

Should I Stay or Should I Go: What Governs Circumstellar Disk Lifetimes

**Lisa Prato¹ Taylor Kutra¹ Benjamin Tofflemire² Gail Schaefer³
Rachel Akeson⁴ Dominique Segura-Cox⁵ Adam Kraus²
Peter Knowlton¹ Jacob Hyden¹ Christopher Johns-Krull⁶
Sean Andrews⁷ Eric Jensen⁸**

¹Lowell Observatory, ²University of Texas, Austin, ³CHARA Array - Georgia State University,

⁴Caltech/IPAC, ⁵The University of Texas at Austin, ⁶Rice University,

⁷Harvard-Smithsonian Center for Astrophysics, ⁸Swarthmore College

Published on: Jun 19, 2024

URL: <https://baas.aas.org/pub/2024n7i202p05>

License: [Creative Commons Attribution 4.0 International License \(CC-BY 4.0\)](https://creativecommons.org/licenses/by/4.0/).

Primordial disks around young stars are the demonstrated sites of planet formation, yet the qualities supporting disk longevity and the triggers driving disk dissipation are poorly understood. Circumstellar disks in pre-main sequence binary systems provide ideal environments within which to analyze disk properties as a function of stellar characteristics. We present early results from our unique high-angular resolution program which combines (1) millimeter imaging of circumstellar disks with ALMA and (2) near-infrared, component-resolved, R=30,000 spectroscopy of the young stars with Keck+NIRSPEC for binaries with at least partially determined orbits. By controlling for orbital parameters, we highlight the relationships between the properties of circumstellar disks (e.g., radial extent, substructure, inclination) and stars (e.g., veiling, rotation period, magnetic field strength). In the eccentric, 0.1'' quasi-twin DF Tau binary, two circumstellar disks are detected with ALMA but one disk is actively accreting while the other appears to have decoupled from a rapidly rotating central star. Another twin system, the 0.2'' low-eccentricity FO Tau binary, shows well-aligned orbital and disk inclinations, and modest stellar rotation and near-infrared excess veiling in both components. This research was supported in part by NSF awards AST-1313399 and AST-2109179.