

1070-37-301 **Tim Austin*** (timaustin@math.brown.edu), Mathematics Department, Brown University, Box 1917, 151 Thayer St, Providence, RI 02912. *Some recent advances in Multiple Recurrence.*

In 1975 Szemerédi proved the remarkable combinatorial fact that any subset of the integers having positive upper density contains arbitrarily long arithmetic progressions. Shortly afterwards Furstenberg gave a new proof of Szemerédi’s Theorem using a conversion to an assertion of ‘multiple recurrence’ for probability-preserving systems, which he then proved using newly-developed machinery in ergodic theory.

Furstenberg’s work gave rise to a new subdiscipline called ‘Ergodic Ramsey Theory’, which then found several further combinatorial applications. More recent work has provided a much more detailed picture of the structures that underlie this area of ergodic theory, and offered a clearer insight into the connections between this field and finitary approaches to the same results. I will describe a purely structural question within ergodic theory that has recently emerged from these efforts, and whose solution in some special cases gives a new approach to the multidimensional generalizations of multiple recurrence and Szemerédi’s Theorem. (Received February 15, 2011)