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The impact of the magnetic correlated noise on the anisotropic stochastic gravitational wave background

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One potential factor that could impede searches for the stochastic gravitational-wave background (SGWB) — arising from the incoherent superposition of numerous unresolvable signals in the universe — is correlated noise at Earth-scale distances, such as the Schumann resonances. With the dawn of next-generation detectors, these effects are expected to become even more pronounced, emphasizing the importance of considering correlated noise sources in SGWB searches. In this study, we delve into the influence of such noises on anisotropic SGWB searches. To this end, we carried out an all-sky, all-frequency stochastic directional search using data from the LEMI-120 (Advanced LIGO) and the Metronix MFS-06e (Advanced Virgo) magnetometers. We then compared these measurements with the directional upper limit derived from gravitational-wave data collected during the first three observing runs of the LIGO-Virgo-KAGRA collaboration. Our preliminary results indicate that the magnetic correlations are subleading compared with the anisotropic SGWB with the current detector sensitivity.

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