

## **COST Action IC1205 on Computational Social Choice: STSM Report**

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During my visit, we formed a working group in order to work on the problem of obtaining a McGarvey-like result for supermajority relations. Besides Rolf Niedermeier and Robert Brederick from TU Berlin, the working group consisted of Nimrod Talmon (Weizmann Institute of Science, Israel), Laurent Bulteau (Lyon University, France), and Gerhard Woeginger (TU Eindhoven, The Netherlands), who visited Niedermeier's group at the same time.

Based on previous work of Michel Le Breton and a Dagstuhl working group, we formulated a conjecture that relates the supermajority-realizability of a graph to the length of a shortest cycle in the graph. While we did not manage to prove the conjecture (neither did we find a counterexample), we did make progress on the problem. First, we observed that one direction of the conjectured if-and-only-if statement follows from a basic pigeonhole principle argument and does not require a much more involved argument involving the concept of Nakamura numbers. Second, we proved that the conjecture holds for several graph classes, including directed acyclic graphs (DAGs). Third, we considered the special case of  $2/3$ -supermajority relations and proved that, in this case, the conjecture holds for all 2-degenerate graphs. Fourth, we considered a relaxed version of our problem and observed a promising relation to zero-sum game theory along the lines of a paper by Shepardson and Tovey.

Besides enabling progress on the supermajority problem, the visit provided an excellent opportunity to foster collaborations with various members of Niedermeier's group.