The study of protostellar outflows with FIRST

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With the present contribution we would like to overview the capabilities offered by the three instruments on-board FIRST for the study of outflows from young stellar objects.
Bipolar outflows are one of the first observational manifestations of the formation of a new star; the study of their properties can be therefore a powerful tool to derive information on the embedded exciting source which is often much more difficult to be directly observed. Outflows drive strong radiative shocks whose cooling occur over a wide range of wavelength from the UV to the submillimeter. The frequency range covered by FIRST, however, contains the most basic information on the physics and chemistry of the molecular gas at the excitation conditions attained in shocks. The importance of observations in the far infrared for the study of outflows has been demonstrated by the results obtained with ISO on a relatively large sample of young stellar objects; their far infrared spectra are dominated by strong lines of [OI], CO, H_2O and OH, which constitute a significant fraction of the total shock gas cooling. An analysis of such emission shows however that ISO is too limited in terms of spectral coverage, sensitivity, spectral and spatial resolution to allow for more than gross estimates of the physical parameters of the gas emission averaged over the beam. On the basis of what we have learned with ISO, we will discuss the potentiality of FIRST to make a detailed analysis of the chemical and physical structure of the bipolar outflows and to trace its evolution during the protostar lifetime.