Kempner Colloquium

THERE AND BACK AGAIN: FROM THE BORSUK-ULAM THEOREM TO QUANTUM SPACES

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Assuming that both temperature and pressure are continuous functions, we can conclude that there are always two antipodal points on Earth with exactly the same pressure and temperature. This is the two-dimensional version of the celebrated Borsuk-Ulam Theorem which states that for any continuous map from the n-dimensional sphere to n-dimensional real Euclidean space there is always a pair of antipodal points on the sphere that are identified by the map. Our quest to unravel topological mysteries in the Middle Earth of quantum spaces will begin with gentle preparations in the Shire of elementary topology. Then, after riding swiftly through the Rohan of C*-algebras and Gelfand-Naimark Theorems and carefully avoiding the Mordor of incomprehensible technicalities, we shall arrive in the Gondor of compact quantum groups acting on unital C*-algebras. It is therein that the generalized Borsuk-Ulam-type statements dwell waiting to be proven or disproven. Time permitting, we shall pay tribute to the ancient quantum group SUq(2), and show how the proven non-trivializability of the SUq(2)-principal instanton bundle is a special case of two different noncommutative Borsuk-Ulam-type conjectures. (Based on joint work with Paul F. Baum and Ludwik Dabrowski.)

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