

Geometric Phases: Old and New

Prof Sir Michael Berry FRS (University of Bristol, UK)

Friday, 27 March 2026 @ 14h00-15h00 SAST

Venues: Online and NITheCS Seminar Room, Stellenbosch University

ABSTRACT

The waves that describe systems in quantum physics can carry information about how their environment has been altered, for example by forces acting on them. This effect is the geometric phase. It occurs in the optics of polarised light, where it goes back to the 1820s. It influences wave interference; and it provides insight into the spin-statistics relation for identical quantum particles. The underlying mathematics is geometric: parallel transport, explaining how falling cats turn upright, and how to park a car. Recent results describe the typical behaviour of the geometric phase curvature and the related quantum metric. Incorporating the backreaction of the geometric phase on the dynamics of the changing environment exposes an unsolved problem: how can a system be separated from its slowly-varying environment? The concept has a tangled history.

BIOGRAPHY



Sir Michael Berry is a theoretical physicist at the University of Bristol. His research explores deep connections between classical and quantum physics, and between ray and wave optics. He is widely known for discovering and developing the concept of the geometric phase and for revealing geometric structures underlying many physical phenomena. Alongside highly mathematical work, he is celebrated for showing how profound physics appears in everyday phenomena such as rainbows, polarized skylight, and tidal bores. His contributions have had lasting impact across theoretical physics, optics, and quantum theory.

For more of Sir Berry's biography, visit michaelberryphysics.wordpress.com

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