LUNAR AND PLANETARY LABORATORY

Follow the dust to explore other solar systems

By Sarah Morrison

SPECIAL TO THE ARIZONA DAILY STAR

How can we explore the outer reaches of other solar systems? The answer lies in debris belts, disks composed of dust and debris, which orbit a star.

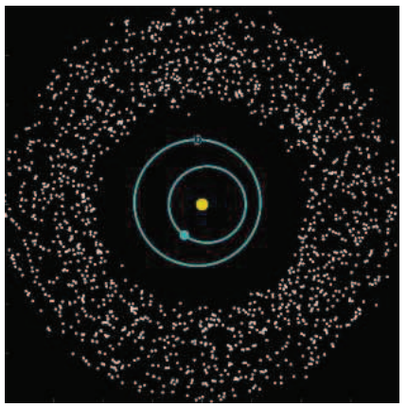
Solar systems with debris disks can span the early stages of planet formation, providing a glimpse of the materials that formed rocky, Earth-like planets and the retrospective processes that occurred in our solar system long ago.

Some solar systems, including our own, have multiple debris belts with wide gaps between them. These gaps are likely occupied by planets.

Astronomers are starting to detect these planets in young solar systems. One such solar system, HD 95086, hosts at least one planet that's five times the mass of Jupiter, along with massive asteroid and Kuiper-like debris belts.

University of Arizona planetary science professor Renu Malhotra and I teamed up with UA debris-disk observers Kate Su and George Rieke to use the debris to figure out how many other planets could be found in HD 95086.

We simulated the gravitational effects of massive planets on one another and on debris to determine possible planet locations and masses.



SARAH MORRISON / UA LUNAR AND PLANETARY LABORATORY

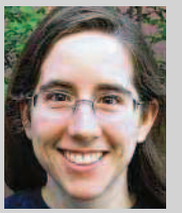
This snapshot of an orbital dynamics computer simulation of HD 95086 uses the locations of asteroids and currently known planet "b" to figure out what orbital paths planets can have while preserving the debris astronomers observe (only the outer debris belt is shown).

Massive planets clear wide swaths of debris and cannot orbit too closely to each other without destabilizing each other's orbits.

We have shown that HD 95086b is not alone — the gap in the dusty debris is too wide to have been formed from a single planet, which means that HD 95086 is a promising target for more planet-hunting.

UA astronomy professor Kaitlin Kratter and I are continuing this effort for the growing number of similar promising debris disk systems.

ABOUT THE GALLIEO CIRCLE SCHOLAR



Sarah Morrison is a Ph.D. candidate in planetary sciences and 2013 Galileo Circle Scholar at the University of Arizona Lunar and Planetary Laboratory. Using orbital dynamics, she studies the evolution of planetary systems. Her research focuses on planet-planet gravitational interactions and how they have shaped solar systems throughout the galaxy including our own. She also enjoys observing the often clear Southwestern skies while pondering perplexing planetary puzzles.