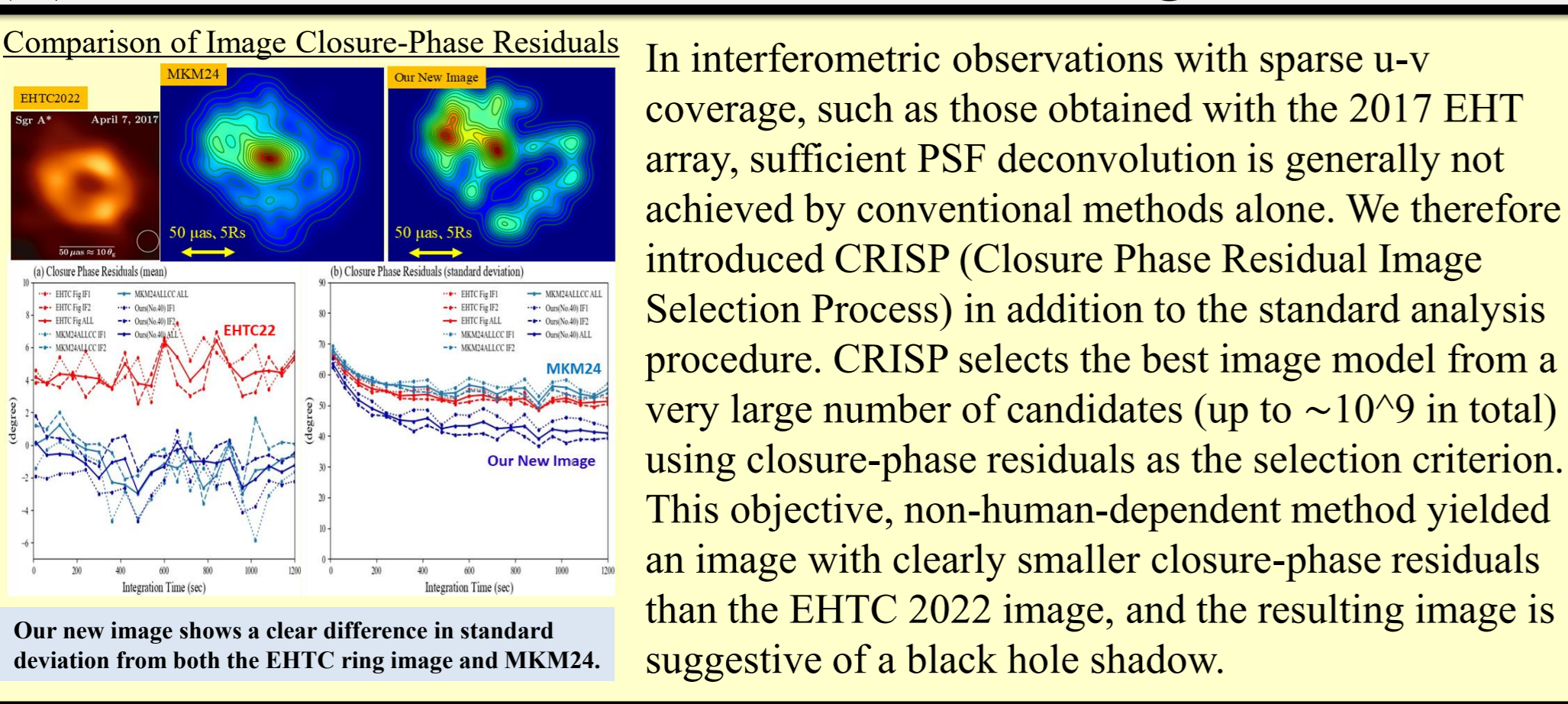


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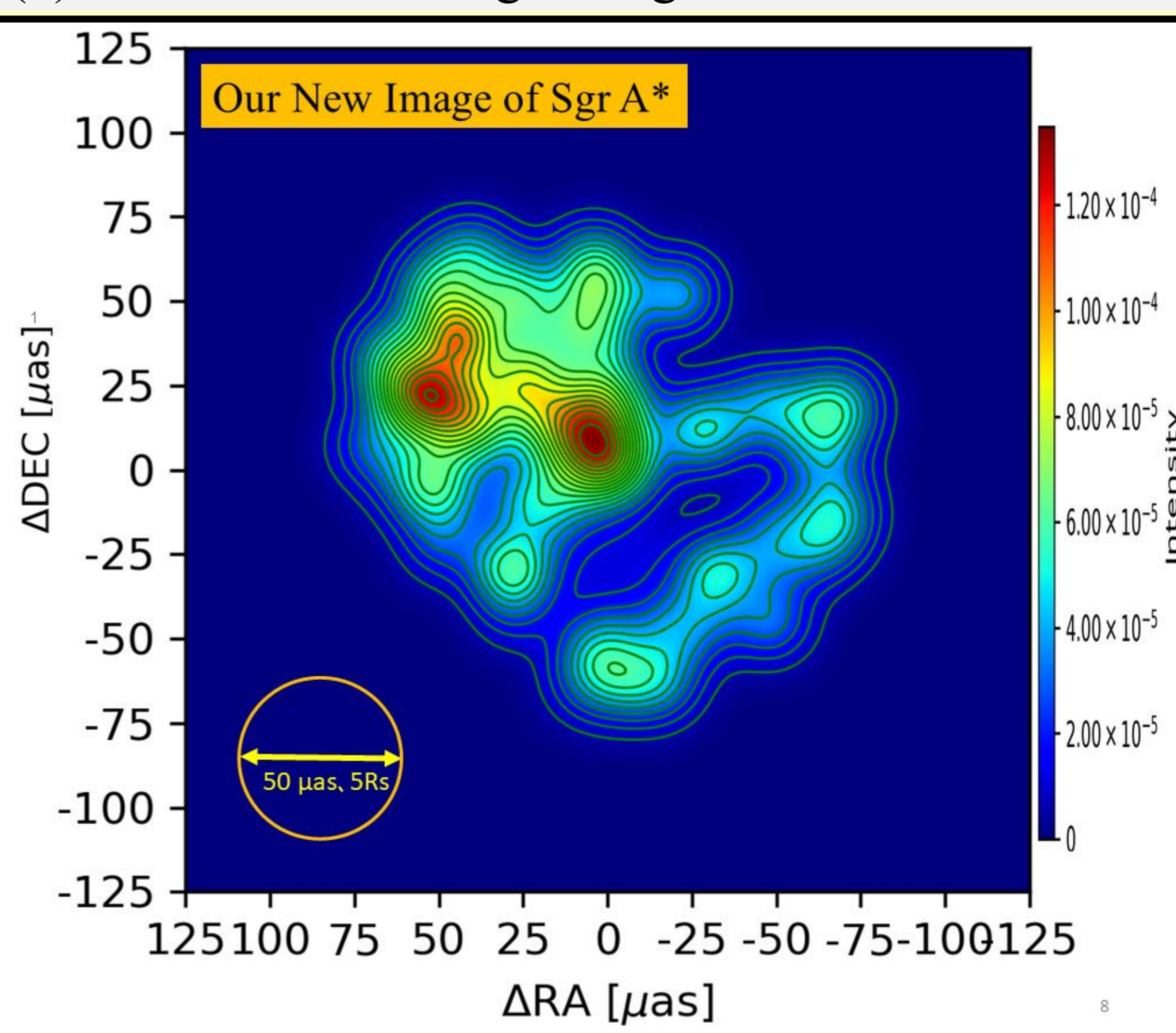
We conducted a reanalysis of the EHT archive data of Sgr A* in 2017. Since 2024, we have developed a methodology that constructs image models from CLEAN components and evaluates them using closure-phase residuals. Because closure phase is independent of antenna-based errors and depends solely on the source structure, it provides an objective criterion for assessing image reliability. Miyoshi et al. (2024, MN) identified an east–west elongated and asymmetric brightness distribution in Sgr A*, interpreted as an accretion disk viewed nearly edge-on. We extended this analysis by comparing roughly 10⁹ image models through closure-phase residual criteria, enabling a more comprehensive exploration of the allowed image space. This large-scale evaluation produced models with reduced residuals, offering strengthened support for the interpretation proposed by Miyoshi et al. (2024, MN). The selected images exhibit a morphology that appears to represent the shape of a black-hole shadow. **The resulting image can be interpreted as a rapidly rotating accretion disk around the black hole viewed nearly edge-on. In addition, the construction of a time-variable movie revealed temporal variations in the structure.**

(1) How to find a reliable static image

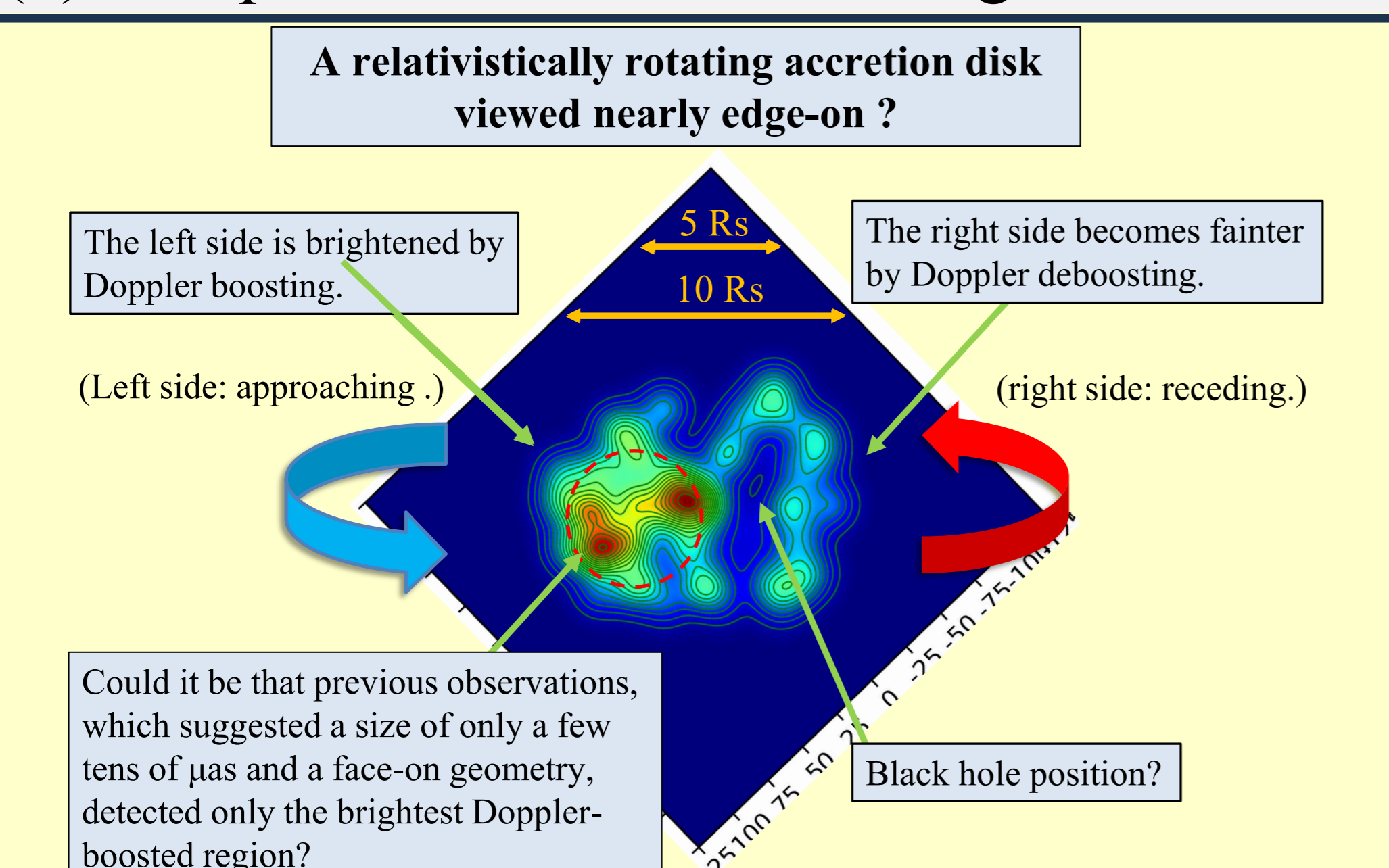


In interferometric observations with sparse u-v coverage, such as those obtained with the 2017 EHT array, sufficient PSF deconvolution is generally not achieved by conventional methods alone. We therefore introduced CRISP (Closure Phase Residual Image Selection Process) in addition to the standard analysis procedure. CRISP selects the best image model from a very large number of candidates (up to ~10⁹ in total) using closure-phase residuals as the selection criterion. This objective, non-human-dependent method yielded an image with clearly smaller closure-phase residuals than the EHTC 2022 image, and the resulting image is suggestive of a black hole shadow.

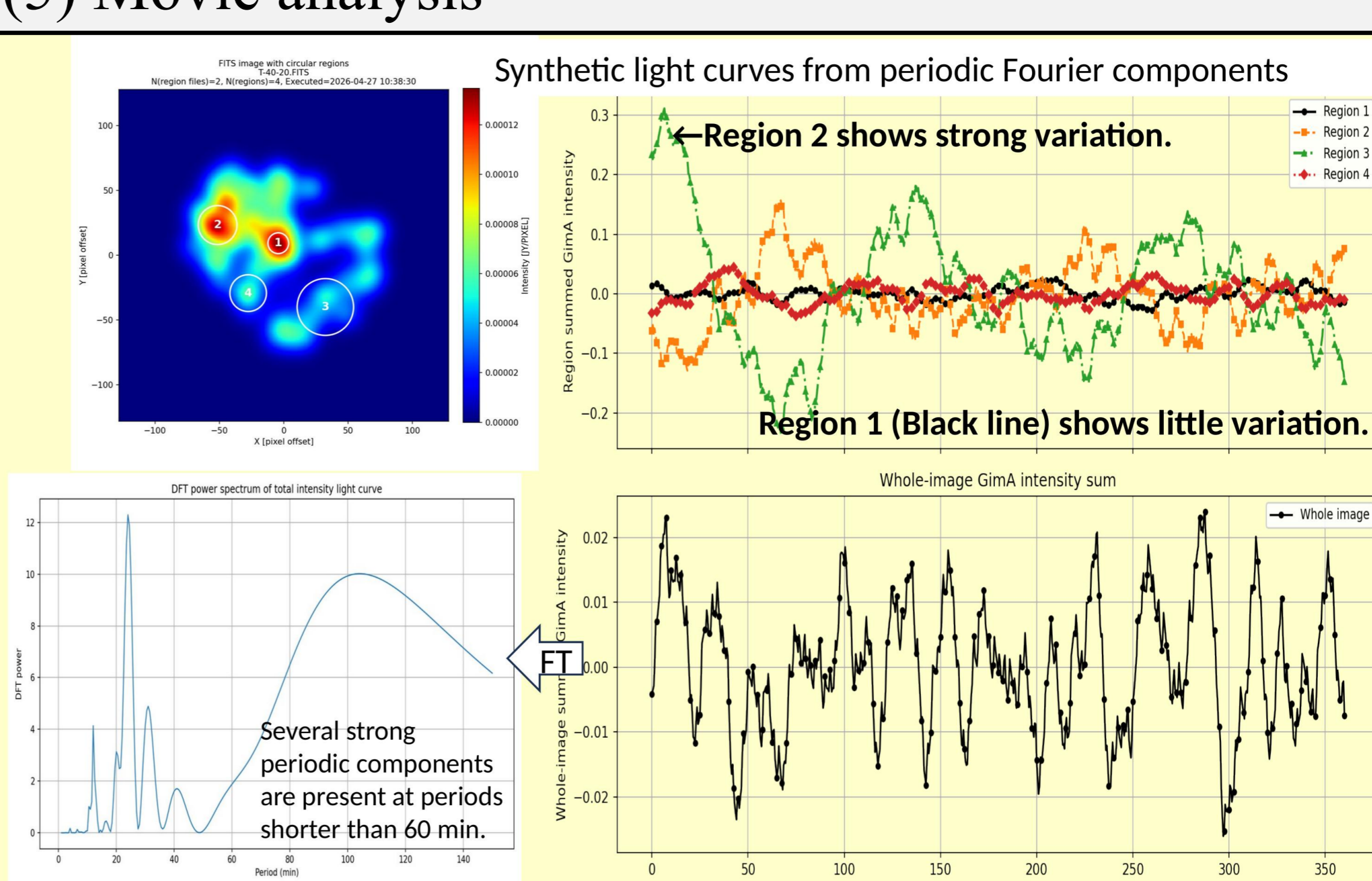
(2) Reliable static image of Sgr A* from CRISP



(3) Interpretation of the static image

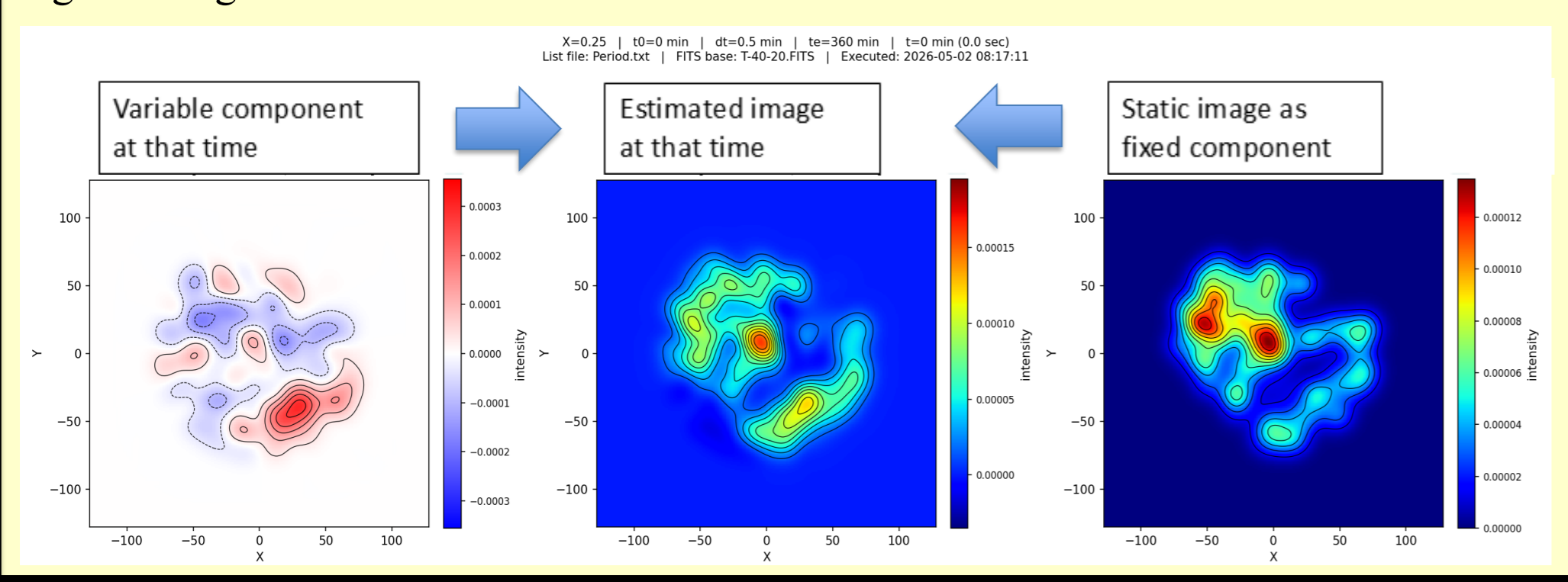


(5) Movie analysis



(4) Movie generation method

For Sgr A*, the orbital period at 3R_s is about 30 min. Over the ~12 h observation, the structure would complete more than 20 rotations. In addition, short-term variability at the ~5--10% level indicates ongoing brightness changes during the observation, so the structure is also expected to evolve. Interpreting such a source as a single static image may therefore produce a result similar to a long-exposure photograph of a moving object. We therefore investigated the time variability of the structure by estimating periodic components using Slit Modulation Imaging (Miyoshi 2008). A static image was then added as the fixed component to produce the image at each time, thereby generating a time-variable movie.



Both peaks in the static representation may be Doppler-boosted. The central peak is relatively stable, possibly due to persistent brightening by rapid rotation near the black hole (~3R_s), whereas the left peak may be transiently enhanced when a localized bright spot in the disk comes into that direction.

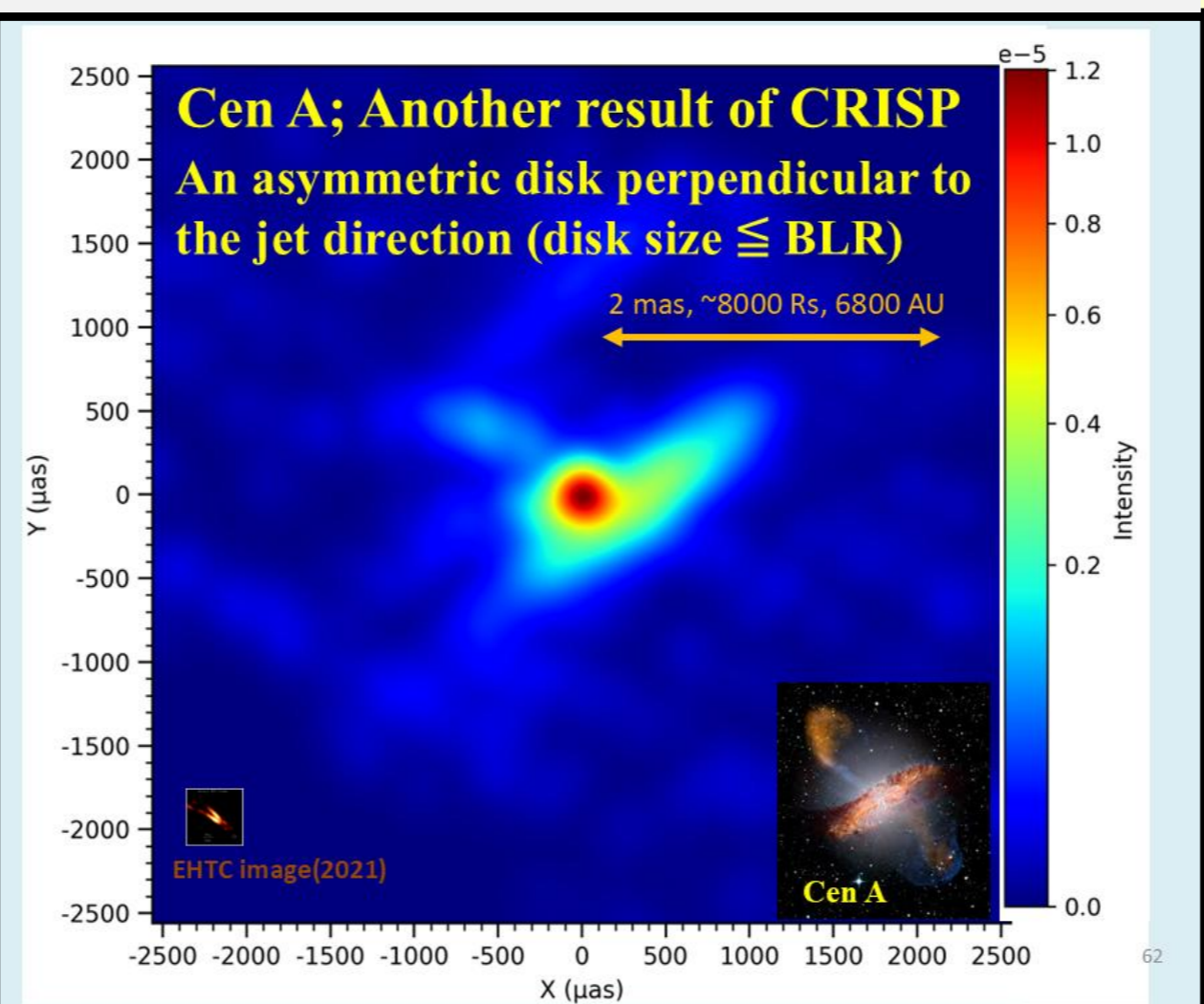
(6) Movie

https://drive.google.com/file/d/1TYExCGPGKvCyl6_TGOha10_FIHt8LUX/view?usp=drive_link



Please access the movie via the QR code. But, please refrain from redistributing the movie.

(7) Topic 1: Cen A



(8) Topic 2: PSF&EHTC images

