

# Multiple propagation paths in locating the source of diffusion in complex networks

Łukasz G. Gajewski<sup>1</sup>, Krzysztof Suchecki<sup>1</sup>

<sup>1</sup>*Warsaw University of Technology, Faculty of Physics*

Understanding how information propagates in a system is an old and important field of study in complex networks physics. The information can be of a various nature - e.g. it could be a virus or a tweet - and often we are interested in locating the source of that diffusion, i.e. "patient zero". Big impact on this field of research had a paper by P.C. Pinto et al.[1] in which the authors had presented a method to estimate which node in a network is most likely the source we are looking for. We investigate the consequences of some assumptions of that method finding that it overestimates propagation time from one node to another due to single shortest path approach. We also propose a modification that takes multiple propagation paths into account and consequently increases the accuracy of the algorithm.

[1] P. C. Pinto, P. Thiran, and M. Vetterli, *Phys. Rev. Lett.* **109**, 068702 (2012)