Homework Assignment
Optical / Infrared Databases and Catalogs
Due: 3:30 PM, Wednesday, September 22

For any of the questions involving calculations, you should show the details of these calculations. You will be graded not only on the answers that you provide, but on demonstration of the steps and reasoning involved in deriving those answers.

Your lab included J, H, and K infrared data for two molecular clouds, L723 and B35A, located at distances of 300 pc and 400 pc, respectively, from Earth. The central coordinates and sizes (full width and height) of the images are:

L723
Central Coordinates (J2000): RA = 19h 17m 57.9s , Dec. = +19° 14′ 17″
Field Size (ΔRA × ΔDec.): 9.7′ × 9.7′

B35A
Central Coordinates (J2000): RA = 05h 44m 34.9s , Dec. = +09° 10′ 18″
Field Size (ΔRA × ΔDec.): 10.0′ × 10.0′

1. Given conversion factors discussed in a previous lecture (see notes for Lecture 1), what are the distances to L723 and B35A in meters? in miles?

2. Given the central coordinates listed above for the L723 images, what are these coordinates expressed in decimal degrees? for the B35A images? You should refer to the notes for Lecture 1.

3. Using your results from Question 2 and the notes for Lecture 1, what are the minimum and maximum RA values and minimum and maximum Dec. values covered by the L723 images? for the B35A images?

4. Using your results from Question 3, perform a SIMBAD search "by criteria" to check for previously known and identified sources within the L723 field. On the "SIMBAD: Query by criteria" webpage, be sure to select the option to return "display maximum 10000 objects," which is found to the right of the box where you enter the search expression. **Print a copy of the display returned by SIMBAD, and attach to this homework assignment.** How many known sources were found by SIMBAD? How many of these known sources are identified "stars" (a star will be identified with an "Otype" that includes an asterisk, "*")?

5. Similar to Question 4, perform a SIMBAD search "by criteria" on the B35A field. . **Print a copy of the display returned by SIMBAD, and attach to this homework assignment.** How many known sources were found by SIMBAD? How many of these known sources are identified "stars"?

6. Given the central coordinates and field sizes listed above for the L723 images, perform a Gator search to identify all the infrared sources in this field that are listed in the 2MASS PSC (Point Source Catalog). You should make use of the "Box" search method, as discussed in this week's lecture (see Lecture 2 notes). In the "Options" box of the Gator form, please request that an email be sent to your email address when the search is completed. Also on that form, request that the catalog contain the same columns as the 2MASS PSC search discussed in the lecture (see Lecture 2 notes). After you have executed the Gator search, it may take several minutes for the results to be ready. When they become available, your browser will display a quick view of the results and you will receive an email from "IRSA Administrator" containing a link pointing to the resulting catalog. Assuming that your search was successful (e.g., this catalog is not empty), **forward the email to the instructors.** How many sources were catalogued by the 2MASS survey in the L723 field?

7. Similar to Question 6, perform a Gator search on the B35A field. **Forward the email from "IRSA Administrator" to the instructors.** How many sources were catalogued by the 2MASS survey in the B35A field?