

PANEL A1: AGN SEDS AND AGN VS. STAR-FORMATION

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ABSTRACT

Photometry and spectroscopy with FIRST will provide unique opportunities to study the spectral energy distributions of AGN and the relation of AGN and starburst galaxies. This is true both for in-depth characterization of nearby sources and for interpretation of high redshift objects detected by FIRST or other surveys.

Key words: Galaxies: formation, spectral energy distribution – Missions: Herschel-FIRST

2. TOPICS

Comprehensive FIRST studies can be envisaged dealing with a number of aspects in the field of AGN SEDs and the relation of AGN and star formation. These include:

- AGN vs. starburst characterisation of sources from FIRST surveys, using rest frame mid- to far-IR SEDs. Initially, this will be addressed by large photometric surveys including the full PACS/SPIRE range corresponding to rest frame mid- to far-IR for distant objects. Deeper photometric and/or SPIRE FTS spectrophotometric follow up will improve further some of the SEDs to be compared to templates of different type and redshift.
- Spectroscopic analysis of the nature of high redshift infrared sources. The brightest of these are in reach of PACS and SPIRE/FTS spectroscopy, using the diagnostics developed by ISO for the local population.
- Observation of extremely high redshift objects – of which many should be known in 2007 – with SPIRE and PACS in order to examine their dust-to-gas ratios.
- SPIRE/PACS broadband photometric studies of selected samples of nearby and distant Seyfert galaxies, radio galaxies, QSOs and starburst galaxies, tracing in particular cold dust components and the relation of thermal and nonthermal emission.
- PACS and HIFI spectroscopy of sizeable samples of local AGN, starbursts, and IR galaxies with sufficient sensitivity to detect fainter diagnostics that are out of reach of ISO and SOFIA. This will characterise physical conditions and dynamics of the gas and aim for, e.g., a better understanding of the [C II] deficit, for a characterisation of starburst properties, and for molecular lines in emission and absorption. HIFI high resolution spectroscopy will address complex radiative transfer in a few key lines.

1. FIRST IN THE CONTEXT OF OTHER MISSIONS

The symbiosis of accretion driven nuclear activity and global as well as circumnuclear host star-formation has been investigated in nearby galaxies and active galactic nuclei, but is as yet incompletely understood. IRAS and ISO data have been used to develop photometric and spectroscopic tools for the 5 – 200 μ m range that provide key insight into this symbiosis. In the coming years, these and more distant objects will be observed by the sensitive SIRTf instruments, photometrically over a similar wavelength range and spectroscopically over a mid-infrared subset. These basic facts and the far-infrared confusion limit for smaller telescopes imply that the long wavelengths – or even the rest frame intermediate wavelengths for high redshift objects – will not be covered well in the pre-FIRST era.

It is therefore felt that FIRST will yield unique information on active and starburst galaxies in particular (i) at long wavelengths for constraining the cold dust components in these objects, (ii) through its improved characterisation of the rest-frame mid-IR SED for higher redshift sources close to the confusion limit, and (iii) through sensitive spectroscopy.

The panel, which met twice, in shared meetings with Panels A2 (‘Gas and dust in nearby galaxies; protogalaxies and high redshift abundances’) and A3 (‘Deep surveys, source counts and cosmology’), felt that FIRST will likely devote considerable amounts of observing time to such issues, in the form of large or other programs.