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Resolving the Binary System Spica using the VERITAS Stellar Intensity Interferometer

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In 2019, the Very Energetic Radiation Imaging Telescope Array System (VERITAS) was augmented with high-speed optical electronics in order to allow for Stellar Intensity Interferometry (SII) observational capabilities. This research shows how VERITAS-SII (VSII), which measures correlations of starlight intensity fluctuations across spatially separated telescopes, can enable the characterization of binary stellar systems. We first use VSII data collected on the binary star Spica to develop a dynamic analysis technique. We then simulate the squared visibility curve given a particular orientation of Spica's components. Because of Spica's 4.0145-day period, the binary separation and orientation, and therefore the simulated squared visibility, should vary greatly from night to night. These variations are consistent with measured variations in the observed squared visibility curves. The initial results indicate that VSII observations potentially demonstrate good sensitivity to the evolution of the Spica binary system. With further development, it may be possible to fit a multi-dimensional image to the system, opening the door to model-dependent VSII imaging.