

# Tidal disruption of self-interacting axion clouds around black holes in binary systems

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Black hole superradiance induces the formation of a cloud of ultralight bosons, such as axions. To detect the signature of the cloud, it is important to consider black holes in binary systems. As a binary inspirals and the separation becomes sufficiently small, the cloud is disrupted by the tidal interaction from the companion. Although axions generally have self-interactions, this effect has so far been ignored in this context. Taking into account the self-interaction, it is shown that the growth of the cloud saturates due to the dissipation and the lifetime becomes longer. Therefore, we investigate the evolution of the cloud in a binary system with self-interaction and present the formulation to solve it. We show the boundary of the orbital frequency where the cloud is disrupted and mention the possibility of bosonova collapse of the cloud.

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