

Min-Kai Lin

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Employment

Department of Astronomy and Steward Observatory, University of Arizona

Steward Theory Fellow

2014—

Canadian Institute for Theoretical Astrophysics

Postdoctoral Fellow

2011–2014

Education

University of Cambridge

PhD in Theoretical Astrophysics

2011

Thesis: Dynamical instabilities in disc-planet interactions

Advisor: Professor John C.B. Papaloizou

University of Cambridge

BA and MSci in Natural Sciences: Astrophysics (First class honors)

2008

Awards and honors

- Steward Observatory Prize Fellowship in Theoretical and Computational Astrophysics 2014
- CITA Postdoctoral Fellowship 2011
- Smith Rayleigh Knight Prize 2010
- Fellow of the Cambridge Overseas Society 2008
- St. John's College Benefactors' Scholarship 2008
- Isaac Newton Studentship 2008
- Overseas Research Scholarship 2008
- Institute of Astronomy Prize (top of class) 2008
- JS Wilson Prize for Natural Sciences 2006, 2007, 2008
- College Awarded Bursary 2007
- Skerne Scholarship 2005, 2006, 2007, 2008
- College Book Prize for Academic Distinction 2005, 2006, 2007, 2008

Teaching and supervision

CITA, University of Toronto

Undergraduate summer student program

2014

Student: R. Les

Project: Gap formation and stability in non-isothermal protoplanetary discs (published in MNRAS)

CITA, University of Toronto

Undergraduate summer student program

2012

Student: R. Cloutier

Project: Orbital migration of giant planets induced by gravitationally unstable gaps (published in MNRAS)

University of Cambridge

Astrophysical Fluid Dynamics for Part II Astrophysics

2011

Clare College, University of Cambridge

Mathematics IA for Natural Sciences

2008—2011

Presentations

- *Vertical shear instability in protoplanetary disks*
Protoplanetary Disk Dynamics and Planet Formation, Yokohama, Japan Sep. 2015
In the Spirit of Lyot, Montreal, Canada Jun. 2015
CITA, Toronto, Canada Jun. 2015
IAUS 314: Young Stars & Planets Near the Sun, Atlanta, USA May 2015
- *On the formation of one-armed spirals in locally isothermal disks*
Disc Dynamics & Planet Formation, Larnaka, Cyprus Jun. 2015
Star and Planet Formation in the Southwest, March, Tucson, USA Mar. 2015
- *Strange aspects of locally isothermal astrophysical disks and the stability of magnetized massive disks*
Berkeley CIPS seminar, UC Berkeley, USA Feb. 2015
- *Gap formation and stability in non-isothermal protoplanetary disks*
Characterizing Planetary Systems Across the HR Diagram, University of Cambridge, UK Jul. 2014
- *From the complex plane to planet formation*
CITA (ISIMA talk) Jul. 2014
University of Arizona Jul. 2014
- *Dust trapping in protoplanetary disk vortices*
University of Toronto Mar. 2014
- *Large-scale hydrodynamic instabilities and structures in protoplanetary disks*
Centre for Star and Planet Formation/Niels Bohr Institute, Copenhagen, Denmark Jan. 2014
- *Gravitational instability of planetary gaps and its effect on orbital migration*
IAUS 299: Exploring the Formation and Evolution of Planetary Systems, Victoria, Canada Jun. 2013
University of Toronto May 2013
- *Large-scale hydrodynamic instabilities in protoplanetary disks*
MIT Apr. 2013
Harvard-Smithsonian Center for Astrophysics Apr. 2013
- *Large-scale vortex formation in protoplanetary disks*
Cornell University (invited talk) Feb. 2013
Princeton University Feb. 2013
University of Toronto Nov. 2012
- *Vortices and spirals at gap edges in 3D self-gravitating disk-planet simulations*
American Geophysical Union Fall Meeting, San Francisco, USA Dec. 2012
Instabilities and Structures in Protoplanetary Disks, Marseille, France Sep. 2012
- *Planet migration with gravitationally unstable gaps*
DAMTP, University of Cambridge Oct. 2011
- *Vortex instabilities in self-gravitating disc-planet interactions*
Baroclinic Instability and Protoplanetary Accretion Disks, Ringberg, Germany Jun. 2011
- *The stability of self-gravitating gaps*
Academia Sinica Institute of Astronomy and Astrophysics, Taipei, Taiwan Nov. 2010
DAMTP, University of Cambridge Nov. 2010
- *Spin down of protostars through gravitational disk torques*
East Asian Numerical Astrophysics Meeting, ASIAA, Taiwan Nov. 2010
International Summer Institute for Modeling in Astrophysics, UC Santa Cruz, USA Aug. 2010
- *Type III migration in a low viscosity disc.*
American Museum of Natural History, New York City, USA Jan. 2010
Winter Workshop on Planetary Astrophysics, KIAA, Peking University, China Dec. 2009
DAMTP, University of Cambridge Oct. 2009
- *Vortices in planetary migration*
Dynamics of Discs and Planets, Cambridge, UK Aug. 2009
- *Three-layer magnetoconvection*
UKMHD, Coventry University, UK Jun. 2009

Other work experiences

UC Santa Cruz

ISIMA summer student

2010

Project: Numerical simulations of star-disk interaction, with M. Krumholz and K. Kratter

DAMTP, University of Cambridge

Summer student

2007

Project: Three-layer magneto-convection, with L. Silvers and M. Proctor

ASIAA, Taipei, Taiwan

Summer/visiting student

2005/2006

Project: Bar-driven density waves in galactic disks, with C. Yuan and D.C.C. Yen

Academic services

Referee, The Astrophysical Journal

2013—

Referee, Astronomy and Astrophysics

2013—

Referee, Astrophysics and Space Science

2013—

Computing

Languages: Fortran, C, IDL, Mathematica

Astrophysical codes: Fargo, Zeus, Pluto, Athena

Publications

Refereed publications:

17. *Cooling requirements for the vertical shear instability in protoplanetary disks*
Lin, M.-K., Youdin, A.N, ApJ, 811, 17 2015
16. *Gap formation and stability in non-isothermal protoplanetary discs*
*Les, R., **Lin, M.-K.**, MNRAS, 450, 1503 2015
15. *One-armed spirals in locally isothermal, radially structured self-gravitating discs*
Lin, M.-K., MNRAS, 448, 3806 2015
14. *Linear stability of magnetized massive protoplanetary disks*
Lin, M.-K., ApJ, 790, 13 2014
13. *Testing large-scale vortex formation against viscous layers in three-dimensional discs*
Lin, M.-K., MNRAS, 437, 575 2014
12. *Steady state of dust distributions in disk vortices: observational predictions and applications to transitional disks*
Lyra, W., **Lin, M.-K.**, ApJ, 775, 17 2013
11. *Orbital migration of giant planets induced by gravitationally unstable gaps: the effect of planet mass*
*Cloutier, R., **Lin, M.-K.**, MNRAS, 434, 621 2013
10. *Non-barotropic linear Rossby wave instability in three-dimensional disks*
Lin, M.-K., ApJ, 765, 84 2013
9. *Effects of upper disc boundary conditions on the linear Rossby wave instability*
Lin, M.-K., MNRAS, 428, 19 2013
8. *Vortex and spiral instabilities at gap edges in three-dimensional self-gravitating disc-satellite simulations*
Lin, M.-K., MNRAS, 426, 3211 2012
7. *Rossby wave instability in locally isothermal and polytropic disks: three-dimensional linear calculations*
Lin, M.-K., ApJ, 754, 21 2012
6. *Outward migration of a giant planet with a gravitationally unstable gap edge*
Lin, M.-K., Papaloizou, J.C.B., MNRAS, 421, 780 2012
5. *Spin-down of protostars through gravitational torques*
Lin, M.-K., Krumholz, M. R., Kratter, K. M., MNRAS, 416, 580 2011
4. *Edge modes in self-gravitating disc-planet interactions*
Lin, M.-K., Papaloizou, J.C.B, MNRAS, 415, 1445 2011
3. *The effect of self-gravity on vortex instabilities in disc-planet interactions*
Lin, M.-K., Papaloizou, J.C.B, MNRAS, 415, 1426 2011
2. *Type III migration in a low viscosity disc*
Lin M.-K., Papaloizou, J.C.B, MNRAS, 405, 1473 2010
1. *Three-layer magnetoconvection*
Lin, M.-K., Silvers, L. J., Proctor, M.R.E., Physics Letters A, 373, 69 2008

Conference proceedings and abstracts:

4. *Vertical shear instability in the solar nebula*
Lin, M.-K., Youdin, A.N., IAUS 314 proceedings 2015

3. *Gravitational instability of planetary gaps and its effect on orbital migration*
Lin, M.-K., *Cloutier, R., IAUS 299 proceedings 2014
2. *Instabilities at planetary gap edges in 3D self-gravitating disks*
Lin, M.-K., Instabilities and Structures in Proto-Planetary Disks, Marseille, France,
EPJ Web of Conferences, 46, id.07001 2013
1. *Evolution of bar-driven disks under the influence of the interaction between two inner Lindblad resonances*
Yuan, C., Yen, D. C. C., **Lin, M.-K.**, AAS Meeting 207, #188.04 2005

*student

Citations

Search engine: NASA ADS

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| 16. Lin, M.-K., Youdin, A.N., 2015, ApJ, 811, 17 | 1 |
| 15. Les, R., Lin, M.-K., 2015, MNRAS, 450, 1503 | 1 |
| 14. Lin, M.-K., ApJ, 2014, 790, 13, | 1 |
| 13. Lin, M.-K., 2014, MNRAS, 437, 575 | 7 |
| 12. Lyra, W., Lin, M.-K., 2013, ApJ, 775, 17 | 31 |
| 11. Cloutier, R., Lin, M.-K., 2013, MNRAS, 434, 621 | 2 |
| 10. Lin, M.-K., 2013, ApJ, 765, 84 | 10 |
| 9. Lin, M.-K., 2013, MNRAS, 428, 19 | 2 |
| 8. Lin, M.-K., 2012, MNRAS, 426, 3211 | 23 |
| 7. Lin, M.-K., 2012, ApJ, 754, 21 | 32 |
| 6. Lin, M.-K., Papaloizou, J.C.B., 2012, MNRAS, 421, 780 | 12 |
| 5. Lin, M.-K., Krumholz, M. R., Kratter, K. M., 2011, MNRAS, 416, 580 | 11 |
| 4. Lin, M.-K., Papaloizou, J.C.B, 2011, MNRAS, 415, 1445 | 18 |
| 3. Lin, M.-K., Papaloizou, J.C.B, 2011, MNRAS, 415, 1426 | 30 |
| 2. Lin M.-K., Papaloizou, J.C.B, 2010, MNRAS, 405, 1473 | 29 |
| 1. Lin, M.-K., Silvers, L. J., Proctor, M.R.E., Physics Letters A, 373, 69 | 1 |