1112-05-115 **Esther Banaian**, **Steve Butler*** (butler@iastate.edu), **Christopher Cox**, **Jeffrey Davis**, **Jacob Landgraf** and **Scarlitte Ponce**. *Enumerating two-ball prime juggling patterns.*

Juggling patterns can be described by a closed walk in a (directed) state graph, where each vertex (or state) is a landing pattern for the balls and directed edges connect states which can occur consecutively. The number of such patterns of length n is well known, but a long standing problem is to count the number of prime juggling patterns (those juggling patterns corresponding to cycles in the state graph). For the case of two balls we give an expression for the number of prime juggling patterns of length n by establishing a connection with partitions of n into distinct parts. From this we show the number of two-ball prime juggling patterns of length n is $\big(\gamma - o(1)\big)2^n$ where $\gamma = 1.32963879259\ldots$. (Received July 25, 2015)