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THE WARM INTERGALACTIC MEDIUM REVEALED

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We report the detection of the warm-hot intergalactic medium (WHIM) predicted by several popular cosmological models and expected to contain most of the barionic mass in the local universe.

This gas is expected to be gravitationally heated to $\sim 10^6\ K$ and therefore emitting in soft X-rays. To detect such an emission we have analized a deep ROSAT map of the Lockman hole. Point sources were detected by two independent methods and subtracted , and the Galactic absorption was corrected for by making use of a high-resolution 21 cm radio map obtained with the Effelsberg radio telescope. After this reduction, two prominent emission peaks are detected in the X-ray map (see Fig. 1). The spectrum of these structures (see Fig. 2) is consistent with that expected from the intergalactic medium, while clusters and unresolved AGNs cannot fit its shape.

To demonstrate the extragalactic nature of this emission, we have also studied the correlation between the X-ray structures and the distribution of galaxies. By analizing wide-field multicolor images obtained by the ING wide-field camera, we discovered a signifiant overdensity of galaxies in correspondence with the strongest diffuse X-ray structure. The photometric redshifts of the galaxies in this overdensity suggest a redshift of the structure of about 0.45. This result strongly suggests that the diffuse X-ray flux is due to extragalactic emission by warm gas associated with an overdense galaxy region.

The full discussion of this work will be given in a forthcoming paper by Zappacosta et al. (2002).

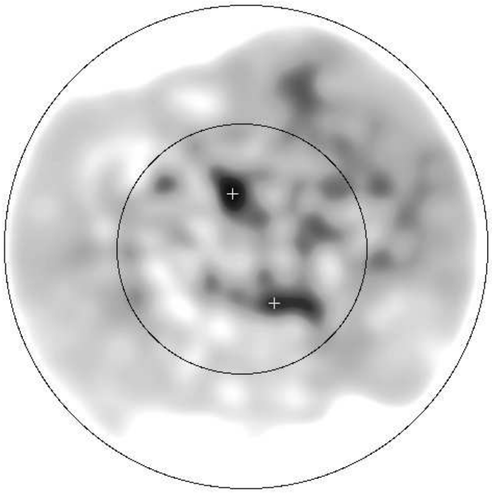

Fig. 1. Soft X-ray structures detected in a ROSAT image of the Lockman hole after subtraction of the point sources. The outer circle is the limit of the ROSAT field, the inner circle is the limit of the region where a reliable subtraction of the point sources can be done. The crosses show the position of the two prominent peaks detected.

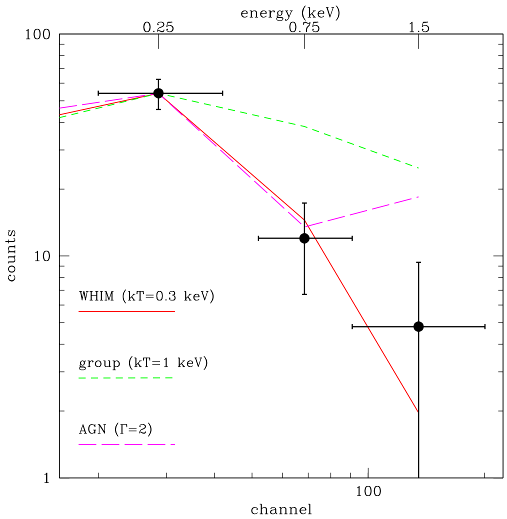

Fig. 2. The X-ray spectrum of the most prominent peak (in total counts) compared with the expectation of three models for intergalactic gas, galaxy groups, and AGNs.

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