Citaton for Julian Sahasrabudhe (Whitehead Prize)

Short citaton

Dr Julian Sahasrabudhe of the University of Cambridge is awarded a Whitehead Prize for his outstanding contributons to Ramsey theory, his solutons to famous problems in complex analysis and random matrix theory, and his remarkable progress on sphere packings.

Long citaton

Dr Julian Sahasrabudhe of the University of Cambridge is awarded a Whitehead Prize for his remarkable contributons to several areas of mathematcs, including sphere packings, random matrices, complex analysis and Ramsey theory. His work has changed the landscape in each of these areas. His results are characterised by the most M Ů Mbh h l' H efore.

for cosine polynomials. He has solved
f roots of cosine polynomials such as cos

$_1x$ + cos a_2x + . . . + cos a_nx must go to infinity as the number of terms n increases. This problem had been open for 50 years, and had atracted a lot of atenton. He gives a lower bound (in fact, an explicit lower bound) on the number of roots: asrabudhe succeeds in this: h
remarkable and unexpected fact: that they must 'correlate' with some easier-to-analyse functons.

Sahasrabudhe has also worked in complex analysis, on Litlewood polynomials. He has solved what was undoubtedly the biggest open problem in this area, a famous problem of Litlewood that asks if there are polynomials of degree n, with all coe cients ±1, such that the image of the unit circle is bounded both above and below by a multple of n

$^{1/2}$. Such
polynomials ar wer bound. The usual belief has been that flat Litlewood polynomials do not e
Indeed, computer sear

Sahasrabudhe solves the problem. In joint work with Balister, Bollobás, Morris and Tiba he shows that, in fact, flat Li t lewood polynomials do exist. The proof is an amazing and intricate blend of hard analysis (proper t es of par t cular trigonometric polynomials) and discrepancy theory.

Recently, Sahasrabudhe has returned to Ramsey theory. He has given the first exponen t al improvement on the Ramsey numbers R(s) in over 70 years. It was known that the Ramsey numbers grow at a rate that is at most 4^s, but nobody could improve on the ‘4’. This has been perhaps the central problem in all of Ramsey theory. Sahasrabudhe, in joint work with Campos, Gri   ths and Morris, gives an upper bound of $(4 - ϙ)^s$ for a fixed posi t ve constant ϙ.

Sahasrabudhe has also made extraordinary progress on sphere packings in high dimensions. The sphere packing problem asks for the densest packing of unit spheres in n