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Sheaves in Algebraic Graph Theory and the Hanna Neumann Conjecture

We present some aspects of spectral theory related to sheaves on graphs. We explain that a sheaf on a graph can be viewed as giving a "block matrix" as an incidence matrix, i.e., giving an incidence matrix where a vertex or edge may have not just one row or column associated to it. These sheaves therefore have adjacency matrices, Laplacians, and other features found in ordinary spectral graph theory. We will indicate how they are involved in a proof of the Strengthened Hanna Neumann Conjecture; this proof requires a lot of work to set up the foundations of sheaf homology, but is quite simple once the foundations are established.