1056-46-515 **Aidan Sims*** (`asims@uow.edu.au`), School of Mathematics and Applied Statistics, Austin Keane Building (15), The University of Wollongong, Wollongong West, NSW 2522, Australia. *Structure theory for k-graph C^*-algebras.*

There are a great many beautiful structure theorems for graph C^*-algebras. They frequently involve surprisingly elementary graph-theoretic conditions, most notably to do with loops in graphs. In particular, there are elementary conditions which characterise when a graph C^*-algebra is simple, when it is AF, and when it is purely infinite; and all of these conditions relate to whether or not the graph contains a loop, and if so whether the loop has an entrance.

For k-graph C^*-algebras, the situation is much more complicated, at least in part because there are many different types of loops that can occur. This has made it very difficult to characterise simple k-graph algebras, and the question of precisely which k-graph C^*-algebras are AF remains open. Moreover, until recently, many of the conditions on k-graphs appearing in structure theorems have related to infinite paths, which are themselves complicated and difficult to work with in the higher-rank setting.

We give an overview recent results with David Robertson and with Peter Lewin which characterise simplicity of k-graph algebras using elementary conditions involving finite paths. We also discuss recent work with Gwion Evans towards characterising which a k-graph C^*-algebras are AF. (Received September 11, 2009)