

## 2. PROJECT SUMMARY

**Intellectual merit.** The University of Minnesota Combinatorics RTG will be run by four faculty members (Gregg Musiker, Pavlo Pylyavskyy, Victor Reiner, and Dennis Stanton). The latter two are more senior, having long association with Minnesota's history as a center in combinatorics, and its connections to algebra, geometry, topology and analysis. The former two are recent hires who have considerably broadened the group's range of research topics. The group is committed to the idea that young mathematicians in combinatorics at all levels need exposure to a wide array of mathematics, including the traditional as well more recent topics, such as cluster algebras, total positivity, and tropical geometry.

Combinatorics is a perfect area for such a research and training grant because of its strong combination of breadth and depth. Topics and problems range from those which are elementary and can be introduced to undergraduates to those which are highly non-elementary and have deep connections to representation theory, algebraic geometry, topology, and mathematical physics.

A cornerstone of the RTG is a reorganization of the group's successful REU program. One of the main goals will be to more efficiently utilize the REU time to educate a broader audience and thoroughly involve grad students and postdocs.

A majority of the funding will focus on enlarged opportunities for graduate student RAs, a larger postdoc program, and having two kinds of conferences: a series of Midwest Combinatorics Conferences with heavy postdoc involvement, and a repeat-hosting of the annual Grad Student Combinatorics Conference. This is an annual conference run entirely by graduate students, and originated in Minnesota in 2005.

**Broader impacts.** Broader impacts within the RTG will focus on

- expansion of the already successful summer REU program into an 8-week REU/REG program, emphasizing greater training and interaction for not only the undergraduates, but also the graduate students and postdocs,
- increased coordination between the weekly Grad Student Combinatorics Seminar and Departmental Combinatorics Seminar, encouraging greater student participation in both seminars, and more pre-talks,
- opportunities for experience in organizing seminars and conferences, both for postdocs and for graduate students, as mentioned above,
- additional course offerings in hot topics in combinatorics taught by postdocs, providing valuable teaching experiences for them, and further exposure to more research areas for our graduate students,
- enhancing travel opportunities for the grad students and postdocs, providing them valuable experience disseminating their work, gaining exposure to other research directions, and establishing research connections,
- expanding outreach to our regional neighbor institutions, not only through the Midwest conferences, but also via outreach talks to some of the many schools in the greater Minnesota area, including the Summer Math Program for Women run at Carleton College, and by partnering with UMTYMP to teach combinatorics to advanced high school students,
- integrated mentorship of postdocs, grad students, and undergraduates through the above programs on facets of their research, teaching, and their careers.