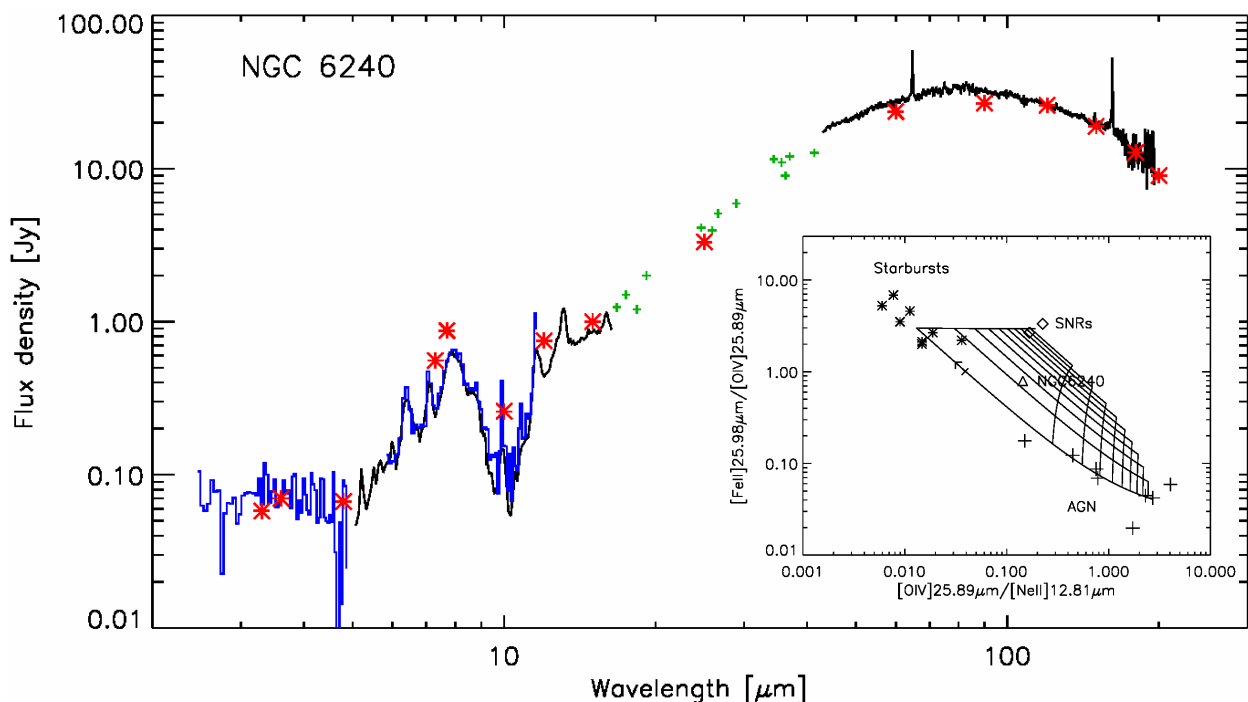




The merging galaxy NGC 6240 is an object presenting many aspects of importance for the role of star formation and AGN activity in [ultra]luminous infrared galaxies and can be studied in great detail due to its proximity. We have analysed and combined all spectra of NGC 6240 obtained with the Infrared Space Observatory for an in-depth study. The mid-infrared spectrum shows starburst indicators in the form of low excitation fine-structure line emission and aromatic 'PAH' features. An unusually strong high excitation [OIV] line is observed which most likely originates in the Narrow Line Region of the optically obscured AGN that is also seen in hard X-rays. NGC 6240 shows extremely powerful emission in the pure rotational lines of molecular hydrogen. We argue that this emission is mainly due to shocks in its turbulent central gas component and its starburst superwind. The total shock cooling in infrared emission lines accounts for $\sim 0.6\%$ of the bolometric luminosity, mainly through rotational H_2 emission and the [OI] $63\mu\text{m}$ line.

We use NGC 6240 as an exemplary case to critically analyse several ways of estimating the total luminosities of the starburst and the AGN, and discuss their systematic and statistical uncertainties. We use several infrared-based estimates as well as the X-ray evidence. Based on a combination of all estimates, the contributions to the bolometric luminosity of NGC 6240 are most likely in the range 50-75% starburst and 25-50% AGN.



Spectral energy distribution of the merging luminous infrared galaxy NGC 6240, from the complete set of 2.5-200 μm Infrared Space Observatory spectra that we have analysed. The insert shows a new diagnostic diagram based on mid-infrared fine structure line. The strength of [OIV] in NGC 6240 is due to the presence of the optically obscured AGN(s), already studied in X-rays, in addition to powerful starburst activity.

References:

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