Contribution ID: **88** Type: **not specified**

Superradiant Bosons Driving Supermassive Black Hole Mergers

Friday, 11 July 2025 12:10 (20 minutes)

Ultralight bosons (ULBs) can form macroscopic superradiant clouds around spinning black holes. We show that for scalar ULB masses $\mu \sim 10^{-22} - 10^{-21}$ eV boson cloud dynamical friction drives supermassive black hole (SMBH) final-parsec evolution in
$lesssim$1~Gyr and suppresses the nanohertz gravitational wave background with turnover. Considering century-monitored OJ287 system, we place novel bounds restricting ULB mass range $\mu \simeq (8.5 - 22) \times 10^{-22}$~eV independent of any dark matter assumptions and show ULB drag can also efficiently reconcile any future confirmations of the debated orbital decay excess. Forthcoming pulsar timing array data and precise SMBH orbital timings will decisively test this scenario.

Presenter: ZHU, Huiyu (IBS CTPU-CGA)

Session Classification: Parallel 2