Conformal cyclic cosmology signatures and anomalies of the CMB sky

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We discuss the Conformal Cyclic Cosmology (CCC) model introduced by R. Penrose and present a high-resolution search for low-variance circles in the Planck and WMAP Cosmic Microwave Background (CMB) data, and introduce a machine-learning algorithm to search for Hawking points in the CMB, which are both predicted signatures of Conformal CCC. We find that CMB anomalies, consisting of a single or a few bright pixels can lead to regions with many low-variance circles when applying the search criteria used in previous works. After removing the anomalies from the data no statistically significant low-variance circles can be found. Concerning Hawking points, also no statistically significant evidence is found when using a Gaussian temperature amplitude model over approximately 1 degree opening angle and after accounting for CMB anomalies. We do observe significant local deviation of the real CMB sky from Gaussian noise. This is a remaining signature of, but not unique to, CCC, and can have consequences for ΛCDM .