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Soft X-ray excess from cosmic ALPs in magnetohydrodynamical cluster simulations

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It has been proposed that the long-standing soft X-ray excess in galaxy clusters could be explained by conversion of a 200eV cosmic ALP background into photons in the cluster magnetic field. However, for an isotropic Gaussian model of the magnetic field in the Coma cluster, the excess is typically under-produced in the central region when compared to observations. In this talk I will explore whether this tension can be alleviated by considering anisotropic magnetic fields generated from magnetohydrodynamical models of cluster formation. I will present the results for three sample clusters and discuss how further simulations can constrain the allowed parameter space.

Summary

For simulations of ALP-photon conversion in the magnetic fields of galaxy clusters, I show how using an anisotropic magnetic field model may produce a better fit to the observed morphology of the 200eV soft X-ray excess.

Author: ANGUS, Stephen (IBS Center for Theoretical Physics of the Universe)

Presenter: ANGUS, Stephen (IBS Center for Theoretical Physics of the Universe)

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