Título/Title:
A complete understanding of the Far InfraRed sources detected with the ESA mission Herschel

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Descrição/Description:
The launch of the Herschel Space Telescope in 2009 started a new era in the field of galaxy evolution. This ESA space mission observed for the first time an unexplored region of the electromagnetic spectrum, the Far InfraRed bands (FIR), opening a new window for the astrophysical research. The FIR radiation in astronomy is fundamental because about half of the energy produced throughout the history of the Universe has been absorbed and re-emitted as infrared light.

The observed emission is due to the interstellar dust, a mixture of different solid particles that absorbs the energy produced during the early phase of star formation. This implies that a complete picture of the star formation process in a galaxy must consider both the optical and Ultra Violet radiation produced during the star births, but also the fraction of this radiation obscured by dust, and visible at longer wavelengths. For this reasons Herschel represents a benchmark for understanding galaxy formation and evolution.

However, the observations at FIR wavelengths are severely limited by the confusion noise. Since the beam size of the instruments on-board of the satellite are large compared to the structures observed, the probability that multiple sources fall inside the beam is not negligible. Source confusion is a severe issue in the Herschel data, which makes it difficult to identify the correct counterparts and measure fluxes for individual sources. A reliable identification of the FIR sources counterpart at other frequencies and the deblending of possible multiple sources inside the Herschel beam are of capital interest in order to exploit at maximum the scientific impact of such a mission. It is therefore important to investigate in detail the mis-associated and/or missed population of Herschel sources, because such galaxy population could play a significant role in the star formation history of the Universe. To solve these problems various methods have been proposed by different teams, investigating the problem applying different approaches.

In this project we propose to perform for the first time a joint analysis of these different methods, to investigate in detail their reliability. The goal is to quantify how the results obtained with different methods depend on the data set available, or the parameters used for the identification. The hypothesis behind the proposed program is that the choice of the method for a specific research depends not only on the data, but also on the scientific goal defined. This project will shed light on this aspect quantifying in which measure this hypothesis is true giving then useful hints to the scientific community about the choice of a method for specific scientific goals.