Stable distributions have attracted significant interest over the last decade in applications ranging from telecommunications to finance and from radar signal processing to biomedicine [1].

This popularity is due to the fact that stable distributions provide a very flexible framework for modelling signals which exhibit impulsive behaviour that cannot be accommodated by the Gaussian distribution. In addition to being capable of modelling varying degrees of impulsiveness they can also model skewed behaviour which have been largely ignored.
In addition to their empirical success, the stable distributions have important theoretical motivation: they are the outcome of a generalised version of the central limit theorem and moreover are generalisations of the Gaussian distribution and share attractive properties with it such as the stability property [2].

Despite this flexibility, stable distributions fall short of describing multimodal data, while many real life data sets possess multimodal property indicating contributions from different contributing phenomena. Gaussian mixtures have been employed widely for modelling multimodal data and have obtained significant success, however for impulsive data there is still need for an alternative model. Moreover, although skewed data can be described with Gaussian mixtures, this is at the expense of large number of components.

In this work we suggest stable mixture densities as an alternative which can model multimodal, impulsive and skewed data with a small number of components.We employ Bayesian inference, in particular Markov chain Monte Carlo techniques for this task.The mixture weights are estimated using Gibbs sampling and the distribution parameters are estimated using Metropolis sampling.

In addition to estimating stable distribution parameters and mixing coefficients, the suggested technique is also capable of estimating the number of components for which the reversible jump MCMC algorithm has been employed [3].

Simulation studies demonstrate the success of the estimation technique and we can conclude that a very flexible modelling framework has been proposed in this work. We are currently testing the algorithm in modelling Wilkinson Microwave Anisotropy Probe measurements of the astrophysical radiation in the sky and will be presenting them at the conference.