

## **GSU Summer Student Program in Physics and Astronomy**

**Project:** A Detailed Study of the Young Binary Star System AT Mic

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**Abstract:** Our large and diverse group at the REsearch Consortium On Nearby Stars (RECONS, [www.recons.org](http://www.recons.org)) investigates low-mass stars near the Sun. One way we do this is with an ongoing program (22+ years) at the SMARTS 0.9m telescope in Chile at the Cerro Tololo Inter-American Observatory (CTIO). We focus on long-term astrometry and photometry, disentangling the binary orbital motion and time-variable brightness of nearby M dwarf stars. These low-mass stars are the most common in the Universe, demonstrate unexplained complex behaviors, and are the targets of many modern exoplanet programs. One target in particular, the AT Microscopii (AT Mic) is a remarkably young, low-mass, binary system (~22 million years old), and at a distance of only 10 parsecs is also the closest such case to the Sun. AT Mic is gravitationally bound to the well-known AU Mic primary star, which hosts a circumstellar debris disk and two newly-discovered Neptune-sized exoplanets.

**An REU student would process the 10 years of new data on AT Mic and analyze it as a full set over the 19 years' baseline.** This will involve learning to reduce astrometry and photometry data with IRAF in our custom data pipeline, as well as exploring techniques to handle the overlapping light profiles of AT Mic's two closely separated stars. Our past data so far show dramatic changes in brightness over both short and long timescales, and the new data will likely continue and strengthen these striking trends.

Results from this work may be presented at scientific conferences and potentially be included in peer-reviewed articles published by members of the RECONS group.

