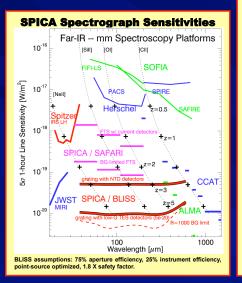
NASA

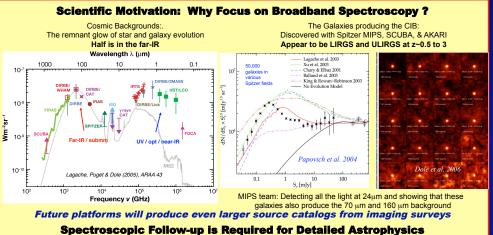
BLISS: a Far-IR Spectrograph for SPICA

Matt Bradford (JPL, Caltech) w/ help from many

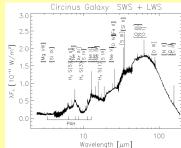
Team

Science: Matt Bradford (PI, JPL), James Bock (JPL, instrument scientist) extenses, mark breatord (r., or c), sames bock (or c) instantier sciences extrus (IPAC SSC), Socit Chapman (Cambridge), Uma Gorti (UC erkeley / NASA ARC), Martin Harwit (Cornell), George Helou (IPAC), Dan ester (U. Texas), Matt Malkan (UCLA), Hideo Matsuhara (ISAS / JAXA), Lease Dis Cascaly india industational Collective India and Antonio Collective India and Antonio Collective India and Antonio Control India Anto bolometers). Kent Irwin (NIST. SQUID MUX readouts). Rick LeDuc (JPO. uperconducting devices), Anthony Turner (JPL, microfabrication). BASS JPL Proposal: Al Nash (BASS project manager), Tim Koch (BASS





Herschel and SCUBA-2 will discover tens to hundreds of thousands of sources in imaging surveys. The far-IR background galaxies will be discovered early in the coming decade. Far-IR spectroscopy is the natural follow-up tool to measure these galaxies' redshifts and properties. Spectroscopy also offers the opportunity to look beyond the bulk of the background galaxies to very early sources via high-z PAHs, silicates, and bright lines. Herschel will provide an excellent localuniverse reference sample, but little spectral capability beyond z~0.5.



A wealth of information is available for early-universe galaxies if we have the sensitivity:

JPL

 Suite of lines provides a reliable redshift template, perhaps the only method for very dusty sources. • Fine structure and molecular lines dominate the gas cooling and measure its properties:

→ Gas mass, temperature, density

→ UV field strength and hardness
 → Metal abundances
 → Starburst / AGN contributions

→ Stellar type, starburst age.
→ Degree of ISM processing

Far-IB lines are subject to very little extinction, they probe the bulk of a galaxy.

Spectrograph Concepts and Technologies

The Ideal Instrument for rapid follow-up of distant (unresolved) galaxies is a broadband grating, operating at or near the background limit.

