Citation for Alessandro Sisto (Whitehead Prize)

Short citation

Professor Alessandro Sisto of Heriot-Watt University is awarded a Whitehead Prize for his outstanding contributions to geometric group theory, particularly his groundbreaking work on hierarchically hyperbolic spaces.

Long citation

Professor Alessandro Sisto of Heriot-Watt Univeristy is awarded a Whitehead Prize for his outstanding contributions to geometric group theory, particularly his groundbreaking work on hierarchically hyperbolic spaces, together with Behrstock and Hagen. This work makes it possible to understand the large-scale geometry of many groups and spaces, modelled on our understanding of the large scale geometry of mapping class groups developed by Masur and Minsky. Even for mapping class groups, this point of view led to new results, e.g. approximating top dimensional quasi-flats by flats, or an efficient upper bound on the asymptotic dimension.

Sisto's early work was on random walks on groups that are not hyperbolic but have some hyperbolic features. It shows, for example, that sample paths tend to follow contracting geodesics. This work was very influential and eventually led to a complete theory of random walks on groups that act on a hyperbolic spaces, by Maher and Tiozzo.

Yet another important contribution by Sisto is his work, with Frigerio and Pozzetti, on bounded cohomology. This cohomology, introduced and studied by Johnson and Gromov, is reasonably well understood in dimension 2, but in higher dimensions it is very much a mystery. This work by Frigerio–Pozzetti–Sisto is our current state of knowledge in dimension 3: the large class acylindrically hyperbolic groups has infinite dimensional third bounded cohomology. Another surprising result from this work is that there exist nontrivial classes with zero norm – this does not happen in dimension 2.

These results have great impact on geometric group theory. In addition, Sisto is very prolific, with over 50 publications (and some quite substantial) after only 10 years since PhD.