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Ultralight Boson Dark Matter Constraints from Superradiance Leveraging the Event Horizon Telescope Collaboration's Observations of M87*

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The initial data from the Event Horizon Telescope (EHT) on M87*, the supermassive black hole at the center of the M87 galaxy, provide direct observational information on its mass, spin, and accretion disk properties. A combination of the EHT data and other constraints provide evidence that M87* has a mass $\sim 6.5 \times 10^9 M_\odot$ and dimensionless spin parameter $|a^*| \geq 0.5$. These determinations disfavor ultra light bosons of mass $\mu_b \sim 10^{-21}$ eV via the phenomenon of superradiance, within the range considered for fuzzy dark matter, invoked to explain dark matter distribution on $\sim \text{kpc}$ scales. Future observations of M87* could be expected to strengthen our conclusions.

Summary

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