



Berlin  
Mathematical  
School

## BMS Friday Colloquium

**Friday 28 October 2011 at 14:15**

*Tea before the lecture begins at 13:00*

BMS Loft, Urania, An der Urania 17, 10787 Berlin

### Hannah Markwig

*(Universität des Saarlandes)*

#### What corresponds to Broccoli in the real world?

Welschinger invariants count real rational curves on a toric Del Pezzo surface belonging to an ample linear system and passing through a generic conjugation invariant set of points  $P$ , weighted with  $\pm 1$ , depending on the nodes of the curve. They can be determined via tropical geometry, i.e. one can define a count of certain tropical curves (which we refer to as Welschinger curves) and prove a Correspondence Theorem stating that this tropical count equals the Welschinger invariant. It follows from the Correspondence Theorem together with the fact that the Welschinger invariants are independent of  $P$  that the corresponding tropical count of Welschinger curves is also independent of the chosen points. However, if  $P$  consists of not only real points but also pairs of complex conjugate points, no proof of this tropical invariance within tropical geometry has been known so far.

Hannah Markwig will introduce broccoli curves, certain tropical curves of genus zero which are similar to Welschinger curves. She will prove that the numbers of broccoli curves through given (real or complex conjugate) points are independent of the chosen points. In the toric Del Pezzo situation she will show that broccoli invariants equal the numbers of Welschinger curves, thus providing a proof of the invariance of Welschinger numbers within tropical geometry. In addition, counting Broccoli curves yields an invariant in many more cases than counting Welschinger curves. Therefore, it is an interesting question whether there is a meaningful invariant count of real curves that corresponds directly to the tropical Broccoli count. This is a joint work with Andreas Gathmann and Franziska Schroeter.

Hannah Markwig was born on 19 November 1980. She graduated from TU Kaiserslautern, worked at the IMA in Minneapolis, at the University of Michigan, and at the Courant Research Centre Göttingen. She is one of the world's leading young researchers in tropical geometry and a professor of geometry at the Universität des Saarlandes. In 2010, she was awarded DFG's Heinz Meier-Leibnitz Prize, a distinction awarded to young researchers for their outstanding achievements.