## **Matthias Beck (San Francisco State)**

## **Permutation Descent Statistics via Polyhedral Geometry**

## Abstract for the Combinatorics Seminar

2014 September 2

Permutations are some of the most fundamental objects of mathematics. A basic combinatorial statistic of a permutation  $\pi_s$  is the number of descents,  $\des(\pi):=\#\{j:\pi(j)>\pi(j+1)\}$ . Euler realized that  $\des(\pi)=\pi_{\kappa}$  and there have been various generalizations of this identity, most notably when Sn gets replaced by another Coxeter group.

I will illustrate how one can view Euler's identity (and its generalizations) geometrically through enumerating integer points in certain polyhedra. This gives rise to "short" proofs of known theorems, as well as new identities.

This is joint work with Ben Braun (Kentucky).

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