CHUN-HUNG LIU, Princeton University
Minimum degree and lengths of cycles

We will address several minimum degree conditions for graphs forcing the existence of cycles of specific lengths.

First, we prove that every graph of minimum degree at least $k+1$ contains $\lfloor k/2 \rfloor$ cycles with consecutive even lengths. When k is an even integer, it confirms one of Thomassen's conjecture which states that every graph of minimum degree at least $k+1$ contains a cycle of length $2m$ modulo k, for each integer m with $0 \leq 2m < k$. Our result is tight and improves a theorem of Fan.

Second, we prove that every graph of minimum degree at least $k+4$ contains k cycles whose lengths forming an arithmetic progression of common difference one or two. This implies that minimum degree $k+4$ suffices in the mentioned Thomassen's conjecture for odd k and improves the best previous result of this conjecture which was proved by Diwan.

Third, we prove that the mentioned minimum degree condition can be further improved to be $k+3$ for 3-connected non-bipartite graphs. This improves another result of Fan and provides a better answer of a question of Bondy and Vince.

This work is joint with Jie Ma.