

# Extremal Problems in Discrete Structures

## Project closing report

During the four year project we wrote 23 papers, 17 are published, 2 in press, 2 are accepted and 2 are submitted. We are glad that apart from the three persons (Gyárfás, Ruszinkó, Sárközy) participating in the project, we could attract 17 further researchers (both young and seniors) to our subjects, so they became our coauthors.

1. Ramsey theory. I pinpoint some new applications of the Regularity Lemma related to recent research areas, we are proud that we could work together with Endre Szemerédi who is a coauthor of six papers we have written during the project. We observe that our results are continued in works of senior and young researchers. I think that the book chapter in "Ramsey theory, yesterday today and tomorrow" in the Progress in Mathematics series of Birkhäuser is also significant, reviewing an area with increasing of present activity.

2. Gallai colorings. This area is on the border of Ramsey theory and extremal combinatorics, posing exciting but difficult questions on possible extensions of a basic technique of Gallai.

3. Codes. Here I emphasize the paper "Uniform hypergraphs containing no grids" a deep and carefully written paper of Füredi and Ruszinkó submitted to Advances in Mathematics.

4. Problems on the chromatic gap. After the solution of the Strong Perfect graph conjecture, the investigation of graph families with bounded chromatic gap renewed. The paper (in cooperation with Sebő and Trotignon) "The chromatic gap and its extremes" is an interesting and deep step towards understanding these families and their relation to Ramsey graphs.

5. Further extremal results. Some of our other publications extend recent results of extremal graph and hypergraph theory.