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Title: False Alarm Vetoes for Transiting Planet Searches

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Abstract: Requiring a 7.1 sigma detection in 16 quarters of data in the Transiting Planet Search (TPS) yields nearly 113,000 detections, or roughly 57% of the total number of targets sent to TPS, most of which are false alarms. After a second cut is made on a robust detection statistic, over 33,000 targets still remain. These false alarms waste resources as they propagate through the remainder of the software pipeline and so a method to discriminate against them is crucial in maintaining the desired sensitivity to true events. To this end, we currently employ a set of three additional chi-squared vetoes that each examine different contributions to the detection statistic. Through the use of these vetoes, the number of detections drops below 10,000, for a false alarm rate less than 5%, while simultaneously achieving a high detection rate of 96% on a set of high quality planet candidates. Transit injection studies have shown however that one of the chi-squared vetoes currently in use was responsible for a majority of the missed detections. A new set of vetoes, described here, will be the subject of future investigation and use in TPS. The new vetoes will improve the recovery rate of injected signals and the tuning of these vetoes will play a major role in increasing our search sensitivity to compensate, in some part, for Kepler's inability to continue its nominal extended mission.