1072-53-224 **Conrad Plaut*** (cplaut@math.utk.edu), Mathematics Department, Ayres Hall 227, Knoxville, TN 37996, and **Jay Wilkins** (wilkins@math.utk.edu), Department of Mathematics, University of Connecticut, 196 Auditorium Rd, Storrs, CT 06269-3009. *The Homotopy Critical Spectrum of a Metric Space I.*

Using the methods of discrete chains and homotopies developed by Berestovskii-Plaut, we define the Homotopy Critical Spectrum of a metric space. Like the Covering Spectrum defined by Sormani-Wei, the Homotopy Critical Spectrum consists of positive numbers that measure quantitatively when the topological type of covering maps of the space changes. However, unlike the work of Sormani-Wei, which utilizes a classical construction of Spanier and requires a geodesic space, our construction works for arbitrary metric spaces, including non-geodesic metrics such as resistance metrics. Discrete methods also have proved useful in considering questions of Gromov-Hausdorff convergence. In this talk I will describe discrete paths and homotopies, and the construction of ϵ-covers. I will discuss what is known for geodesic spaces, including the simple relationship between the Covering and Homotopy Critical Spectra, connections to the spectrum of the Laplacian, and some new results, including determination of the Homotopy Critical Spectrum by "essential circles", stability under Gromov-Hausdorff Convergence, and finiteness theorems. (Received June 28, 2011)