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Title: Using 2-dimensional categories in algebra

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Much can be learnt of a non-commutative ring by studying its categories of right, left or two-sided modules. So much so, that parallel to ring theory, module theory became a field of study in itself, besides being used in other areas of mathematics and physics.

When we work with rings and modules we often find ourselves moving from one category of modules to another, over different rings. This happens, for example, when equipping a left module with the canonical right action of its endomorphism ring, as well as in Morita theory, where equivalences between categories of modules are characterised.

In this talk, I will motivate the definition of bicategory by constructing an example with rings and modules, then I will talk about a theorem which is related to my research, which involves the concept of bialgebroids over a non-commutative ring and comodules between them.