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Title: Hawkes processes with external excitation applied to cyber risk

 Abstract: With the growing digital transformation of the worldwide economy, cyber risk has become a major issue. As 1 % of the world's GDP (around $1,000 billion) is allegedly lost to cybercrime every year, IT systems continue to get increasingly interconnected, making them vulnerable to accumulation phenomena that undermine the mutualization mechanism of insurance.

Previous works in the literature have demonstrated that Hawkes framework is suitable for cyber events modelling, capturing well contagion phenomena and clustering effects observed on cyber data-bases.
In this talk, we aim to extend Hawkes models for cyber risk, by adding exogeneous factors such as the ones generated by the publication of cyber vulnerabilities. Our ambition is to provide a better quantification of contagion, while correcting any correlation effects by capturing external common factors that may explain part of the systemic pattern. Indeed, cyber attacks may not only be generated by the previous cyber attacks, they can also be provoked by the exploitation of an online published vulnerability. As such we propose and study a Hawkes model with two kernels, one for the endogenous factor (the contagion from other cyber events) and one for the exogenous one (cyber vulnerability publications).