NSYSU physics 書報討論

Weekly Seminar

Investigating Three Types of Critical Events in the Taiwan and US Stock Markets Using Topological and Geometrical Methods

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https://scholar.google.com/citations?user=wMlKyVUAAAAJ

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Stock market crashes are seemingly unpredictable and always cause significant loss and disruption to the financial system. Because market crashes involve many participating stocks, they are considered market-level events with multi-scale characteristics. They are thus ideal problems for *topological data analysis* (TDA), which has in recent years become a successful tool for analyzing topological features at different scales. In this talk, I will describe our application of TDA to better understand market crashes, such as the Global Financial Crisis, the US-China trade war crash, and COVID-19 crashes at the whole-of-market level, by pointing out tell-tale signs they leave at different length scales. In addition, I will demonstrate how to include geometrical methods such as the *Ollivier-Ricci curvature* (ORC) to elucidate the processes and mechanisms of these critical events.

If time permits, I will also demonstrate how we can identify information processing pathways for these market events through the use of *alluvial diagrams* to investigate processes such as splitting and merging of stock clusters, and how these events can be organized into cascades that propagate across different scales.

future seminars