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An Unusual Change in the Radio Jets of GRS 1915+105: Caused by a Tertiary Component?

We compare observations at radio wavelengths made along three decades toward the prototypical galactic microquasar. In the year 2023 the source presented major changes with respect to the historical values since 1994. The position angle of the bipolar ejecta in the plane of the sky has increased counter-clockwise by 24◦. The inclination angle of the flow with respect to the line of sight increased by 17◦. Analysis of GRS 1915+105 images over the years suggests that the observed unusual changes took place within a year or less. Our analysis indicates that during 2023 the plane of the disk was aligned with the line of sight, which explains the deep X-ray obscured state, and the high mid-infrared luminosity of the source observed with the James Webb Space Telescope (JWST) in that epoch. Recent 2024 observations show that the position angle of the ejecta has returned to its historic values. This behavior is in agreement with the Lense-Thirring effect, where the axis of a tilted disk around a Kerr black hole will transition to align with the spin of the black hole (Bardeen and Petterson 1975). We suggest that this abrupt and temporary misalignment of the disk spin with respect to the Kerr black hole spin could be due to the presence of an undetected tertiary component in a high eccentricity orbit that, in the context of the Kozai-Lidov mechanism, may perturb the inner compact binary every several decades.

Contribution

Oral talk

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