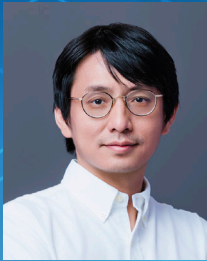




Algorithmic Arbitrage in Crypto Futures Markets: Modeling Spot–Future Convergence, Funding Fees, and Staking Hedges



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Abstract

Cryptocurrency markets present a unique computational laboratory for quantitative trading. Unlike traditional assets, crypto markets feature delivery futures, perpetual swaps with funding fees, and on-chain staking protocols. These mechanisms generate arbitrage opportunities that are both mathematically tractable and empirically observable in real time. This talk introduces algorithmic models for spot–future arbitrage, showing how basis convergence, perpetual funding payments, and leverage interact to define profit and risk profiles. We then extend the framework to a crypto-native strategy: staking tokens on-chain while shorting futures contracts to construct synthetic risk-free yields. Case studies on ETH and TRX illustrate how high-frequency data, exchange APIs, and smart contract interactions can be integrated into automated trading systems. The presentation bridges financial theory with computational practice, highlighting both algorithm design challenges and open research opportunities for computer scientists in market data analytics, distributed systems, and reinforcement learning for trading.

About the Speaker

Prof. ZHANG Chen Jason is currently an Assistant Professor of the Department of Computing, PolyU. Before joining the Department, he worked as a senior manager of the Big Data Institute at The Hong Kong University of Science and Technology (HKUST). He received his PhD degree in Computer Science and Engineering from HKUST in 2015. Prof. Zhang is broadly interested in Crowdsourcing, Fintech and Machine Learning.