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The Far-Infrared Properties of the Most Isolated Galaxies

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Abstract. We describe the mid- (MIR) and far- (FIR) infrared properties of a large (∼1000) sample of the most isolated galaxies in the local Universe. This sample is intended as a "nurture-free" zero point against which more environmentally influenced samples can be compared. We reprocess IRAS MIR/FIR survey data using the ADDSCAN/SCANPI utility for 1030 out of 1050 galaxies from the Catalogue of Isolated Galaxies (CIG) as part of the AMIGA project. We focus on diagnostics (FIR luminosity $L_{\rm FIR}$, $R = \log(L_{\rm FIR}/L_B)$ and IRAS colours) thought to be sensitive to effects of environment or interaction. The distribution of $\log(L_{\rm FIR})$ is sharply peaked from 9.0–10.5 with very few (<2%) galaxies above 10.5. Review of available optical images of the most FIR luminous galaxies finds the majority to be, likely, interacting systems missed in our earlier morphological reevaluation. The optically normalised luminosity diagnostic $R = \log(L_{\rm FIR}/L_B)$ shows a distribution sharply peaked between 0.0 and −1.0. These results were compared to the magnitude limited CfA sample that was selected without environmental discrimination. This modestly (e.g. compared to cluster, binary galaxy and compact group samples) environmentally affected sample shows significantly higher mean $\log(L_{\rm FIR})$ and R, whereas the mean $\log(L_B)$ is the same. Our sample shows a strong $L_{\rm FIR}$ vs. L_B correlation, with a slope steeper than one ($L_{\rm FIR} \propto L_B^{1.41}$). Interacting galaxies were found above this correlation, showing an enhancement in $L_{\rm FIR}$. With respect to the IRAS colours, we found higher F_{60}/F_{100} value for ellipticals and late-type galaxies than for spirals, indicating a higher dust temperature. The mean value of F_{60}/F_{100} was found to be lower than for interacting samples from the literature. The results indicate that the FIR emission is a variable enhanced by interaction, and that our sample probably shows the lowest possible mean value. This attests to the utility of our sample for defining a nurture-free zero point. More details can be found in the paper (*The AMIGA sample of isolated galaxies, III. IRAS data and infrared diagnositics*, U. Lisenfeld *et al.*) which is accepted for publication in Astronomy & Astrophysics.

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