrean, and H. Zinnecker

Infrared properties of the X-ray emitting young stellar objects in the Carina Nebula (in prep.)
Thomas Preibich, Simon Hodgkin, Mike Irwin, Jim Lewis, **Robert R. King**, Mark J. McCaughrean, Hans Zinnecker, Leisa Townsley and Patrick Broos

Detection of a large massive circumstellar disk around a high-mass young stellar object in the Carina Nebula (in prep.)
T. Preibich, T. Ratzka, T. Gehring, H. Ohlendorf, H. Zinnecker, **R. R. King**, M. J. McCaughrean, and J. Lewis

An Introduction to the Chandra Carina Complex Project (in prep.)
Leisa K. Townsley et al. inc. **Robert R. King**

A Catalog of Chandra X-ray Sources in the Carina Nebula (in prep.)
Patrick S. Broos et al. inc. **Robert R. King**

A Chandra ACIS Study of the Young Open Cluster Trumpler 15 in Carina (in prep.)
Junfeng Wang et al. inc. **Robert R. King**

Trumpler 16 as Viewed by the Chandra Carina Complex Project (in prep.)
Scott Wolk et al. inc. **Robert R. King**

X-ray Star Clusters in the Carina Complex (in prep.)
Eric D. Feigelson and 15 others inc. **Robert R. King**

CONFERENCE
PROCEEDINGS

ε Indi Ba, Bb: a spectroscopic study of the nearest known brown dwarfs
Robert R. King, Mark J. McCaughrean, Derek Homeier, France Allard, Ralf-Dieter Scholz and Nicolas Lodieu, Proceedings of the 15th Workshop of Cool Stars, Stellar Systems, and the Sun (2008)

Dynamical masses of the nearest brown dwarf binary: ε Indi Ba, Bb
Catia V. Cardoso, Mark J. McCaughrean, Robert R. King, Laird Close, Ralf-Dieter Scholz, Rainer Lenzen, Wolfgang Brandner, Nicolas Lodieu, and Hans Zinnecker, Proceedings of the 15th Workshop of Cool Stars, Stellar Systems, and the Sun (2008)

TELESCOPE
PROPOSALS

I am P.I. on an ESO proposal entitled *Characterising the IMF of two high-mass star-forming regions with the VLT and Chandra* and a follow-up proposal *Characterising the IMF in a range of high-mass star-forming regions with the VLT and Chandra* which will allow us to investigate the IMF in different high-mass environments.

I am a co-investigator on a series of proposals to determine astrometrically, the dynamical system mass and individual masses of the nearest brown dwarf binary, ε Indi Ba, Bb (McCaughrean P.I.).

I am also a co-investigator on a HAWK-I science verification proposal *The Carina Nebula as a laboratory of massive star feedback* (Preibisch P.I.) and on an NSF proposal *The origins and environments of rich young stellar clusters* (Feigelson P.I.)

I have also recently made use of the 2m robotic Liverpool Telescope for photometric and spectroscopic observations.

OBSERVING
EXPERIENCE

Caltech Sub-millimeter Observatory **September 2010**
Four nights using SHARC-II searching for emission from the debris disk around HR 8799.

Caltech Sub-millimeter Observatory **December 2009**
Four nights using SHARC-II searching for disk emission at $400\ \mu\text{m}$ from brown dwarf in star-forming regions.

ESO VLT **August 2008**
Six half-nights visitor mode using VIMOS (Visible Multi-Object Spectrograph) on UT3 for proposal: *Characterising the IMF of a range of high-mass star-forming regions with the VLT and Chandra*. Preceded by four service mode pre-imaging and imaging runs from which the MOS masks were prepared.

ESO VLT **February 2008**
Three nights visitor mode using VIMOS on UT3 for proposal: *Characterising the IMF of two high-mass star-forming regions with the VLT and Chandra*. Again, preceded by two service mode pre-imaging runs.

Isaac Newton Telescope **June/July 2007**
Twelve nights using the wide-field camera for IPHAS (INT Photometric H α Survey) and UVEX.

William Herschel Telescope **November 2006**
Six nights using AF2/WYFFOS a multi-object fibre-fed spectrograph.

TEACHING
EXPERIENCE

University of Exeter

Second year astronomy laboratory

October 2005 - present

Involves demonstrating the laboratory practicals, marking student's work and end-of-year presentations. I have also run observing sessions for the undergraduates to gather data for their projects.

Open Day Talks

October 2005 - present

I give introductory talks to prospective undergraduates and their parents on our group's research and on the use of our 10" telescope.

First year astronomy laboratory

March 2006 - 2008

Involves demonstrating the laboratory practicals and marking student's work.

Teaching at The Maynard School

January 2007

I have written and delivered lessons on astronomy and astrophysics to sixth formers at a local school as part of their extended studies program.

University of St Andrews

Second year astronomy laboratory

August 2004

Involves creating an astrophysics practical for second year undergraduates. This was based on the comparison of isochrones and evolutionary tracks to observations.

COMPUTING SKILLS

- Languages: FORTRAN, Perl, C-shell scripting, HTML, IRAF, CL scripting, learning C.
- Programs: IRAF, ESOREX/GASGANO, TOPCAT.
- Operating Systems: Unix/Linux, OS X.

REFEREES

Prof. Mark J. McCaughrean
Head of RSSD, ESA
ESTEC,
Keplerlaan 1,
2200 AG Noordwijk,
The Netherlands

Prof. Tim Naylor
Astrophysics Group,
School of Physics,
University of Exeter,
Exeter, EX4 4QL

Dr. Derek Homeier
Institut für Astrophysik,
Georg-August-Universität,
Friedrich-Hund-Platz 1,
3077 Göttingen, Germany

Tel: +31 71 565 3552
mjm@rssd.esa.int

Tel: 01392 264172
timn@astro.ex.ac.uk

Tel: +49 (551) 39-7980
derek@astro.physik.uni-goettingen.de