

PÓLYA PRIZE: citation for Martin Liebeck

Short citation:

Professor Martin Liebeck of Imperial College London is awarded the Pólya Prize for his profound and prodigious contributions to group theory, particularly the subgroup structure of simple groups and probabilistic group theory.

Long citation:

Professor Martin Liebeck of Imperial College London is awarded the Pólya Prize for his profound and prodigious contributions to diverse aspects of group theory.

A leading authority on the subgroup structure of finite simple groups and a pioneer of probabilistic methods in group theory, Liebeck has solved longstanding problems of fundamental importance, built powerful bodies of theory, and used group theory to advance fields from geometry to model theory.

In the wake of the classification of finite simple groups and simple algebraic groups over algebraically closed fields, attention fell on the structure of their subgroups, particularly the maximal ones. Liebeck has pioneered many of the major techniques in this area and proved definitive results. His oeuvre is a cornerstone for subsequent applications of group theory, and for the development of new areas such as probabilistic group theory.

His wide-ranging work with Seitz includes determining the maximal subgroups of classical groups in geometric terms, understanding the reductive subgroups of exceptional algebraic groups, and classifying the maximal subgroups of the finite exceptional groups. Their work provided crucial foundations for Serre's theory of complete reducibility, and their study of unipotent and nilpotent classes in simple algebraic groups and Lie algebras is definitive. Liebeck's monograph with Kleidman on the subgroup structure of the finite classical groups was central to the development of the field, while his many results with Praeger and Saxl include a classification of the maximal subgroups of alternating and symmetric groups.

Liebeck and Shalev settled Dixon's conjecture, proving that two random elements in a finite simple group G generate the whole group with probability tending to 1 as $|G|$ tends to infinity. The seminal ideas that they developed in this and related works, including their understanding of the asymptotics of character sums in simple groups, animated probabilistic group theory and led to the solution of longstanding problems in group theory and beyond, such as the Guralnick-Thompson conjecture on monodromy groups of covers of the Riemann sphere by a genus g curve.

Liebeck's ingenuity and subtle command of large swathes of group theory have enabled him to solve deep problems of enduring value. With O'Brien, Shalev and Tiep, he proved that every element of every finite non-abelian simple group is a commutator (the Ore Conjecture, 1951), and with Bridson, Evans and Segal he determined which families of finite simple groups admit algorithms to list the members of the family that are images of a given finitely presented group.

A great organiser and a superb expositor, Martin Liebeck has led the pure mathematics section at Imperial College for 20 years, shaping it into one of the finest groups in Europe while protecting and nurturing his colleagues.