LAE Scanner Instructions
Emission Line Classifications

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0.1 Intro:

This manual will provide you with the basics required to reliably classify MAGPI emission line detections produced using the LSDcat software. Here, we have simply provided screenshot examples of the handful of detection types found in the LSDcat catalogues. Each of these examples were selected to be very clear, but be aware that this will not always be the case! This is what the "unsure" classification type is for, don't be afraid to use it!
As you will find out, only a small minority ($\sim$10%) of detections are actual galaxies. The remainder are spurious and are not of scientific interest. The goal of this step in our classification is simply to cull these spurious detections and provide a clean catalogue of emission line only sources for each MAGPI field. As such, most of the examples provided are the various spurious source types. We provide three clear examples of real galaxies to start with in order to compare these directly with spurious sources as you read this manual.
Finally, this manual will not show you how to use LAE scanner. There are brief instructions found on the LAE scanner github repo, as well as a short video that explains how to get started with the GUI.

0.2 Examples:

0.2.1 Real Sources:

Here we provide three clear examples of real galaxies. How do we know they are real? Checking the line profile, you will see that the lines are broadened as expected due to both intrinsic line broadening of the source as well as broadening induced by the spectrograph. Second, the narrow band image is similarly broadened by the atmospheric seeing. Of course, MAGPI data is collected using adaptive optics, meaning this latter effect is reduced compared to natural seeing, however we still expect some broadening to remain (compare to, e.g., sharp edged spurious sources below). Consider these three examples as benchmarks when inspecting spurious sources.

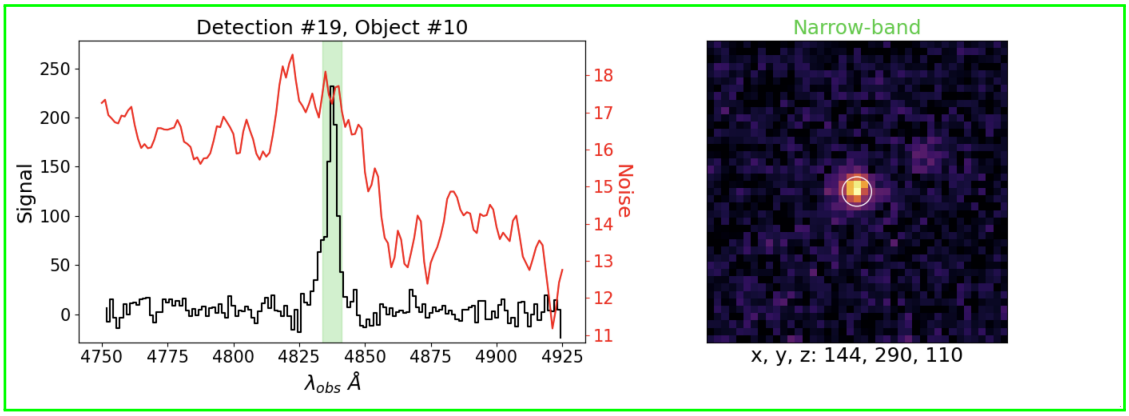

Figure 1: Real Source

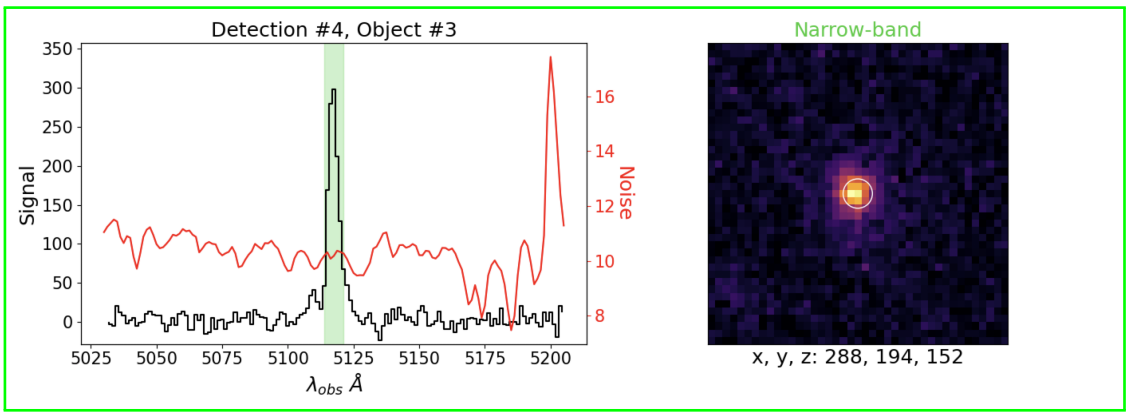

Figure 2: Real Source

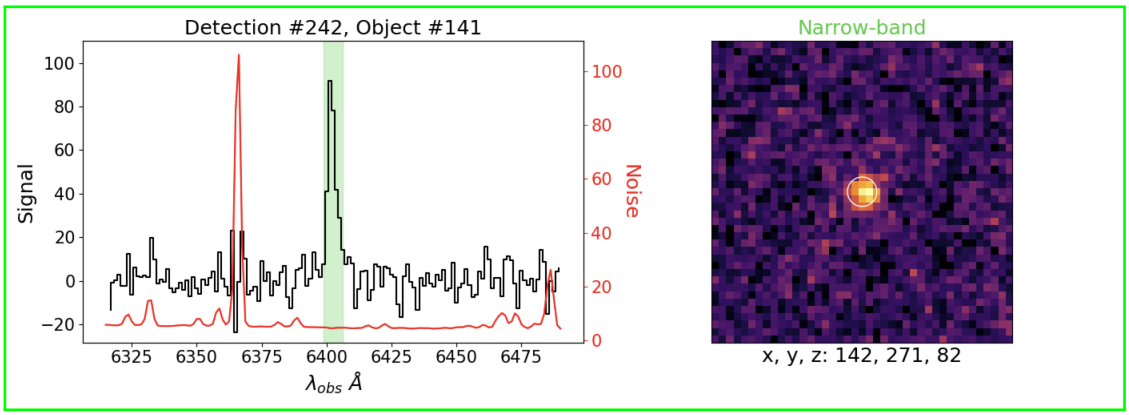

Figure 3: Real Source

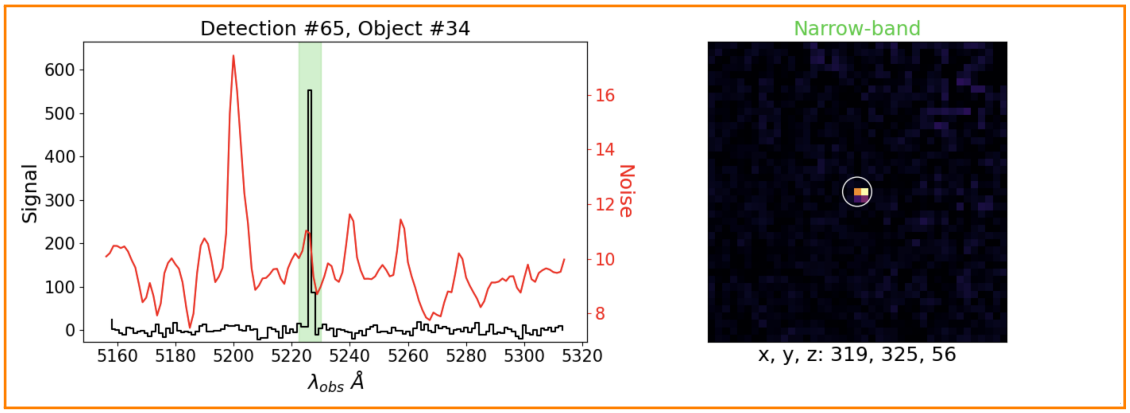

Figure 4: Narrow line

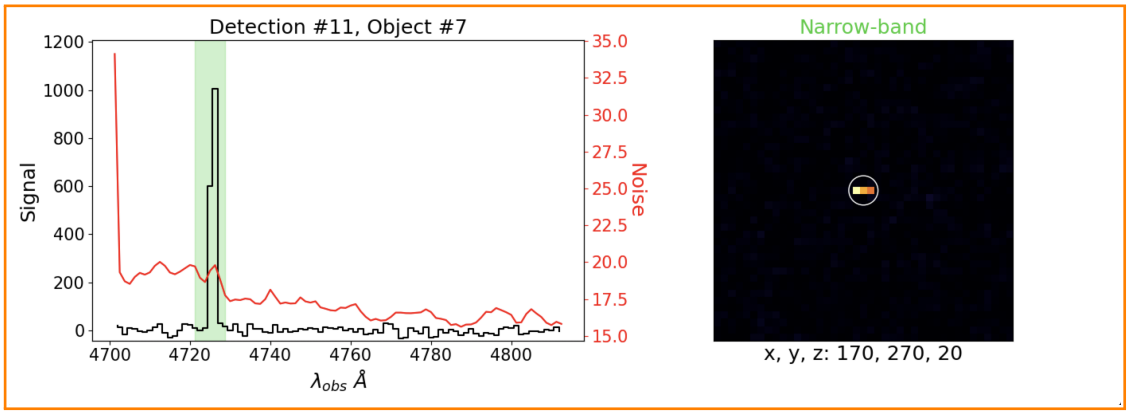

Figure 5: Sharp Edges

0.2.2 Spurious Sources:

There are essentially two broad types of spurious sources: sharp edged/narrow lined and skyline residuals. Be aware that, in both cases, spurious sources are more frequently found near the edges of the field.

Sharp Edges and Narrow Lines:

Probably the most common type of spurious sources appear to have very sharp edges in their narrow-band images. Often times, you will find a series of a few bright pixels along one or two rows or columns of the image. In extreme cases, these sources appear as a single bright pixel. Additionally, such sources often (but not always) exhibit extremely narrow line profiles (in the extreme a single wavelength channel is bright). Below are a collection of such spurious sources covering a range of appearances.

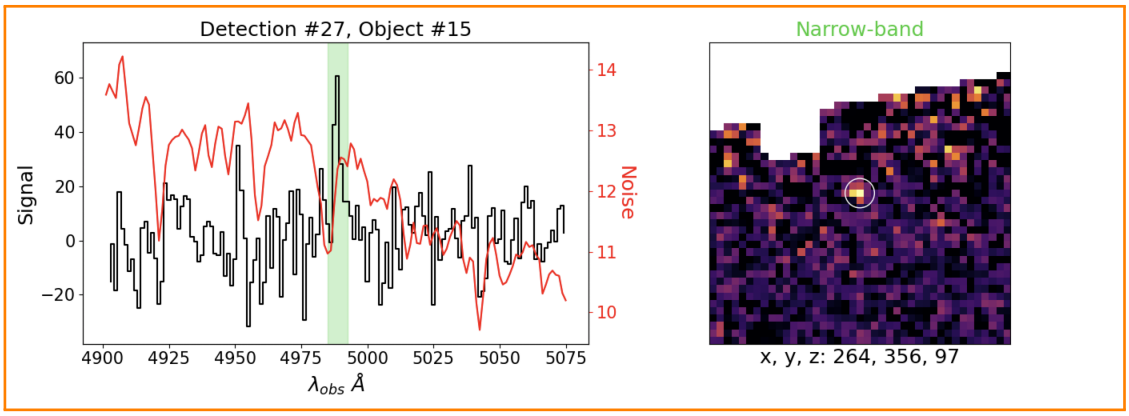

Figure 6: Sharp Edges

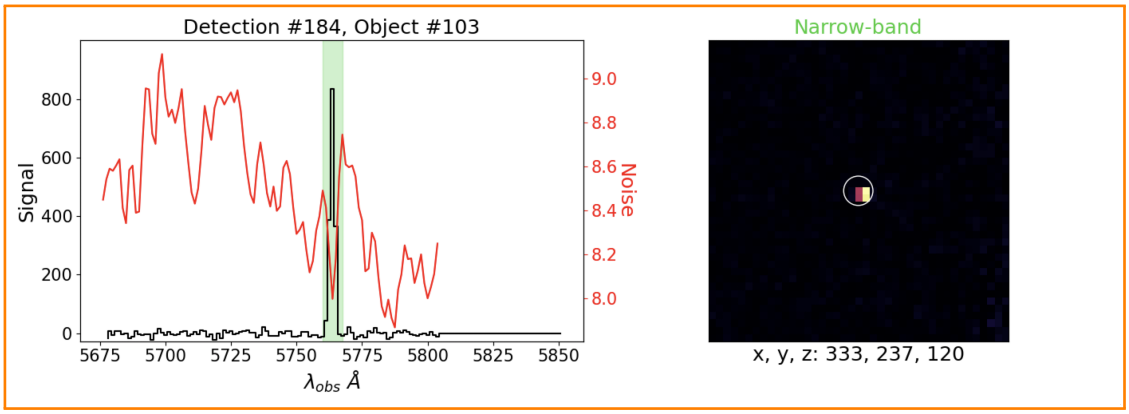

Figure 7: Sharp Edges

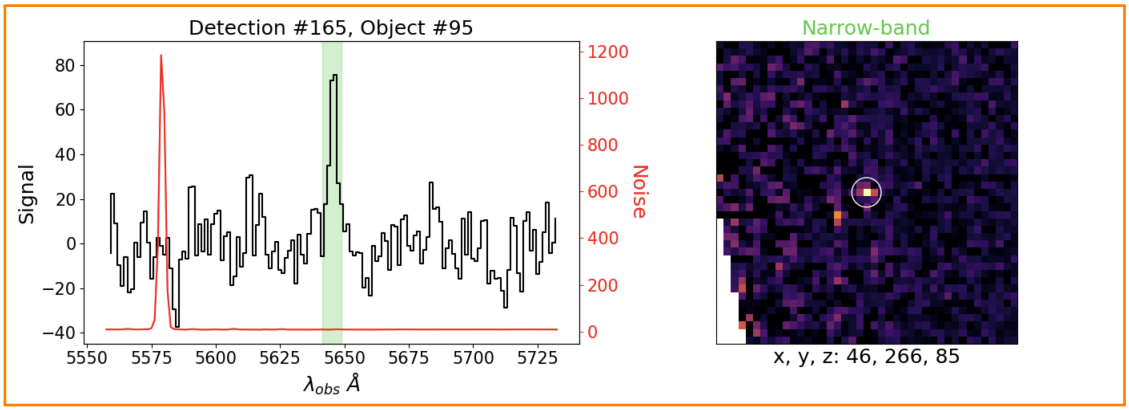

Figure 8: Single Pixel

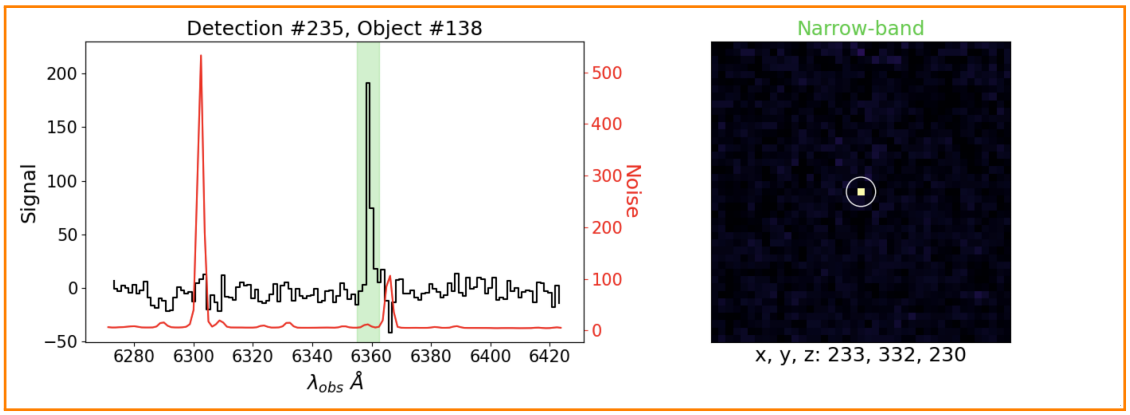

Figure 9: Single Pixel

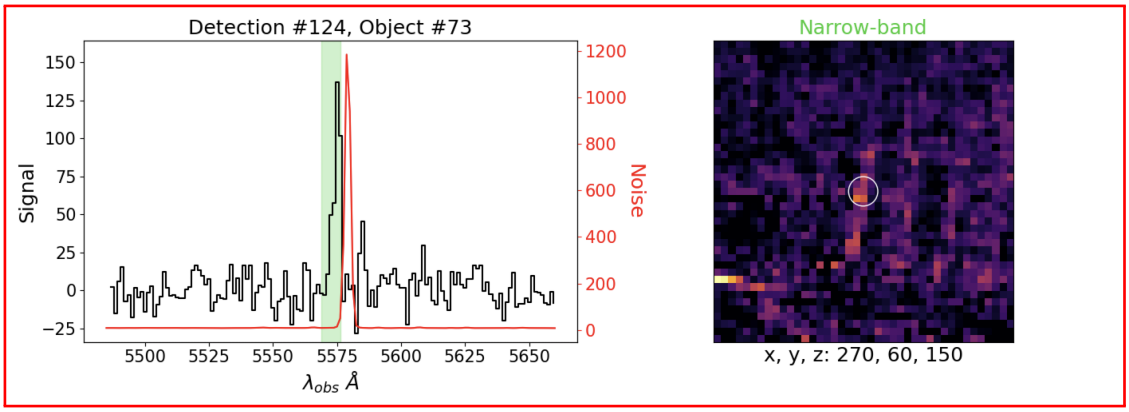

Figure 10: Skyline residual

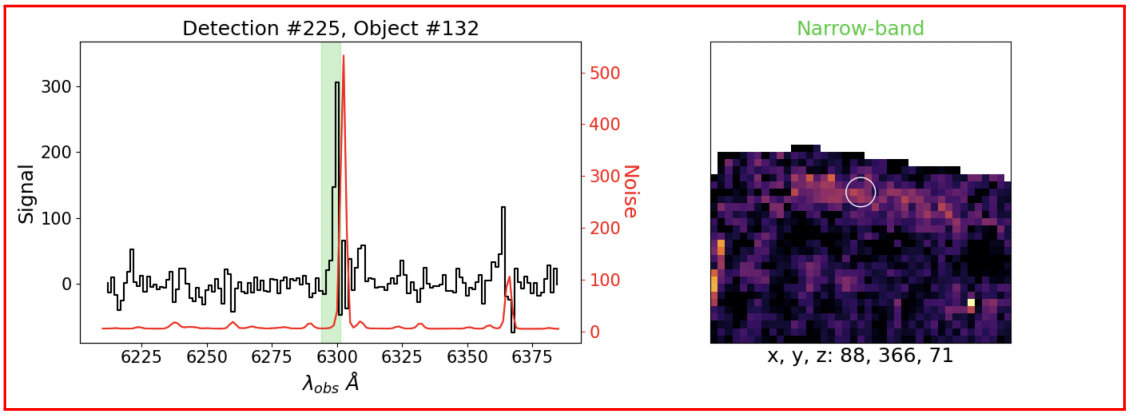

Figure 11: Skyline residual

Skyline Residuals:

The other type of spurious sources are residual skylines left over after the subtraction step during data reduction. These sources are pretty easy to pick out as they are 1) often very large in the narrow band image and 2) the emission line in the profile falls very close to (or on top of) a strong sky emission line (as evident in the red noise spectrum). Here are two examples of such sources:

0.3 Concluding Remarks:

You are now ready to classify MAGPI emission line only sources with LAE scanner! We reiterate here that examples provided in this manual were selected as very clear cut examples. As you work through your classifications you will start to get a better feel for the level of variation of sources to expect and your confidence will grow (as well as the reliability of your classifications). Regardless of how many you've done, there will always be uncertainty, don't be afraid to use the "unsure" classification! Ultimately, this is a team effort and the compiled classifications from multiple people will determine the content of the final catalogue of real sources.
Before you start classifying your assigned catalogue, you should first work through the training catalog for GAMAJ140913, which can be found in the github repo. You will also find a video walking you through the usage of LAE Scanner. Once you have completed the training set, you will find your classifications in the folder containing LAE Scanner. You can then compare your answers with the aggregate answers of R. Bassett, T. Nanayakkara, and E. Wisnioski by running the script `training_summary.py`. This should be run as:

```
python training_summary.py -i your_classifications.dat
```

This will produce a PDF annotated, trainingsummary.pdf, with your answers and our answers. Review this to get a sense of how you went. The training examples have been selected to be fairly clear examples (in most cases!).
Finally, we want to thank you for your time and effort. We are aware that this is a tedious job, but your contribution is greatly appreciated!