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Exotic symmetry in networks

Network dynamical systems appear all throughout science and engineering. Despite this prevalence, it remains unclear precisely how network structure impacts the dynamics. One very successful approach in answering this question is by identifying symmetry. Of course, there are many networks that do not have any form of symmetry, yet which still show remarkable dynamical behavior. Instead a wide array of other network features (such as node-dependency, synchrony spaces, and so forth) are known to impact the dynamics. We will see that most of these features can still be captured as symmetry, provided one widens the definition. That is, instead of considering classical group symmetry, one has to allow for more “exotic structures”, such as semigroups, categories and quivers. In many cases the network topology itself can even be seen as such a symmetry. An important consequence is that network structure can therefore be preserved in most reduction techniques, which in turn makes it possible to analyse bifurcations in such systems. In order to best explain these notions, I do not assume any familiarity with group symmetry -or their exotic counterparts- on the part of the audience.

The Seminar will take place online via Zoom as part of the Oberseminar “Nonlinear Dynamics” organized by Bernold Fiedler (FU Berlin), Isabelle Schneider (FU Berlin), Eckehard Schöll (TU Berlin) and Matthias Wolfrum (WIAS). For information on how to access the event, please contact any of the above or: henning.reinken@itp.tu-berlin.de

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