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A categorical realization of the cut and flow lattices of graphs

A lattice is a free Abelian group equipped with a symmetric bilinear form. When a lattice L comes with a distinguished basis, we can ask for a categorical realization of the lattice: an algebra A such that the Grothendieck group of the category of (projective) A-modules with its Hom pairing is isomorphic to L, with the isomorphism classes of indecomposable projective modules descending to the given basis. We will discuss how to find such an algebra for an interesting class of lattices coming from graph theory, and why this construction is likely to have other applications. Joint work with Anthony Licata.