

Intracluster Dust and Far Infrared Emission

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Abstract. We make predictions for the diffuse far-infrared (FIR) emission from dust in the intracluster medium (ICM) of the Virgo cluster. The dust injection rate from known sources in the cluster is unlikely to give rise to a detectable diffuse FIR IC emission. However, the outer regions of dynamically young clusters have a further potential source of IC grains since they are still accreting freshly infalling spiral galaxies which are presumably contained in an accreting intergalactic medium (IGM). We show that cosmic ray driven winds from the infalling spirals can inject grains into a subvirial IGM that is external to the observed X-ray-emitting ICM. Predictions for the Virgo cluster are generalised to other clusters, and the possibility of detection of dynamically young clusters at cosmological distances is discussed. Although dominated by the discrete source emission from galactic disks, it is possible that diffuse submillimeter dust emission from the ICM could be detected in experiments similar to those designed to map the submillimeter excess due to the Sunyaev-Zeldovich effect in distant clusters. We further discuss the implications of our proposed scenario for the optical extinction in clusters, as well as for the properties and dust content of the IGM. Further implications for the environmental effects on the chemical evolution of spiral galaxies are also considered.