

Interferometric Imaging of CH Cyg

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CH Cyg consists of an M6-7 III and white dwarf (Hinkel et al. 2009). The system shows two orbit like periodicities, one 750 days and the other 15.6 years. The system has been described as a long period symbiotic (15.6 year orbit) with a 750 day long secondary period (750 days) in the giant, or a triple system with a 750 day symbiotic and a third component in the 15.6 year orbit (Hinkle et al. 1993; Iijima et al. 2019).

Pedretti et al. 2007 presented an analysis of observations obtained with IONIC and aperture masking using Keck-I. They did not detect changes in the angular diameter of the giant in the system over three years but found a spherical hot dust shell and a correlation between closure phases and the 750 day period.

CH Cyg was observed using the CHARA Array on July 15,16 2022; June 2, and September 8, 2023 with the MIRCX and MYSTIC beam combiners. We present analysis of the July 2022 observations here.

In Figures 1-3, we present the (u,v) coverage, squared visibilities, and closure phase for the combined observations of the star taken in July 2022. Figure 4 presents the best fit limb darkened disk fits. Figures 5 and 6 present an image reconstruction using MIRCX data from July 2022 as well as the result of a reconstruction using a simulated observation of an oblate limb darkened disk. Images were made using SQUEEZE on a 128x128 grid with 0.125 mas/pixe and are the average of 5 chains. An oblate disk was used as an initial image. Figure 5 was convolved by the beam on the lower right.

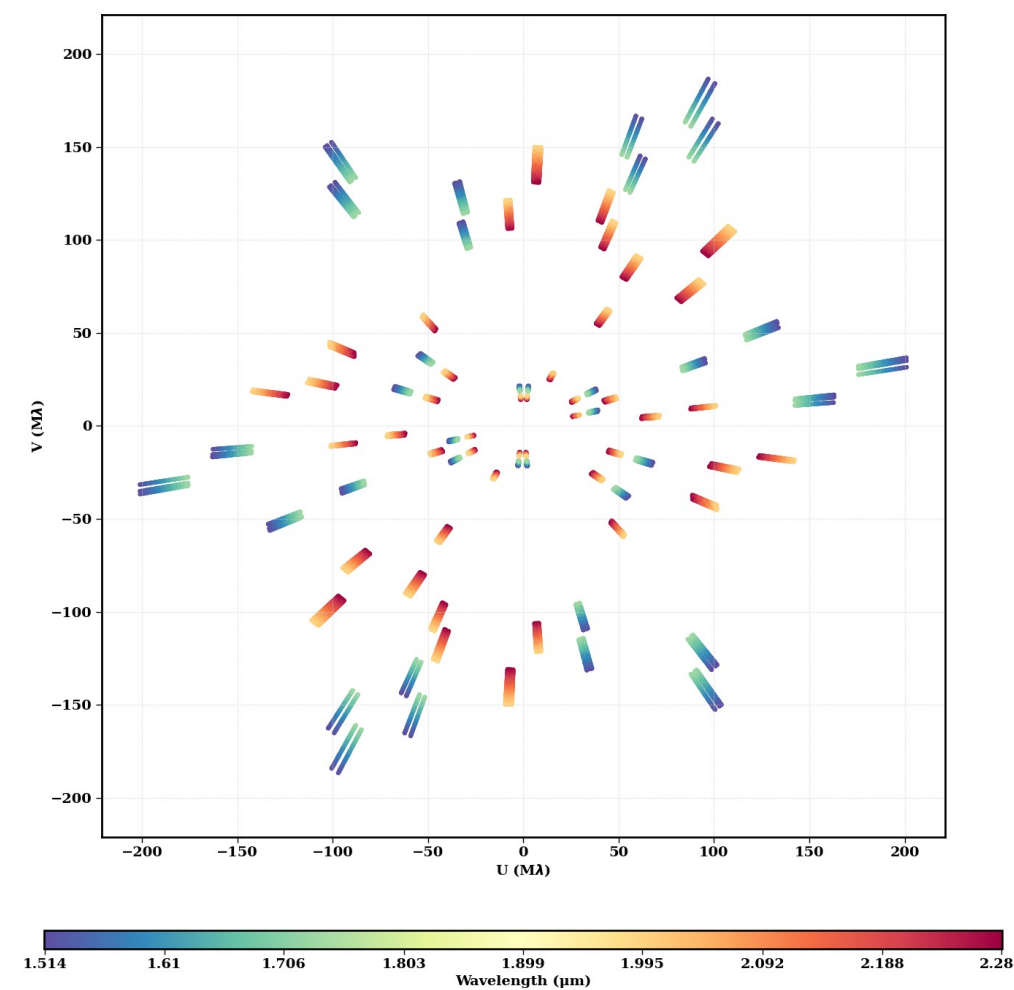


Figure 1: (u,v) coverage of July 2022 observations of CH Cyg

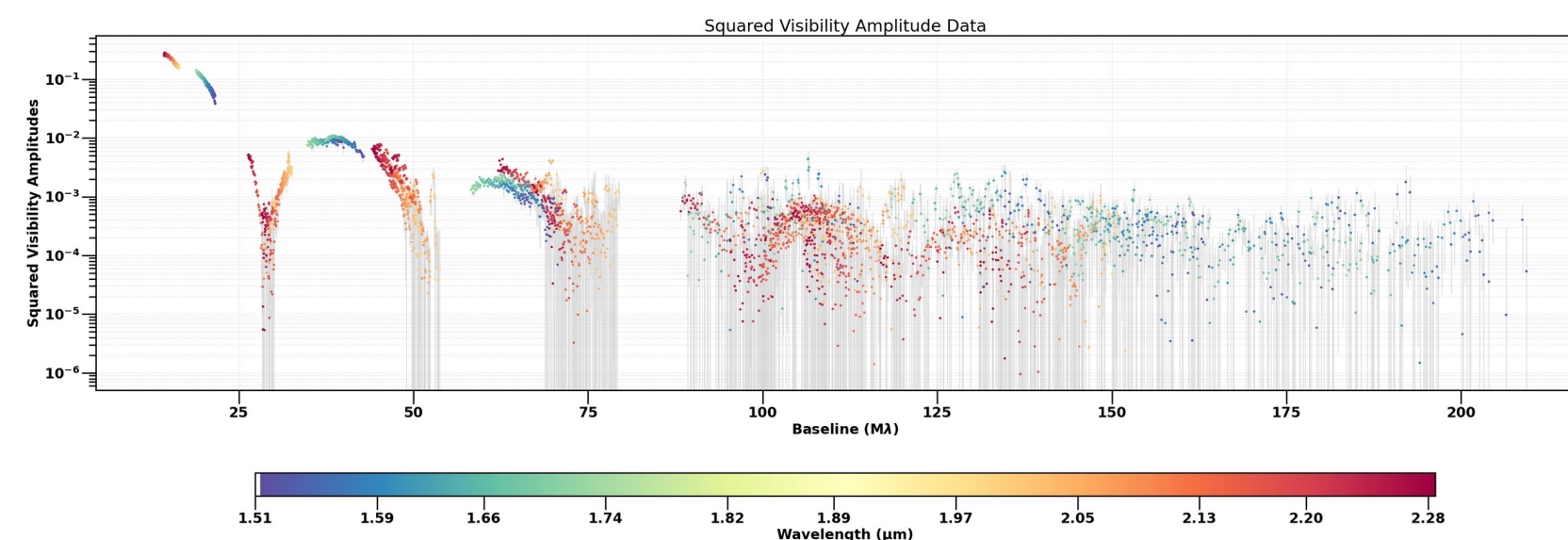


Figure 2: Squared visibilities of July 2022 observations of CH Cyg

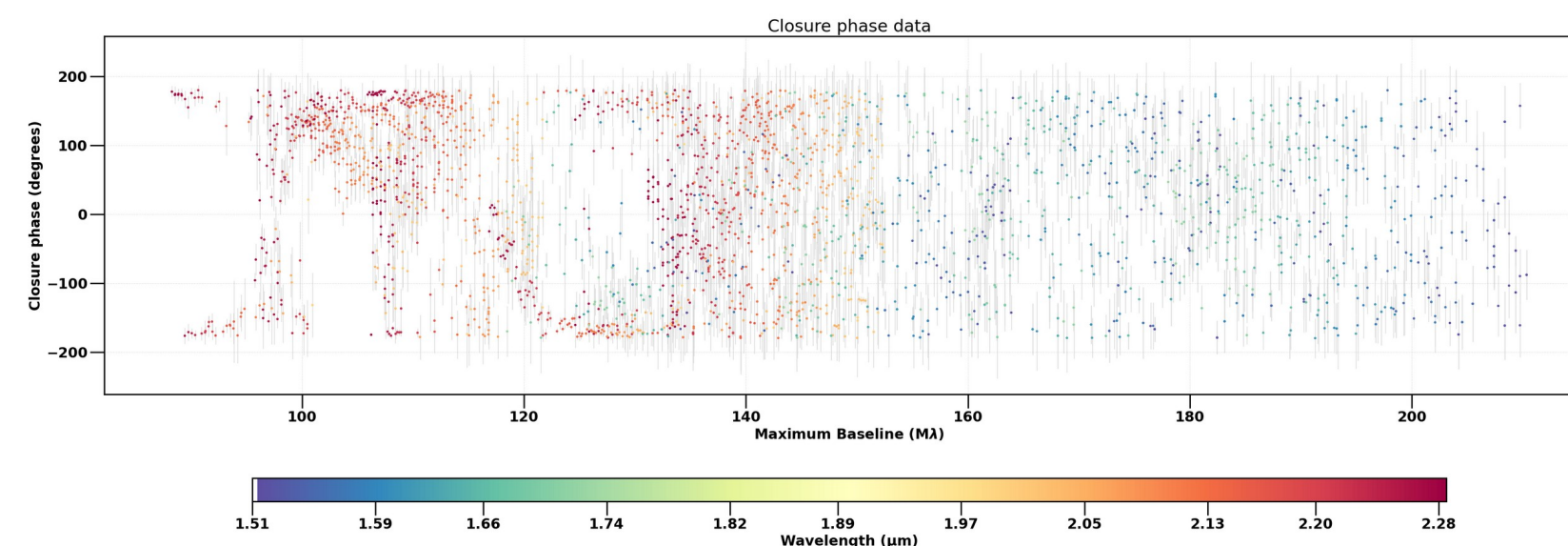


Figure 3: Closure phases of July 2022 observations of CH Cyg

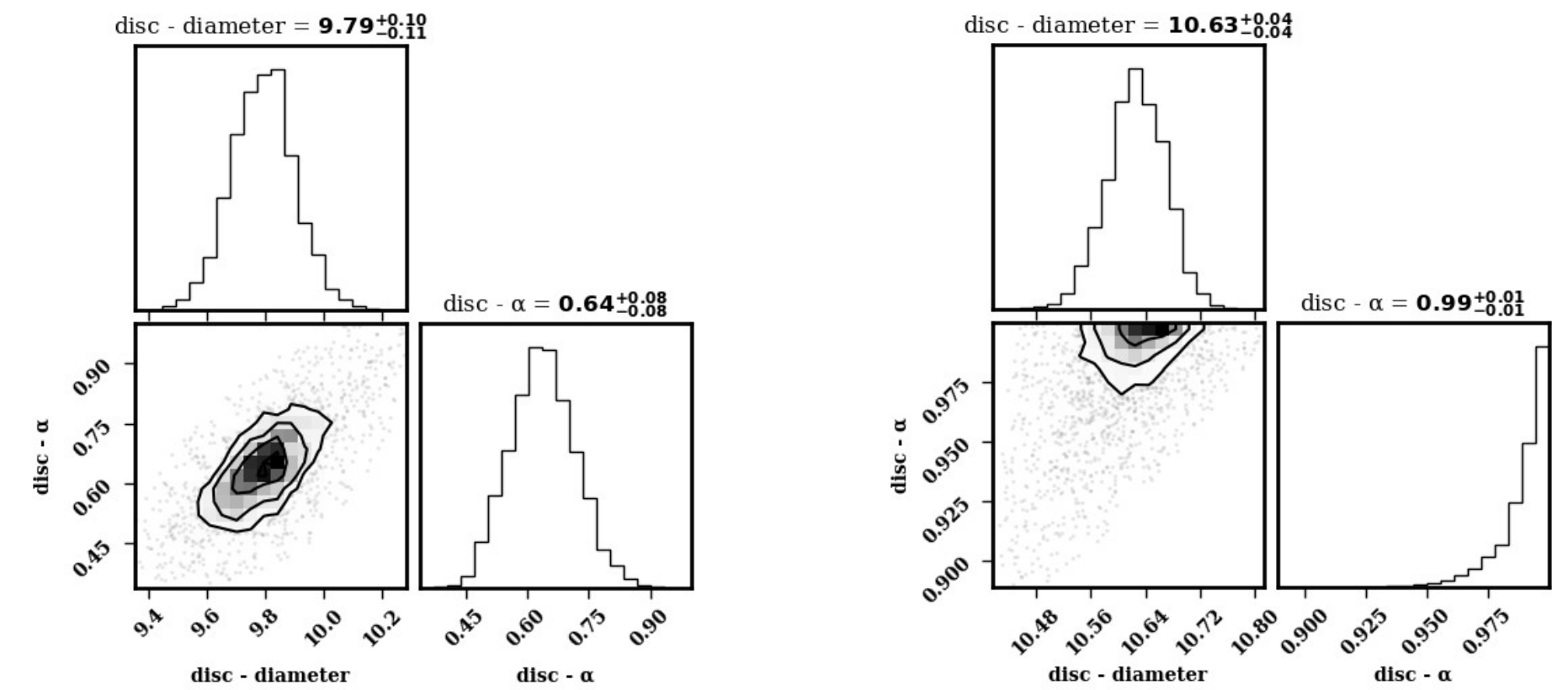


Figure 4: Power law limb darkening fits using the first two lobes for July 2022 observations. L: MIRCX (H band) R: MYSTIC (K band). PMROIRED (not shown) fits suggest an oblate disk may be a better fit.

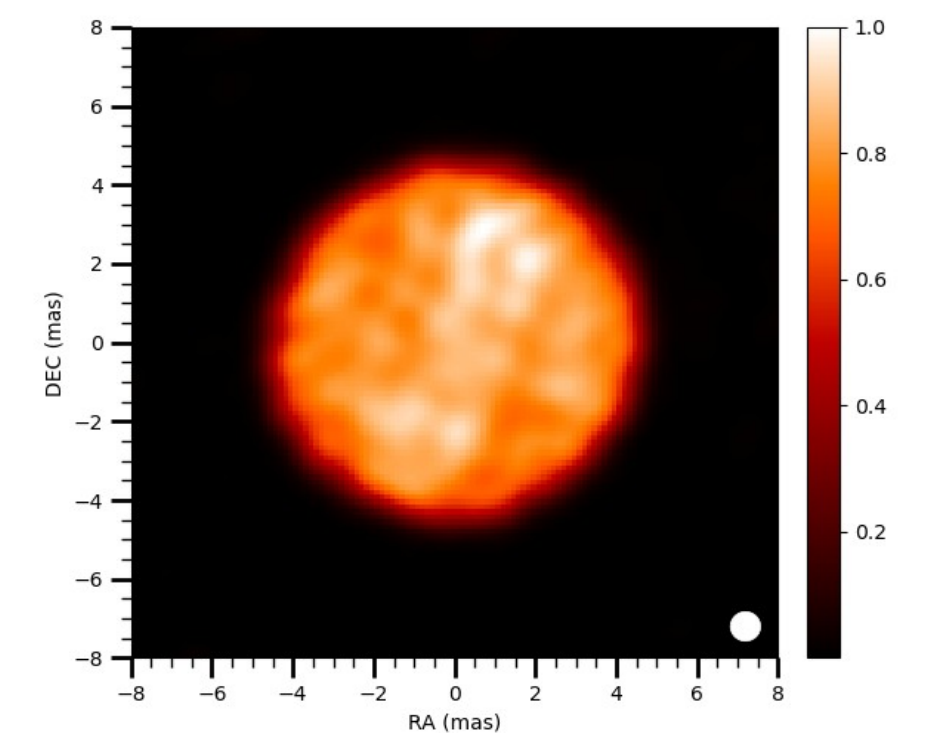


Figure 5: Reconstructed image based on July 2022 MIRCX data.

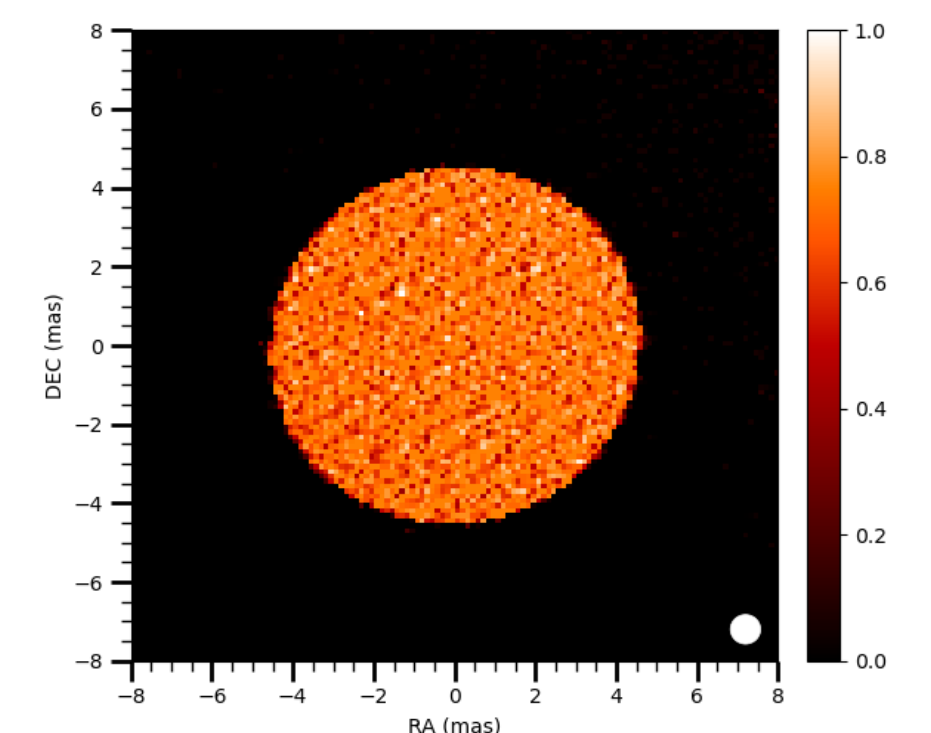


Figure 6: Reconstructed image based on a simulated observation of an oblate disk using July 2022 data