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PREFACE

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Preface

Claritons and the asymptotics of ideas: the physics of Michael Berry

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What is the elementary particle of sudden understanding? It is the clariton*. Any scientist will recognise the 'Aha!' moment when this particle is created. But there are snags: all too frequently, today's clariton is annihilated by tomorrow's* anticlariton*…And how sad that a clariton is sometimes less than astonishing—well known to those who know well, a mere* claritino.

MVB 'My contribution to particle physics', https://michaelberryphysics.wordpress.com/about-2/.

So Michael Berry describes, with characteristic whimsy, the excitement and frustrations of scientific discovery.

Michael's own discoveries have been both deep and wide ranging. His preferred territory is the borderland between theories of different scales: for example, quantum and classical mechanics, or wave and geometric optics. Subtle phenomena appear in these borderlands where the macroscopic description emerges from the microscopic, often manifesting through striking images and phenomena: caustics, topological singularities, and probably his best-known work, the geometric—or Berry—phase.

In the course of a career of 50+ years, Michael has established a distinctive school of mathematical physics, one which emphasises exploration and explication over rigorous proof. His approach combines deep mathematical analysis, often involving the decoding of divergent asymptotic expansions in the spirit of his PhD supervisor, Robert Dingle, with a longstanding Bristol tradition of geometric reasoning, with Charles Frank and John Nye among its leading exponents.

Michael has tended to avoid the scientific mainstream, choosing instead paths less travelled. It is testament to the acuity of his curiosity and intuition that his work has proved so influential over such a broad range for fields. In physics, his ideas have found application in condensed matter physics (Berry curvature, quantum chaos), quantum information (topological quantum computing, superoscillations), and high-energy physics (Stokes' phenomenon), as well as in fields closest to his own interests (optics, nonlinear dynamics, atomic and molecular physics). In mathematics, his work is the basis for conjectures and the inspiration for current research in analysis, geometry and number theory (spectral statistics, spectral geometry, quantum unique ergodicity, approaches to the Riemann hypothesis).

The following 38 contributions from distinguished authors attest to the span and influence of Michael's science, as well as to the regard and affection in which he is held by so many scientists and scientific communities. It has been our privilege to edit this volume dedicated to his 80th birthday and to preface this celebration of his work and achievement.

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