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Packing Three Equal Circles Onto a Flat Klein Bottle.

The study of maximally dense packings of disjoint equal circles is a problem in Discrete Geometry. The optimal densities and arrangements are known for packings of small numbers of equal circles into hard boundary containers, including squares, equilateral triangles and circles. In this presentation, we will explore packings of small numbers of equal circles onto a boundaryless container called a flat Klein bottle. Using numerous figures we will introduce all the basic concepts (including the notion of a flat Klein bottle, an optimal packing, and self-tangencies), illustrate some maximally dense arrangements, and outline the proofs of their optimality. This research was conducted as part of the 2015 REU program at Grand Valley State University. (Received September 21, 2015)