

**Senior Whitehead Prize 2019
Citation for Professor Ben Green FRS**

Professor Ben Green FRS, of the University of Oxford, is awarded a Senior Whitehead Prize for his groundbreaking contributions to additive combinatorics, analytic number theory, and group theory. In all three areas he has proved results of a power that would have seemed unthinkable twenty years ago.

His most famous result, proved with Terence Tao, is that the prime numbers contain arithmetic progressions of all lengths. This was followed up by a series of papers, culminating in a paper with Tao and Tamar Ziegler that proved the so-called inverse theorem for the U^k -norms. This completed a programme that proved a very wide class cases of the Hardy–Littlewood conjecture about the asymptotic density of configurations in the primes: essentially, they proved all cases apart from those that would have implied “impossibly difficult” results such as the twin-primes conjecture.

More recently, with Kevin Ford, Sergei Konyagin, James Maynard and Tao he has proved a decades-old conjecture of Erdős concerning long gaps in the primes.

A famous result of his in group theory, proved with Emmanuel Breuillard and Tao, concerns the structure of “approximate groups”, that is, subsets of groups that have an approximate closure property. Such subsets play a central role in additive combinatorics, but while the Abelian case was well understood thanks to remarkable work of Gregory Freiman and Imre Ruzsa, the non-Abelian case was much harder. The proof is a mixture of deep ideas and a technical tour de force: to give an idea of how strong it is, one consequence of their result is Gromov's theorem on polynomial growth.

These are just a few highlights from his many results, which together constitute an extraordinary and highly influential body of work.

Green is currently the Waynflete Professor of Pure Mathematics at Oxford. He has received several awards, including the Clay Research Award, the Ramanujan Prize, the Salem Prize, the Sylvester Medal, the Ostrowski Prize and a Whitehead Prize.