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Abstract:

A Direct Measurement of the Density of Background False-Positive Transit Signals from Kepler Data
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A major source of Kepler false positives is background eclipsing binaries or transiting planets diluted by the flux of the target star. These false positives can often be identified by measuring the location of the transit signal through centroid analysis. There are several circumstances, however, where centroid analysis cannot identify background transit signals, such as when the source appears very close to the target star on the sky or when the transit signal to noise ratio is too low. It is therefore important to know the likelihood of such background transit signals for a given target star. The density of such background signals on the sky tells us much about this likelihood.

Because the target star Kepler magnitude determines which background signals will appear as plausible planetary false positive transits, the relevant background false positive signal density depends on the target star.

There have been several model-based estimates of the density of transit signals, based on stellar population models and observed statistics of eclipsing binaries. Such model-based estimates have been used in the statistical validation of Kepler planetary candidates.

We present a direct measurement of the density of background false positive signals from Kepler data. We use the fact that for each target star many pixels are collected, typically out to a few arc seconds. We compare the measured distance of identified background false positive sources from the target star with the total area searched for the target stars. By grouping target stars by Kepler magnitude and Galactic Latitude we estimate the spatial density of background false positive sources. We compare our results to model-based estimates.