Towards a Kirchberg Phillips theorem for Leavitt path algebras

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An important class of Leavitt path algebras (introduced in Monday's colloquium) consists of the *purely infinite simple* Leavitt path algebras. The algebraic structure of such rings is of interest in its own right, and will be explored briefly in this talk. It turns out that the graphs E which yield purely infinite simple unital Leavitt path algebras $L(E)$ are precisely the graphs which yield purely infinite simple unital graph C*-algebras $C^*(E)$. As it also turns out, the purely infinite simple unital graph C*-algebras possess enough additional structure so that the deep, fundamental theorem of Kirchberg and Phillips (yes, UO's N.C. Phillips) applies. In short, this theorem yields that (a surprisingly minimal amount of) similarity between the K-theoretic data of two such C*-algebras is sufficient to yield an isomorphism between them.

We show in this talk how this same question can be posed for purely infinite simple unital Leavitt path algebras. We then describe some of the recent strides which have been made towards achieving a result analogous to the Kirchberg Phillips theorem in the setting of Leavitt path algebras over arbitrary fields. Finally, we describe the remaining obstacle, dubbed "the determinant gap". (Joint work with Chris Smith of UCCS, and Enrique Pardo and Adel Louly of the Universidad de Cádiz, Spain.)