

# **Sculpting the outer disk of a super massive black-hole with a secondary disruptor**

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Supermassive binary black-hole systems are predicted to occur with some regularity as galaxies merge. While gravitational wave observatories are expected to detect close-to-merger systems, less is known about the earliest stages of the pre-merger, in particular when the shrinking of the orbit is not yet dominated by the GW emission. In those early stages, one can expect the primary's outer disk to be stripped away by the gravitational impact of an approaching secondary disruptor. Using our Numerical Observatory of Violent Accretion systems (NOVAs) we studied how the presence of a distant secondary disruptor impacts the outer region of the primary's disk. We focused primarily on how that would sculpt and reshape the primary disk and what are the resulting observables associated with early pre-merger systems. While none of the effects detected are unique to early binary systems, we found a necessary observable in the truncation of the outer disk and present its potential as a test of binarity for all BBH candidates to search for any incoherence between the inferred system parameters and the expected disk size.