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*Cycles of length three and four in tournaments*

Given a tournament with  $d\binom{n}{3}$  cycles of length three, how many cycles of length four must there be? Linial and Morgenstern (2016) conjectured that the minimum is asymptotically attained by “blowing up” a transitive tournament and orienting the edges randomly within the parts. This is reminiscent of the tight examples for the famous Triangle and Clique Density Theorems. We prove the conjecture for  $d \geq 1/36$  using spectral methods. We also show that the family of tight examples is more complex than expected and fully characterise it for  $d \geq 1/16$ . Joint work with Timothy Chan, Andrzej Grzesik and Daniel Král’.