Title: Modeling Protoplanetary Disks in the Small Magellanic Cloud

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Computer modeling is a useful way to interpret data and observations. In astronomy, image data from other stellar systems can be difficult to access because of the great distances between them and Earth. Spectral data are gathered instead, and models are created to interpret this data and determine what the stellar systems look like. The Small Magellanic Cloud (SMC) is a galaxy 200,000 lightyears away from our own, which is more than far enough away to make gathering image data difficult. One of the main characteristics of the SMC is its low metallicity, which means it has a low presence of elements heavier than hydrogen and helium. This means the galaxy closely resembles the early universe, which also had a low metallicity. My project focuses on how this type of environment effects planet formation, and what types of planets could have formed. The systems in the SMC are used as an analog to early universe systems, from which no data can be detected. The results of studying planet formation in the SMC can then be applied to planet formation in the early universe. Since little image data can be gathered on SMC stellar systems that could be forming planets, modeling is used to create spectra to fit the data that is available. I created model spectra of these distant systems using a software package called RADMC-3D. This software package allows me to input parameters for characteristics of the stellar system, including the star's temperature and size, and the protoplanetary disk's inner and outer radii, surface density, dust and gas components, grain sizes of the dust, locations of gaps, and much more. I then use RADMC-3D to create a model spectra that would have been measured from the model disk created based on those parameters. Finally, I plot the model against data from the physical system to see if it fits. If there is a fit, the parameters used in the model can be considered the physical characteristics of the SMC stellar system. The possibility of planets forming in the system can be determined from the most telling characteristic, the presence of gaps in the disk which can be formed from planets gathering material from the disk. The most challenging part of this task is to create models that fit that data, since there are many different parameters that can be changed that effect the model spectra. It is also possible that the systems being modeled are not actually stellar systems with protoplanetary disks, they may by planetary nebulae or something else entirely. So far, I have produced models with a variety of different disk characteristics and I am comparing them to data from a system in the SMC. The models are not yet an exact fit, but the modeling process has been improved and I have determined specific parameters to focus on, mainly the dust grain sizes.