

UROP Research Abstract Assignment Fall 2015 Only (NOT for Winter Semester)

Assignment Due Date: Friday, December 4, 2015

Type Student Name: Parker Schaub Student Peer Advisor: Inarar Ismailova

Type Abstract Title: Mapping the Blue Star Distribution of the NGC 3031 Galaxy

Type in Abstract Here (minimum 250 words):

ABSTRACT

We have used the data from the Galaxy Halos, Outer disks, Substructure, Thick disks and Star clusters (GHOSTS) survey (Radburn-Smith et al 2011 Astrophysical Journal Supplement Series, 195, 18) to explore the distribution of blue stars in the stellar halo of the NGC 3031 (Messier 81 or M81) galaxy—and eventually other disk galaxies—with the intent to use this information to further our understanding of the formation and distribution of dark matter halos, around disk galaxies. The blue star population represents the stars of a galaxy which are very massive, and very young (relatively speaking), and thus help to characterize where in the galaxy new stars are being formed. In general, we are asking: Where are the blue stars concentrated? To what extents does the blue star halo extend? Are there unexpected or notable patterns in the blue star distribution of this galaxy? We intend to answer these questions using data from the GHOSTS survey (a recent study undertaken by a group of astronomers that included some University of Michigan faculty). This data contains image fields of stars in 16 galaxies, including M81. We studied the 28 fields that were taken of M81, mostly along its major and minor axis, using internet based IPython Notebook software. By writing a few simple programs, we were able to identify the blue stars of this galaxy (at least, those which fell in the measured fields) based on their color and magnitude, then plot them by right ascension and declination. After mapping the blue star distribution of disk galaxies, we identify patterns, concentrations, and other features of the distribution worth noting. This plotting and analysis is part of a larger attempt to understand dark matter; in particular, where does dark matter exist in disk galaxies? What role does dark matter play in the formation and sustenance of a galaxy? How are the stellar halo and dark matter halo of a disk galaxy related?

*Key words:* galaxies: stellar halos — galaxies: spiral — galaxies: blue stars — galaxies: formation — cosmology: dark matter halos — galaxies: formation — galaxy: NGC 3031 — galaxy: M81

Research Sponsor (Print): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Sponsor Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_

\_\_ Yes \_\_ No Did you have a conversation with the student about this assignment?

\_\_ Yes \_\_ No Did this student give you enough advance notice about this assignment?

\_\_ Yes \_\_ No Is this abstract largely the work of this student?

\_\_ Yes \_\_ No Does this format match the abstract requirements of your discipline? (e.g. embedded references, footnotes, etc?)

\_\_ Yes \_\_ No Was this assignment conducive to your having an in-depth conversation with this student about the objectives and/or bigger picture of this research project?

Comments: