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Probing Primordial Stochastic Gravitational Wave Background with Multi-band Astrophysical Foreground Cleaning ZHEN PAN, HUAN YANG, Perimeter Inst for Theo Phys — The primordial stochastic gravitational wave background (SGWB) carries first-hand messages of early-universe physics, possibly including effects from inflation, preheating, cosmic strings, electroweak symmetry breaking, and etc. However, the astrophysical foreground from compact binaries may mask the SGWB, introducing difficulties in detecting the signal and measuring it accurately. In this Letter, we propose a foreground cleaning method taking advantage of gravitational wave observations in other frequency bands. We apply this method to probing the SGWB with space-borne gravitational wave detectors, such as the Laser Interferometer Space Antenna (LISA). We find that the spectral density of the LISA-band astrophysical foreground can be predicted with percent-level accuracy assuming 10-years' observations of third-generation GW detectors, e.g., Cosmic Explorer. After the foreground cleaning, LISA's sensitivity to the primordial SGWB will be substantially improved.

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