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**Cory Glover\*** (cglover@mathematics.byu.edu) and **Mark Kempton**. *Understanding the Non-Backtracking Spectrum of Graphs*.

The non-backtracking matrix of a graph models a non-backtracking random walk as a Markov chain across the directed edges of a graph. It is commonly known that the spectrum of said matrix can be related to the spectrum of the adjacency matrix by Ihara's Theorem. In this talk, we examine specific graphs to find the explicit values of the non-backtracking spectrum that satisfy Ihara's Theorem. These graphs include bipartite graphs, cycles, trees and others. In addition, we identify properties of the non-backtracking spectrum for graphs with degree at least 2. Our method uses an invariant subspace, in particular its eigenvectors, to identify the values of and bounds on the non-backtracking spectrum. In addition, we create a bound on the spectral radius of the non-backtracking matrix in terms of the spectral radius of the adjacency matrix. (Received August 19, 2020)