

Continuous gravitational waves from axion clouds

Sylvia J. Zhu^{1,2}, Daichi Tsuna³, Richard Brito⁴, Maria Alessandra Papa^{2,5}, Norita Kawanaka⁶,
Heinz-Bernd Eggenstein²

¹ *Deutsches Elektronen Synchrotron (DESY), Zeuthen, Germany*

² *Max-Planck-Institut für Gravitationsphysik, Hannover, Germany*

³ *University of Tokyo, Tokyo, Japan*

⁴ *“Sapienza” Università di Roma, Rome, Italy*

⁵ *University of Wisconsin-Milwaukee, Milwaukee, USA*

⁶ *Kyoto University, Kyoto, Japan*

Axions and axion-like particles of mass 10^{-14} to 10^{-12} eV can quickly form clouds with large occupation numbers around stellar-mass black holes via the superradiance instability (e.g., [1]). This axion cloud – black hole system acts like a gravitational-wave ‘atom,’ and would emit long-lived, monochromatic, continuous gravitational waves (CWs) from axion annihilations and level transitions. The CWs from these annihilations could be detectable by the current generation of ground-based gravitational-wave interferometers [2], given reasonable assumptions about the Galactic isolated black hole population [3], and would produce a signature that is distinct from the more standard CW signals from isolated neutron stars. I will present the expected CW signal from axion annihilations, and prospects for detection in the context of both standard and modified CW searches.

References

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