XMM-Newton observations of the supernova remnant MSH14-63/RCW86

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Abstract

We present an analysis of XMM-Newton data of the remnant MSH14-63/RCW86. Although the remnant is not yet completely covered by XMM, the parts that have been observed show a number of interesting phenomena.

A surprise is the low ionization of the plasma. Under the assumption of equilibrium ionization some parts may be as cool as 0.1 keV. Under the more likely assumption of non-equilibrium ionization, the temperature may be higher, but as the line emission indicates, OVII is in some regions the dominant oxygen ionization stage.

The low temperature together with the presence of continuum above 1 keV is in support of the idea that some featureless spectra in the remnant may be non-thermal bremsstrahlung, caused by a hard tail to an otherwise cool electron temperature. However, in the most extreme cases the electron temperature should be lower than 0.1 keV. The overall cool electron will suppress line emission of Mg and Si. Fe cannot be hided as its fluorescent yield is high. Indeed we confirm the presence of Fe K emission at 6.4 keV, which proofs that electrons with energies above 7.1 keV are present.

Another explanation of the featureless spectra is X-ray synchrotron emission. However, the featureless spectra are found in regions that are weak at radio wavelengths. And some bremsstrahlung should be present in order to explain the 6.4 keV line emission. Although, the flux density levels at radio and X-ray can still be reconciled with X-ray synchrotron models.

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