

NJP?s best of 2020

New Journal of Physics publisher cites ICFO paper in top research of 2020

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The New Journal of Physics (NJP), an open access journal that is owned and run by scientific societies, with the selection of content and the peer review managed by a prestigious international board of scientists, has recently listed a i¿½publishers picki¿½ of arti les comprising some of the most cited and downloaded NJP papers from 2020.

The paper i¿½Single trajectory characterization via machine learningi¿½ published in NJP January 2020 by Gorka Munoz-Gil, Miguel Angel Garcia-March, Carlo Manzo, Jo e D Martin-Guerrero and ICREA Prof at ICFO Maciej Lewenstein, was included in this list of igh impact articles.

Abstract:

In order to study transport in complex environments, it is extremely important to determine

the physical mechanism underlying diffusion and precisely characterize its nature and parameters. Often, this task is strongly impacted by data consisting of trajectories with short length (either due to brief recordings or previous trajectory segmentation) and limited localization precision. In this paper, the authors proposed a machine learning method based on a random forest architecture, which is able to associate single trajectories to the underlying diffusion mechanism with high accuracy. In addition, the algorithm is able to determine the anomalous exponent with a small error, thus inherently providing a classification of the motion as normal or anomalous (sub- or super-diffusion). The method provides highly accurate outputs even when working with very short trajectories and in the presence of experimental noise.

The use of machine learning in anomalous diffusion data has had an enormous impact in the community, with new methods and applications appearing every day. The ease of use of these techniques, as well as their accuracy make them an extremely powerful tool when dealing with experimental setups. Motivated by this success, the authors developed an open competition, the **ANDI challenge**, to further push the field of single trajectory characterisation. Participants from seventeen institutions around the globe put their methods on the test against each other during eight months, improving by huge margins the existing techniques.

Congratulations to all who contributed to this high impact work.