Min-Kai Lin

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Employment

University of Arizona
Steward Theory Fellow *2014—*

Canadian Institute for Theoretical Astrophysics
Postdoctoral Fellow *2011–2014*

Education

University of Cambridge
PhD, Theoretical Astrophysics *2011*
Advisor: Professor John C.B. Papaloizou
Thesis: Dynamical instabilities in disc-planet interactions
BA and MSci, 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
- Student: R. Les *2014*
  Project: Gap formation and stability in non-isothermal protoplanetary discs
- Student: R. Cloutier *2012*
  Project: Orbital migration of giant planets induced by gravitationally unstable gaps

University of Cambridge
Astrophysical Fluid Dynamics for Part II Astrophysics *2011*

Clare College, University of Cambridge
Mathematics IA for Natural Sciences *2008—2011*

Computing

Languages: Fortran, C, IDL, Mathematica

Astrophysical MHD codes: Fargo, Fargo3D, Zeus-MP, Pluto, Athena

Presentations

- *Vertical shear instability in protoplanetary disks*
  Protoplanetary Disk Dynamics and Planet Formation, Yokohama, Japan *Sep. 2015*
  In the Spirit of Lyot, Montreal, Canada; CITA fluids talk *Jun. 2015*
  IAUS 314: Young Stars & Planets Near the Sun, Atlanta, USA *May 2015*
- *On the formation of of one-armed spirals in locally isothermal disks*
  Disc Dynamics & Planet Formation, Larnaka, Cyprus *Jun. 2015*
  Star and Planet Formation in the Southwest, Tucson, USA *Mar. 2015*
- *Strange aspects of locally isothermal astrophysical disks and the stability of magnetized massive disks*
  UC Berkeley CIPS seminar *Feb. 2015*

- *Gap formation and stability in non-isothermal protoplanetary disks*
  Characterizing Planetary Systems Across the HR Diagram, Cambridge, UK *Jul. 2014*
- *From the complex plane to planet formation*
  CITA (ISIMA talk), 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, Harvard-Smithsonian CfA *Apr. 2013*
- *Large-scale vortex formation in protoplanetary disks*
  Cornell University (invited talk), 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*
  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*
  ASIAA; 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*
  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—*
Panelist, NASA Proposal Review Panel *2015*

Publications

* = directly supervised student
Refereed:

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*

Citations

Search engine: NASA ADS

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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