1. Introduction

The major advantage of studying galaxies in the near infrared (NIR), is the minimization of dust extinction. The NIR is the region of the stellar emission spectrum which is least affected by both dust emission and extinction. Dust emission becomes more of a factor at longer wavelengths while dust extinction is more significant at shorter ones. The other important advantage of a NIR study is that it probes the bulk of the stellar mass in the galaxies. Since Tully-Fisher (T-F) is a relationship between a galaxy's total stellar content and its rotation speed, minimizing the biases in the measurement of the bulk of the stellar emission provides a significant advantage.

One of the projects that can be carried out with NIR data is determining the peculiar motions of a large number of galaxies. With this information, the derivation of the three dimensional potential and hence the mass density field and the cosmological parameter \( \Omega \) (Bertschinger et. al., 1990) should be possible. Constraining \( \Omega \) and studying peculiar motions over the entire sky is one of the core projects for the 2MASS data set.

2. Why Use 2MASS for a Tully-Fisher Study?

One of the 2MASS survey's major advantages over other large T-F studies is sample consistency. 2MASS will provide a uniform sample of galaxies over the entire sky which surpasses the number of sources in all previous catalogs by an order of magnitude. In addition, all of the galaxies observed with 2MASS will also have simultaneous measurements in three NIR bands, J, H, and K. With such a large survey and so many objects to choose from we have the additional advantage that subsamples of the survey will also be large. With the availability of large subsamples, we will be able...
to apply stringent constraints to the data without harming our sample statistics. There is also a hidden benefit for 2MASS in using the data in a large T-F project; the driving force behind this and the other 2MASS core science projects is database validation. In order to generate a well tested catalog for public consumption, the data must be exercised through careful scientific investigation. A project of this scope requires the use of much of the information generated in the extragalactic database.

One of the most obvious and most basic concerns in any project of this sort is the limitations due to signal-to-noise (S/N). Some of the concerns related to signal-to-noise, such as our ability to measure the disk of the galaxies, will be discussed in later sections. As with any observational project, one has to consider the observational unknowns which include the variability of the point spread function and photometric calibration. These are concerns which will continue to be addressed as the project continues and we obtain more survey data.

Another general concern for any all-sky T-F survey is the effects arising at low Galactic latitude. As we have noted, the NIR minimizes the effects of extinction, but it is still a concern at the lowest Galactic latitudes. In the plane the selection criteria for galaxies is going to be different because of the effect of dust and the fact that we are confusion limited. In particular, more galaxies will be selected at K since it is less affected by extinction than at J which selects most of the objects at high galactic latitude because it is more sensitive.

A more technical concern for the use of the 2MASS survey is how we choose to automate the selection of objects. We have the advantages of a large survey, but with that comes the difficulty of managing the data. We must cull the sample so that we are only analyzing spiral galaxies, since they are the only ones to which the T-F relation applies. We must also eliminate distorted spirals from the data set. Separating morphological types has proved to be a difficult task since it is hard to determine morphology in the NIR. Ideally we would like to have a parameter, or set of parameters, in the database which could be used to distinguish morphological types. To test parameters for this purpose, we have selected a sample of the 2MASS objects and, from the Digitized Sky Survey (DSS) data, have determined the morphology by-eye. It is the by-eye determination which is the only way we have to obtain "truth." It should be noted that even by-eye, using the optical DSS data, it was often difficult to determine a galaxy's morphology. When using this sample, we were not able to find any parameters (we tested many of those in the database, but in this preliminary investigation we did not test them all) which separated out spiral galaxies. If we are not able to find parameters which do distinguish morphological types, we have the option of applying an axis ratio limit to the galaxies used. Since ellipticals do