COMPLETE SUBGRAPHS IN MULTIPARTITE GRAPHS

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Turán's Theorem states that every graph G of edge density $\|G\|/\binom{|G|}{2} > \frac{k-2}{k-1}$ contains a complete graph K^k and describes the unique extremal graphs. We give a similar Theorem for ℓ-partite graphs. For large ℓ, we find the minimal edge density d_ℓ^k, such that every ℓ-partite graph whose parts have pairwise edge density greater than d_ℓ^k contains a K^k. It turns out that $d_\ell^k = \frac{k-2}{k-1}$ for large enough ℓ, disproving a conjecture by Bondy, Chen, Thomassé and Thomassen. We also describe the structure of the extremal graphs.

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