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Dr. Cheryl Praeger named Honorary Fellow of the ICA

Honorary Fellowship in the Institute of Combinatorics and its Applications is awarded to an individual who has made **pre-eminent contributions to combinatorics or its applications**.

Cheryl Praeger was a Foundation Fellow of the Institute in 1990 and was a Council Member from 1992 to 2010. She has also held many leadership positions in the mathematical community: President of the Australian Mathematical Society (1992–1994), Member of the Executive Committee of the International Mathematical Union (2007–2014) and Foreign Secretary of the Australian Academy of Sciences (2014–2018).

Her research and service has been recognized by many organizations including the 2011 Euler Medal from the ICA, the 2021 Inaugural Ruby Payne-Scott Medal and Lecture from the Australian Academy of Sciences, the 2014 George Szekeres Medal from the Australian Mathematical Society, the 2019 Australian Prime Minister's Prize for Science and in 2021 received Australia's highest honor by becoming a Companion of the Order of Australia. She has also received honorary doctorates from universities around the world, namely The University of St Andrews, Scotland; University of Primorska, Slovenia; Yazd University, Iran; Université Libre de Bruxelles, Belgium; University of Queensland, Australia; and Prince of Songkla University, Thailand.

Cheryl has regularly been an invited speaker at international conferences and gave an invited lecture at the 2002 ICM in Beijing. She has also been a member of the editorial board of many mathematical journals. This includes the Joint Editor-In-Chief of the Journal of Algebraic Combinatorics from 2000 to 2004 and the editorial boards of Ars Combinatoria (since 1986), Australasian Journal of Combinatorics (since 1991), Journal of Combinatorial Designs (since 1991), Designs, Codes and Cryptography (since 1994) and Algebraic Combinatorics (since 2017).

Cheryl's research achievements alone are remarkable and has focused on finite groups and their actions on graphs, designs, geometries, codes, and linear spaces. She has published six monographs and nearly 450 journal articles across a wide range of topics. We will only outline a small part of her research in graph theory here. She successfully harnessed the Classification of

Finite Simple Groups in a wide range of problems. The O'Nan-Scott Theorem is the most important tool for modern permutation group theory, enabling the reduction of many problems involving finite transitive groups to ones involving simple groups. Cheryl's proof of the Sims' Conjecture (from 1968) with Cameron, Saxl and Seitz demonstrated that automorphisms of finite vertex-primitive graphs are determined by their `local action'. This, together with the Reduction Theorem for finite distance transitive graphs with Saxl and Yokoyama constituted the first major applications of the O'Nan-Scott Theorem in Algebraic Graph Theory. The latter result inspired a program for classifying the finite vertex-primitive distance transitive graphs, one of several instances in which her fundamental research results have led to a significant new research program taken up by mathematicians internationally.

While powerful primitive permutation group machinery can be brought to bear on many problems in Algebraic Graph Theory, for others reduction to a `primitive situation' loses vital combinatorial information, and hence cannot be used. A spectacular instance of this is the class of $s$-arc transitive graphs (for $s \geq 2$) which had been regarded by some as `wild'. However, in 1993, she proved that each non-bipartite example is a cover of a vertex-quasiprimitive, s-arc transitive graph, thus facilitating reduction to the study of vertex-quasiprimitive (rather than vertex-primitive) members. At the same time she proved a version of the O'Nan-Scott Theorem for finite quasiprimitive groups, showing that only half the possible types of quasiprimitive groups could act s-arc transitively. The reduction involved passing to a normal quotient graph that was vertex-quasiprimitive or biquasiprimitive. The normal quotient method is applicable to many other families of graphs, and is now regarded as a standard technique for studying finite arc-transitive graphs.

Cheryl's theoretical development for permutation groups is arguably the most important in decades; in particular her theory of quasiprimitive permutation groups is fundamental for work in algebraic combinatorics, especially in graph theory. Her normal quotient method for analysing infinite families of symmetrical graphs and geometries has transformed the theory of edge-transitive graphs, giving a new global framework for studying infinite families of these graphs.

Cheryl collaborates easily and enjoys the opportunity of increasing her own and other's expertise through joint work. This is evidenced in her extensive international record of co-authors including senior research leaders and young researchers, as well as the flourishing research group she has built up in the Centre for the Mathematics of Symmetry and Computation at the University of Western Australia (of which she was the inaugural Director). Also, she has been outstanding in her support for mathematics in many countries in the region including the Philippines, China, Korea, Malaysia, Thailand and Iran, where she has mentored local mathematicians, including co-authoring research publications.

The Institute of Combinatorics and its Applications is an international scholarly society that was founded in 1990 by Ralph Stanton; the ICA was established for the purpose of promoting the development of combinatorics and of encouraging publications and conferences in combinatorics and its applications.