1125-15-2442 **Robert Erra***, 14-16 rue Voltaire, 94270 Le Kremlin Bicetre, France, and **Marwan Burelle**, **Alexandre Letois** and **Mark Angoustures**. *A new spectral graph entropy.* Preliminary report.

We propose here a new graph entropy. Let G be an undirected graph of size N; the now classical Von Neumann entropy of a graph is defined as: $S(G) = -\sum_{i=1}^{N} \lambda_i \log(\lambda_i)$, with $Sp(G) = \{\lambda_1, \cdots, \lambda_N\}$ the spectrum of the adjacency matrix of G; we can also use the spectrum of the normalized combinatorial Laplacian of G.

Let k be the number of distinct eigenvalues, let $M = \{m_1, \cdots m_k\}$ be the vector of multiplicities of all eigenvalues and let $\mathcal{M} = \{\omega_1 = m_1/N, \cdots \omega_k = m_k/N\}$ be the normalized vector of multiplicities. So we have $\sum_{i=1}^{K} \omega_i = 1$, we can then compute $H_S(G) = -\sum_{i=1}^{K} \omega_i \log(\omega_i)$, and we will call this the *spectral graph entropy.* This is the Shannon entropy of the normalized vector of eigenvalue multiplicities.

This entropy has a nice property: it can be computed for directed or undirected graphs, for weighted or unweighted graphs. We can also compute the graph entropy with the normalized combinatorial Laplacian of G instead of using the adjacency matrix.

We will present a simple algorithm to compute exactly this spectral entropy. We will give some of its properties and we will present some open problems. (Received September 20, 2016)