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Planet formation through the lens of dynamics

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LIST OF PUBLICATIONS

1. **Huang S.**, Ormel C., Portegies Zwart S., Kokubo E., Yi T., 2025, **ApJ**, 988, 137
A Resonant Beginning for the Solar System's Terrestrial Planets.
2. **Huang S.**, van der Marel N. & Portegies Zwart S., 2024, **A&A**, 691, A155
Origin of transition disk cavities: Pebble-accreting protoplanets vs Super-Jupiters.
3. **Huang S.**, Portegies Zwart S., C. & Wilhelm M., 2024, **A&A**, 689, A338
Suppression of giant planet formation around low-mass stars in clustered environments.
4. **Huang S.** & Ormel C., 2023, **MNRAS**, 522, 828
When, where, and how many planets end up in first-order resonances?
5. **Huang S.** & Ormel C., 2022, **MNRAS**, 511, 3814
The dynamics of the TRAPPIST-1 system in the context of its formation.

CURRICULUM VITÆ

I was born on October 22 in a village near Hefei, the capital of Anhui Province, China. As a child, I was rather mischievous and enjoyed simple games such as playing marbles with friends. Somewhat unexpectedly, I passed the entrance exam to a prestigious junior middle school in Hefei. During this period, my interest in science grew significantly. I still remember a remark from my history teacher: "History is a vase in the hands of those who manipulate it." Although I now view this statement more critically, it left a strong impression on me at the time and contributed to my preference for subjects grounded in objective reasoning like science.

After Gaokao (the entrance exam of Chinese Universities), I choose physics in Hohai University in Nanjing from 2016 to 2020 as a bachelor student. While studying the basic physics courses, I was keen on doing some cool scientific researches. Under the guidance of Prof. Hua Zou, my initial project involved applying machine learning techniques to predict deformation of the CCD in the LAMOST telescope due to temperature variations. While implementing neural networks was relatively straightforward, the project sparked my interest in astronomy and motivated me to pursue the field further.

In 2019, I attended a summer camp organized by the Department of Astronomy at Tsinghua University. At that time, my background in astronomy was still limited, mostly based on fundamental physics and my own research experience. Nevertheless, Prof. Chris Ormel recognized my enthusiasm for scientific research and offered me a position as a graduate student at Tsinghua University to study planet formation. This was an opportunity I readily accepted. Coincidentally, that same year saw both the awarding of the Nobel Prize in Physics for discoveries in exoplanet research and the outbreak of the COVID-19 pandemic.

During the pandemic when I started my graduate work, I used planet-planet dynamical interaction as a tool to constrain the planet formation and evolution processes. Although opportunities for international collaboration were limited during this period, I later grasped one of the few chances and joined the CSC joint PhD program between Tsinghua University and Leiden Observatory. From 2022 to 2024, I spent a very good time at Leiden University as a joint PhD student. Under the supervision of Prof. Simon Portegies Zwart, I studied how planet formation is influenced by stellar dynamics and photoevaporation in young star clusters.

As I move forward in my academic career, I have been awarded the TDLI postdoctoral fellowship at Shanghai Jiao Tong University. Starting in July 2026, I will begin this new position, where I aim to investigate the effects of planet giant impacts and identify exoplanetary systems that have possibly experienced such events.

ACKNOWLEDGMENTS

Looking back over my PhD, I am amazed at how far I have come. The achievement I am most proud of is neither the handful of publications I have written nor the many scientific presentations I have given. Rather, I cherish the interactions with so many friends and the joy I have found both in life and in science. As someone who has never been particularly good at expressing himself, I could not have imagined this growth before starting my PhD.

I would like to sincerely thank the support staff, including the secretaries and IT helpdesk at the Sterrewacht and Tsinghua DoA, for ensuring that everything runs smoothly. Especially as a joint degree CSC student, I have relied on your assistance more often than most.

I am deeply grateful to my two advisors in the Joint PhD program, Chris and Simon, for their invaluable guidance and encouragement throughout this project. At the start of my PhD, I have grown tremendously thanks to Chris. Your insights during our discussions have helped me cultivate an intuition for many physical processes in astronomy as a theorist. The thought-provoking questions you consistently raise have greatly deepened my understanding of the research. On the other hand, Simon's research interests are as broad as the local Universe. And you have always been excited to discuss ideas with me, some are very wild. You would always help analyze their feasibility with me and encourage me to explore them further. I am honored to have worked with both of you.

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Finally, I would like to express my deepest gratitude to my parents. Your unconditional love, encouragement, and constant support have made everything possible. Last but not least, I want to thank my girlfriend, Tianjiao, for her patience throughout this journey. With your companionship, every step I take feels more confident and less hesitant. I look forward to the many adventures that await us.