**SHEPHARD PRIZE: citation for Kenneth Falconer**

**Short citation:**
A Shephard Prize is awarded to Regius Professor Kenneth Falconer, FRSE, of the University of St Andrews, for his many original and profound results in fractal geometry, particularly the description, occurrence, geometrical properties and dimensional analysis of fractal sets and measures.

**Long citation:**
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Over the past 40 years, fractal geometry has developed from a collection of mathematical curiosities to an internationally studied field. Much of this growth is due to Falconer's insight and influence, and his masterly ability to explain complex and subtle mathematical theory in an intuitive, engaging and comprehensible manner.

An excellent example of the of the exposition of this approach is his paper, '*Sets with prescribed projections and Nikodym sets*' in the LMS Proceedings (1986). Here, Falconer showed, using a fractal construction, that if a subset of every $m$-dimensional subspace is prescribed (subject to a measurability condition) then it is possible to construct a set in $R^n$ which has projections onto almost all subspaces to within area 0 of the set prescribed. This has subsequently become known as the 'Digital Sundial Theorem', the intuitive idea being that an object can be designed so that the shadows show the thickened digits of the time, which change as the sun moves round to realise projections in different directions. This insight into projections is often presented in public lectures, and inspired the company 'Digital Sundials International' to manufacture such sundials commercially (not quite using the construction in the theorem!). Falconer continues to develop projection properties of fractals in his more recent papers.

Many other problems in fractal geometry can be explained intuitively; for example, 'Falconer's distance problem' and problems on self-affine sets, pioneered by him in the 1980s, are easily explained but continue to challenge world-leading mathematicians.

Falconer has raised the public awareness of fractal geometry through many public lectures, including science festivals, LMS Popular lectures, etc. and by his recent book *Fractals – A Very Short Introduction*. His other books on the subject – *Fractal Geometry - Mathematical Foundations and Applications*, *Techniques in Fractal Geometry* and *The Geometry of Fractal Sets* – treat the many mathematical aspects of fractal geometry, and are classics in the field.