Equitably 2-colourable even cycle systems

Francesca Merola
Università Roma Tre
merola@mat.uniroma3.it
Andrea C. Burgess
University of New Brunswick
andrea.burgess@unb.ca

An ℓ-cycle decomposition of a graph G is said to be *equitably c-colourable* if there is a c-vertex-colouring of G such that each colour is represented (approximately) an equal number of times on each cycle: more precisely, we ask that in each cycle C of the decomposition, each colour appears on $\lfloor \ell/c \rfloor$ or $\lceil \ell/c \rceil$ of the vertices of C. In this talk, we consider the case $c = 2$ and present some new results on the existence of 2-colourable even ℓ-cycle systems of the cocktail party graph $K_v - I$. In particular, we determine a complete existence result for equitably 2-colourable ℓ-cycle decompositions of $K_v - I$, ℓ even, in the cases that $v \equiv 0, 2 \pmod{\ell}$, or ℓ is a power of 2, or $\ell \in \{2q, 4q\}$ for q an odd prime power, or $\ell \leq 30$. We will also discuss some work in progress on analogous problems for cycles of odd length.