Astronomy 423 Homework Set 8

Due: Wednesday, Apr. 7

1. Image the 5 GHz VLBA data on 4C +72.26 using Difmap including self-calibration (hint, change directories to your assigned area (a421, a422, a423, or a424) then start difmap and read in the data with "obs 4C72.TBC0,8,true". This will load and average the data to 8 seconds. Select Stokes I polarization and use all the IFs. Perform self-calibration for the data and make the best image you can. You should use the difmap cookbook (difmap-cookbook.pdf available from the class web pages) and the difmap 'help' files as needed. As you go along answer the following questions for the source:

    a) What is the expected thermal noise for 4C +72.26?
    b) Start with uniform weighting (the default). After a few rounds of clean and selfcal, switch to natural weighting (use the command "uvweight 0,-1"). What is the rms noise off the source after self-calibration?
    c) Look at the visibility data with vplot and radplot. Can you find any bad data? Describe the time(s) and antenna(s) and IF(s) affected (hint: use the "s" key to get statistics while putting the cursor near a bad point).
    d) What is the final dynamic range in your image?
    e) Make a model of the data using the "modelfit" command in Difmap using Gaussian components. Include a hardcopy of the model (text file).
    f) What sort of reduced chi-square agreement can you reach between the model and the data?
    g) Provide three different estimates of the total flux density (from the model-fit, from the sum of the clean components, and from a box in the image plane).
    h) Make a contour plot of your best Stokes I image and turn in a hard copy.
    i) How does your image compare (peak flux, rms noise) to what you got using AIPS? Better image than AIPS is worth 2 points extra credit. Best image gets +5 bonus points. Better image than mine is worth +10 bonus points.