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AM 16. JUNI 2014 UM 17 UHR C.T.

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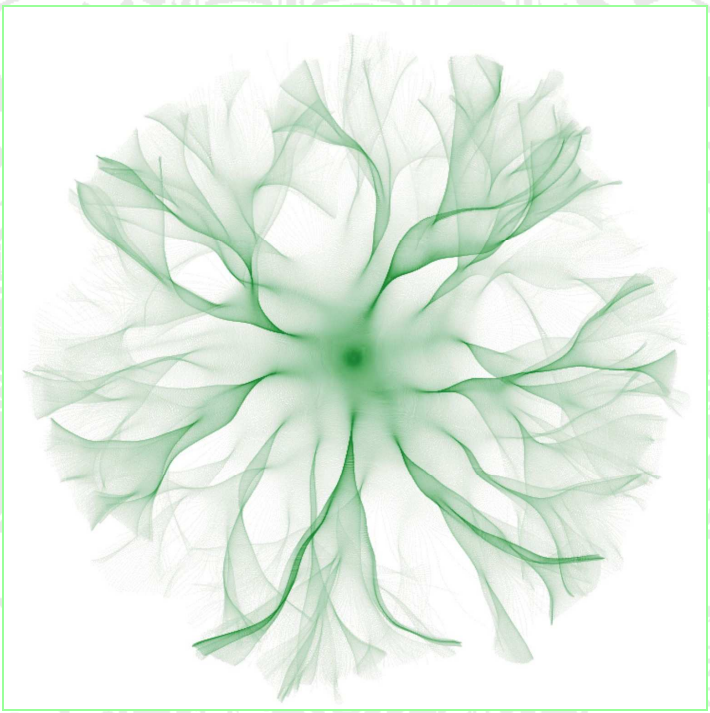

WAVES IN RANDOM MEDIA: BRANCHED FLOWS AND THE STATISTICS OF EXTREME WAVES

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Wave propagation in random media — this might sound abstract but is in fact very tangible and almost omnipresent in science and everyday life. A common example of such random waves are surface water waves such as the wind driven ocean waves, but also light, sound, electrons, tsunamis and even earth quakes are waves that in a natural environment typically propagate through a complex medium. Due to its complexity, the medium is often best described as random, with examples including the turbulent atmosphere, complex patterns of ocean currents or a semiconductor crystal sprinkled with impurities.

In recent years it has become clear that even very small fluctuations in the random medium, if they are correlated, lead to strong fluctuations in the wave intensities that have pronounced branch-like spatial structures. This branching has been reported for electron, micro, sound, and water waves. However, branching leads to heavy-tailed distributions in wave height or intensity in all the above mentioned systems causing the formation of extreme waves, sometimes called *rogue* or *freak waves*, most prominently known for ocean waves where they are a serious hazard for even the largest seafaring ships.