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Young Stars and Planets Near the Sun

Edited by

Joel H. Kastner
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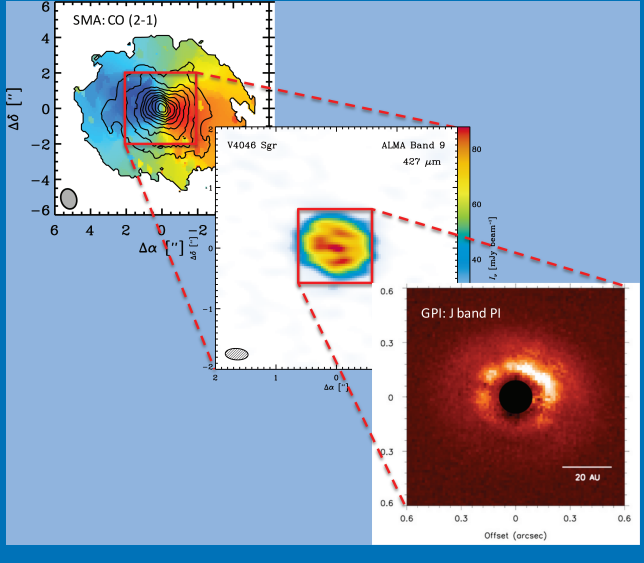

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IAU SYMPOSIUM 314

COVER ILLUSTRATION

The V4046 Sgr disk as imaged in CO line emission by the Submillimeter Array (left; from Rosenfeld et al. 2013, ApJ, 775, 136), in 427 μm continuum emission by ALMA during Early Science (Cycle 0) operations (center; from Andrews et al., in prep.), and in polarized intensity at 1.25 μm by the Gemini Planet Imager in its coronagraphic/polarimetric mode (right; from Rapson et al. 2015, ApJ, 803, L10). The proximity and age of systems like V4046 Sgr — a member of the $\sim$20 Myr-old β Pic Moving Group that lies just $\sim$73 pc from Earth — enable unique studies of early stellar evolution and the origins of planetary systems.

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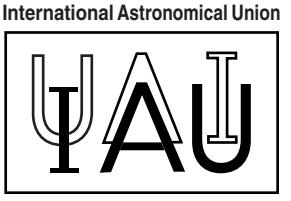

YOUNG STARS AND PLANETS NEAR THE SUN

PROCEEDINGS OF THE 314th SYMPOSIUM OF THE INTERNATIONAL ASTRONOMICAL UNION HELD IN ATLANTA, GEORGIA, USA MAY 11–15, 2015

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Preface

The motivation for a 2015 IAU Symposium dedicated to the study of young stars and planets near the Sun is captured perfectly in the following summary from our original meeting proposal, written by SOC member Ben Zuckerman: *The region surrounding the Sun out to a distance of ∼100 pc is often described as the "local bubble" due to the relatively low density of the interstellar medium and an accompanying lack of regions of star formation. In the past two decades, research by many astronomers has revealed an abundance of post T Tauri stars and early type stars of comparable age inside of the bubble. Many of these stars have been classified as members of kinematic moving groups, whose ages range from ∼8 Myr up to ∼200 Myr. Because these stellar groups are so close to Earth, they provide some of the best samples available to astronomy to investigate the early evolution of low- to intermediate-mass stars. While these nearby, youthful stars are themselves of great interest to stellar astronomy, they also represent the most readily accessible targets for direct imaging (and other measurements) of dusty circumstellar debris disks and young, substellar objects — i.e., newly formed brown dwarfs and, especially, planets. Indeed, <200 Myr-old stars within ∼100 pc represent the best laboratories to study the conditions and timescales associated with protoplanetary disk evolution and the formation and early physical and dynamical evolution of planetary systems.*

Our Symposium was intended to highlight the major advances in our understanding of the early evolution of stars and planetary systems, and the potential for further progress, flowing from investigations of nearby young stars. Our aim was to gather scientists approaching such studies from a wide variety of directions: the identification, ages, and origins of local young moving groups; early stellar evolution from theoretical and observational perspectives; the signatures of nascent or recently formed exoplanet systems, including the dispersal of protoplanetary disks, the nature of debris disks, and star-disk, planet-disk, and planet-planet interactions; and the properties of newborn planets.

To draw out the latest results in (and connections between) these diverse topics, the meeting was organized into five, interrelated themes, which also represent the basis for the presentation of the papers in these Proceedings: 1) the identification, ages, and origins of nearby young stars and moving groups; 2) the early evolution of low- to intermediate-mass stars; 3) the dispersal of protoplanetary disks and the origins of debris disks; 4) the early evolution of planetary systems; and 5) the prospects for advances in the study of nearby young stars and planets resulting from new and future observing facilities.

IAU Symposium 314 was the product of a dedicated and thoughtful SOC and LOC whose expertise runs wide and deep through all of the science topics just listed. I am particularly indebted to my co-editors, Beate Stelzer and Stan Metchev, for their time and care in editing these Proceedings.

Our colleague Ben Zuckerman again deserves special mention. Of the many researchers who have driven the field of nearby young star and planet research so far forward over the past two decades, no one has contributed more than Ben. Fittingly, it was Ben who initiated the discussions between a few of us that led to the concept for this Symposium, and it was his steady guidance that resulted in its realization. So, while IAU Symposium 314 may not have been formally dedicated to Ben, our meeting was clearly a testament to that remarkable Zuckermanian vision and insight.

Joel Kastner, SOC co-Chair
Rochester, NY, USA, August 2015

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Acknowledgements

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The organizers are grateful to Ben Zuckerman for providing a thought-provoking public lecture on the search for higher forms of life in the universe, and to Ben, expert panelists Virginia Trimble and Karin Obërg, and moderator Sebastien Lepine for leading an insightful, dynamic, highly audience-interactive discussion on the same topic following Ben's lecture.

The success of this symposium both professionally and publicly relied heavily on the efforts of the eager, hard working and on-task LOC volunteer staff. Special thanks to the LOC's public outreach coordinator, Nicole Cabrera, for her creative effort in advertising the IAUS 314 public lecture and panel discussion, and for organizing the IAUS 314 Creative Lessons in Astronomy and Space Science (CLASS) Contest. We thank German Chaparro, Virginie Faramaz, Daniel Horenstein, Jeremy Jones, and Laura Vican for presenting at the CLASS Contest, which enabled 40 ninth graders from Cristo Rey Atlanta to learn astronomy from real astronomers. We extend a special thanks to the graduate students who took leading roles in the symposium arrangements: Cassy Davison and Jeremy

Jones (t-shirt design), Mitchell Revalksi (volunteer staffing), Dicy Saylor (badges and social media), and Tara Cotten, Ryan Norris, and Jennifer Winters (program assembly). The lively mid-week excursions were kindly organized and hosted by Nicole Cabrera, Tara Cotten, Cassy Davison, Jinhee Lee, Ryan Norris, Sam Quinn, and Jennifer Winters. Finally, we are grateful to Matt Anderson, Sanam Chaudhary, David Davis, Karen Garcia, Dawn Graninger, Daniel Horenstein, Sushant Mahajan, Rachel Matson, Rahul Patel, Kristina Punzi, Valerie Rapson, Caroline Roberts, Michele Silverstein, and Luqian Wang for logistical support.

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CONFERENCE PHOTOGRAPH

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