Report on the visit of John Quigg to UiO in Spring 2019

In the first half of June 2019 I visited UiO as part of the BFS/TFS guest professors program. I gave a mini-course titled "Duality theory for C*-crossed products", which included an introduction to actions and coactions of locally compact groups on C*-algebras and their associated C*-crossed products, with emphasis on duality aspects (including the duality theorems of Takesaki-Takai, Imai-Takai, Katayama, and Landstad). The culmination of the mini-course was a brief outline of how this theory is being applied to shed light on recent attempts to "fix" the Baum-Connes conjecture, using "exotic" crossed products. This is joint work with Steve Kaliszewski and Magnus Landstad, and is part of a long-term project intended to reformulate certain features of the Baum-Connes conjecture in terms of coaction functors. Indeed, after the mini-course I spent a week in Trondheim continuing the research with Magnus.

I wrote notes for this mini-course, which are available on the web page for the course: `https://www.mn.uio.no/math/english/research/groups/operator-algebras/events/conferences/special-courses/JQ-2019.html`

In a nutshell, C*-crossed product duality answers the following question: how do we recover a C*-dynamical system from the crossed product? For nonabelian groups, we need not only actions, but also coactions, which makes the theory quite technical. Nevertheless, the resulting duality theory is well-established, there are many open problems left.

Additionally, during my visit to Oslo I continued a research project with Erik Bédos (also joint with Steve) on Zappa-Zsép products of left cancellative small categories (which are vast generalizations, invented by Jack Spielberg, of directed graphs). This project also uses skew products of the appropriate categories, and the associated C*-algebras involve coactions (and therefore crossed-product duality) in a central way. In fact, we submitted a new paper on this topic in mid-July.

It's my great pleasure to take this opportunity to express my appreciation for the warm hospitality and the exciting research collaboration I have repeatedly experienced in Oslo and Trondheim.