GANG LI

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EDUCATION AND WORK

KU Leuven, Belgium *November 2022 - Present*
Postdoctoral researcher, supervised by Professor Conny Aerts

IRAP, Université de Toulouse, France *December 2020 - November 2022*
Postdoctoral researcher, collaborated with Dr. Sébastien Deheuvels

The University of Sydney, Australia *October 2016 - December 2020*
PhD in astrophysics, supervised by Professor Timothy Bedding
Dean's International Postgraduate Research Scholarship, the University of Sydney
Postgraduate Research Support Scheme, the University of Sydney
Nomination of the Charlene Heisler Prize

Beijing Normal University, Beijing, China *September 2012 - June 2016*
Bachelor of Astronomy, supervised by Jianning Fu. Overall score: 91
National scholarship, top 0.2%, Ministry of Education of the People's Republic of China
Outstanding graduates in Beijing, top 5%, Beijing Municipal Commission of Education.
Outstanding thesis, top 3%, Beijing Normal University.
Funding of the science research plan for the university students in Beijing, Beijing Municipal Commission of Education.

RESEARCH

I am deeply fascinated by asteroseismology, the study of stellar oscillations, because it provides the only method to peer the stellar interiors. With the advent of space-based satellites, asteroseismology has emerged as a dynamic and groundbreaking field within stellar physics. My research encompasses a wide range of areas, from main-sequence stars to red giants, as well as binary stars with strong tidal interaction and stars with central magnetic fields.

- PhD Research at the University of Sydney:
  1. Conducted a comprehensive study on the largest sample of γ-Doradus stars to date.
  2. Reported rotation rates in the near-core regions, challenging existing theories on angular momentum transport.
  3. Proposed a new mechanism, "inverse tides," to explain the phenomenon of extremely slow rotators in binary systems.
- Postdoctoral Research in Toulouse:
  1. Made a groundbreaking discovery of central magnetic fields within stellar cores (published in the main journal of ***Nature***.)
  2. Compiled the largest sample of red giant stars, measuring their envelope rotation rates for the first time and providing observational constraints on angular momentum transport mechanisms.
- Current Research at KU Leuven:

1. Focusing on studying stellar oscillations in open clusters in collaboration with Flemish colleagues.
2. Identified numerous previously undetected intriguing variable stars.
3. Utilizing the cluster environment to provide additional constraints for stellar physics calibration through asteroseismic modeling.
4. Research synergy with asteroseismology enhances understanding of cluster formation and evolution.

of red giant stars'. This study presents significant findings about the internal magnetic fields in the cores of red giant stars, which are crucial for understanding the magnetic effects on stellar evolution.

PUBLICATIONS

I have published nine first-author peer-reviewed papers and more than 16 collaborative papers. My total citation count is 495, with 95 of those citations coming from my first-author paper *Li et al. (2020), MNRAS, 491, 3, 3586-3605.* Additionally, I have a first-author paper published in Nature.

Nine first-author peer-reviewed papers:

- **Li, Gang** et al.; 2024; *Asteroseismic measurement of core and envelope rotation rates for 2006 red giant branch stars*; accepted for publication by Astronomy & Astrophysics.
- **Li, Gang** et al.; 2024; *Asteroseismology of the young open cluster NGC 2516 I: Photometric and spectroscopic observations*; accepted for publication by Astronomy & Astrophysics.
- **Li, Gang** et al.; 2023; *Internal magnetic fields in 13 red giants detected by asteroseismology*; Astronomy & Astrophysics, Volume 680, id.A26, 57 pp. Citation: 6.
- **Li, Gang** et al.; 2022; *Magnetic fields of 30 to 100 kG in the cores of red giant stars*; **Nature**, Volume 610, Issue 7930, p.43-46. Citation: 23.
- **Li, Gang** et al.; 2020; *The effect of tides on near-core rotation: analysis of 35 Kepler γ Doradus stars in eclipsing and spectroscopic binaries*; Monthly Notices of the Royal Astronomical Society, 497, 4, 4363-4375. Citation: 30.
- **Li, Gang** et al.; 2020; *Gravity-mode period spacings and near-core rotation rates of 611 γ Doradus stars with Kepler*; Monthly Notices of the Royal Astronomical Society, 491, 3, 3586-3605. Citation: 95.
- **Li, Gang** et al.; 2019; *Period spacings of γ Doradus pulsators in the Kepler field: Rossby and gravity modes in 82 stars*; Monthly Notices of the Royal Astronomical Society, 487, 1, 782-800. Citation: 51.
- **Li, Gang** et al.; 2019; *Period spacings of γ Doradus pulsators in the Kepler field: detection methods and application to 22 slow rotators*; Monthly Notices of the Royal Astronomical Society, 482, 2, 1757-1785. Citation: 46.
- **Li, Gang** et al.; 2018; *Pulsations and period variations of the δ Scuti star AN Lyncis in a possible three-body system*; Monthly Notices of the Royal Astronomical Society, 473, 1, 398-411. Citation: 3.

Two papers without peer-review related to Antarctic astronomy:

- **Li, Gang** et al.; 2016; *Light Curve Solutions of an Eclipsing Binary OGLE-GD-ECL-04451 with a Dramatic Change in Amplitude*; eprint arXiv: 1602.01552.
- **Li, Gang** et al.; 2015; *Variable stars observed with the AST3-1 telescope from dome A of antarctica*; eprint arXiv: 1510.06134. Citation: 2.

Co-authored peer-reviewed papers:

- Fritzewski D, et al.; *Age-dating the young open cluster UBC 1 with g-mode asteroseismology, gyrochronology, and isochrone fitting*, 2024, Astronomy & Astrophysics, Volume 681, id.A13, 18 pp.
- Shen, Dong-Xiang; **Li, Gang**; et al.; *Variability of Magnetic Hot Stars from the TESS Observations*, 2023, Astrophysical Journal, Volume 955, Issue 2, id.123, 25 pp.
- Sepulveda, Aldo G.; Huber, Daniel; **Li, Gang**; *20 s Cadence TESS Photometry of HR 8799*, 2023, Research Notes of the AAS, Volume 7, Issue 1, id.2.
- Deheuvels, Sébastien; **Li, Gang**; et al.; *Strong magnetic fields detected in the cores of 11 red giant stars using gravity-mode period spacings*, 2023, Astronomy & Astrophysics, Volume 670, id.L16, 9 pp.
- Sepulveda, Aldo G.; Huber, Daniel; Zhang, Zhoujian; **Li, Gang**; et al.; *The Directly Imaged Exoplanet Host Star 51 Eridani is a Gamma Doradus Pulsator*, 2022, Astrophysical Journal, Volume 938, Issue 1, id.49, 7 pp.
- Guo, Zhao; Ogilvie, Gordon I.; **Li, Gang**; et al.; *A new window to tidal asteroseismology: nonlinearly excited stellar eigenmodes and the period spacing pattern in KOI-54*, 2022, Monthly Notices of the Royal Astronomical Society, Volume 517, Issue 1, pp.437-446.
- Yang, Tao-Zhi; Zuo, Zhao-Yu; **Li, Gang**; et al.; *TIC 308396022: δ Scuti-γ Doradus hybrid with large-amplitude radial fundamental mode and regular g-mode period spacing*, 2021, Astronomy & Astrophysics, Volume 655, id.A63, 7 pp.
- Gebruers, S; et al.; *A homogeneous spectroscopic analysis of a Kepler legacy sample of dwarfs for gravity-mode asteroseismology*, 2021, Astronomy & Astrophysics, Volume 650, id.A151, 27 pp.
- Saio, Hideyuki; Takata, Masao; Lee, Umin; **Li, Gang**; et al.; *Rotation of the convective core in γ Dor stars measured by dips in period spacings of g modes coupled with inertial modes*, 2021, Monthly Notices of the Royal Astronomical Society, Volume 502, Issue 4, pp.5856-5874.
- Bedding, Timothy R.; et al, *Very regular high-frequency pulsation modes in young intermediate-mass stars*, 2020, Nature, Volume 581, Issue 7807, p.147-151.
- Guo, Zhao; Fuller, Jim; Shporer, Avi; **Li, Gang**; Hambleton, Kelly; Mannuel, Joseph; Murphy, Simon J., Isaacson, Howard; *KIC4142768: An evolved γ Doradus/δ Scuti hybrid pulsating eclipsing binary with Tidally excited oscillations*, 2019, Astrophysical Journal, 885, page 46.
- Guo, Zhao; **Li, Gang**; *A Mass-accreting γ Doradus Pulsator with a Synchronized Core in Kepler Eclipsing Binary KIC 7385478*, 2019, Astrophysical Journal Letters, Volume 882, Issue 1, article id. L5, 6 pp.
- Liu, N.; et al.; *Photometric Solutions of Three Eclipsing Binary Stars Observed from Dome A, Antarctica*; 2018, Astrophysical Journal, Volume 155, Issue 4, article id. 168, 9 pp. (2018).
- Guo, Zhen; et al.; *Star-Disk Interactions in Multiband Photometric Monitoring of the Classical T Tauri Star GI Tau*, 2018, Astrophysical Journal, Volume 852, Issue 1, article id. 56, 15 pp. (2018).
- Saio, Hideyuki; Bedding, Timothy R.; Kurtz, Donald W.; Murphy, Simon J.; Antoci, Victoria; Shibahashi, Hiromoto; **Li, Gang**; Takata, Masao; *An astrophysical interpretation of the remarkable g-mode frequency groups of the rapidly rotating γ Doradus star, KIC 5608334*, 2018, Monthly Notices of the Royal Astronomical Society, 477, Issue 2, p.2183-2195.
- Wang, Lingzhi; Ma, Bin; **Li, Gang**; et al.; *Variable Stars Observed in the Galactic Disk by AST3-1 from Dome A, Antarctica*, 2017, Astrophysical Journal, Volume 153, Issue 3, article id. 104, 24 pp. (2017).

CONFERENCE TALKS AND POSTERS

Talk: *Asteroseismology in the young open cluster NGC 2516 observed by the TESS mission*, TESS Asteroseismic Science Consortium 7/Kepler Asteroseismic Science Consortium 14, July 2023, Hawaii, USA.

Talk: *Internal magnetic fields detected and measured using asteroseismology in red giants*, TESS Asteroseismic Science Consortium 6/Kepler Asteroseismic Science Consortium 13, July 2022, Leuven, Belgium.

Talk: *Internal magnetic fields detected and measured using asteroseismology in red giants*, Cool stars 21, July 2022, Toulouse, France.

Talk: *Gravity and Rossby modes in 600 Kepler γ Doradus stars*, TESS Asteroseismic Science Consortium 5/Kepler Asteroseismic Science Consortium 12, July 2019, Boston, USA. Supported by the Postgraduate Research Support Scheme.

Talk: *Characterisation of gravity and Rossby modes in hundreds of Kepler γ Doradus stars*, TESS Asteroseismic Science Consortium 4/Kepler Asteroseismic Science Consortium 11, July, 2018, Aarhus, Denmark. Supported by the Postgraduate Research Support Scheme.

Poster: *Detection of period spacings in 354 γ Doradus stars based on cross-correlation and MCMC*, TESS Asteroseismic Science Consortium 3/Kepler Asteroseismic Science Consortium 10, July 2017, Birmingham, UK.

TEACHING

Supervisor of three Master's and one Bachelor's projects at KU Leuven: I propose research projects and guide master and undergraduate students in completing their research training courses.

- Bachelor project: Synergizing Antarctic Observations with Space-based Data for Decade-long Photometric Study of Eclipsing Binary Systems. Students: Mauro De Haes, Wout Van Den Eynde. Duration: 9/2023 – 12/2023.
- Master project: The census of delta Scuti stars in all-sky open clusters. Students: Thomas Mattheussen, Arthur Bouckaert. Duration: 9/2023 – 12/2023.
- Master project: From Antarctica to space: photometric follow-up observations of variable stars after 10 years. Students: Evi Goethuys, Nick Vermaelen, Saakshi Rajesh Wadhwa. Duration 9/2023 – 12/2023.
- International Master student exchange project: Asteroseismology in the four Kepler open clusters. Student: Haotian Wang. Duration: 8/2023 – 11/2023. *This student will pursue a PhD degree at KU Leuven under my supervision.*

Tutor of physics and astronomy courses at the University of Sydney: I worked as a tutor at the University of Sydney for three years. The courses I taught included regular physics, physics experiments, and astronomy experiments.

Astronomy Olympiad teacher at Beijing 101 Middle School: I designed and delivered a specialised course for the Astronomy Olympiad in China. Two of my students received gold medals, highlighting the effectiveness of my instructional approach.

AWARDED GRANTS

Discovery Early Career Researcher Award (DECRA): The DECRA scheme provides focused research support for early career researchers by the Australian Research Council. Funding in three years: $\sim$ 450k AUD.

Grant for a long stay visit abroad: The Research Foundation - Flanders (FWO), Belgium. This grant supports researchers who will be staying abroad for a longer period to perform advanced research. I used this grant to visit the University of Sydney from April to May 2023.

Grant for a short stay visit abroad: The Research Foundation - Flanders (FWO), Belgium. This grant will support me in attending the MESA school in June 2024 and the following research visit to the University of Sydney.

National Natural Science Grant of China: *Statistic investigation of gravity modes in the regime of nonlinear asteroseismology*. Applicants: Weikai Zong, **Gang Li**, Tianqi Cang. Funding: about 550k RMB. I contributed to the scientific objectives of the main-sequence gravity mode and was actively involved in the writing of the proposal.