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Prospect for WHIM detection in the cosmic web by SRG/eROSITA

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Hydrodynamical simulations predict that the cosmic web contains the majority of the missing baryons in the form of plasma, called the warm-hot intergalactic medium (WHIM). However, its direct measurement through X-ray emission has been prevented for decades due to the weakness of the signal and to the complex morphology of cosmic filaments.

We identified more than 15,000 large-scale filaments, spanning 30-100 Mpc length, in the SDSS survey and statistically detected the X-ray emission from the WHIM at ~ 4 sigma confidence level using the ROSAT and Planck data. We expect a much more significant detection from SRG/eROSITA. We indeed predicted the detectability to the WHIM. The prediction shows that stacking ~ 2000 filaments only would lead to a 5σ detection with an average gas temperature of the WHIM as low as ~ 0.3 keV.

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