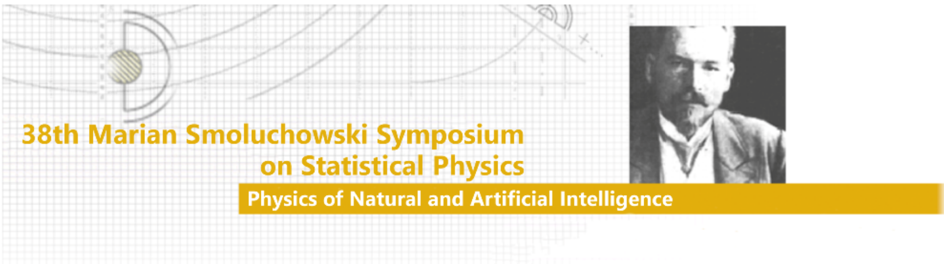

Contribution ID: **41** Type: **Invited talk**

Price of information in games of chance

Wednesday, 17 September 2025 09:00 (30 minutes)

In the age of data-driven decision-making, understanding how to assign a fair price to information has become a pressing and complex challenge. Information, in the form of intangible data that can be traded in exchange of money, does not follow the standard supply-demand rules that govern tangible assets. We address this problem by developing a game-theoretic and statistical physics framework for pricing information in games of chance. Specifically, we analyze a setting in which players bet on the outcome of an underlying stochastic process whose statistical properties are unknown, and receive a reward if the bet is successful. One or more players possess privileged information about the process, derived from past observations. Using tools from Bayesian game theory and expected utility maximization, we quantify the financial value of this information by computing equilibrium strategies and the range of fair transaction prices when the informed player sells part of their data to a competitor instead of using it exclusively to exploit their 'edge' in the game. Our model reveals a rich landscape of regimes—symbiotic, competitive, and even predator-prey—depending on the quality of information shared and the number of players involved. We further incorporate volatility aversion into player preferences, capturing realistic behaviors in uncertain environments and highlighting the dependence on the length of the string of data exchanged. This work lays the foundation for a theory of data valuation grounded in principles of both economics and statistical mechanics, with implications for digital marketplaces, algorithmic trading, and the broader study of informational asymmetry.

Primary authors: Dr PICCIOLI, Giovanni (King's College London); Mr CASABURI, Pasquale (King's College London); VIVO, Pierpaolo (King's College London)

Presenter: VIVO, Pierpaolo (King's College London)

Session Classification: Session 7: Computational Models of Disease, Development and Evolution