1171-05-106 Ron Aharoni, Eli Berger, Maria Chudnovsky and Shira Zerbib* (zerbib@iastate.edu). Two generalizations of the Caccetta-Haggkvist conjecture. Preliminary report.

The Caccetta-Haggkvist (CH) conjecture is that the directed girth dgirth(G) of a directed graph D on n vertices is at most $\lceil \frac{n}{\delta^+(D)} \rceil$, where dgirth(D) is the smallest length of a directed cycle in G, and $\delta^+(D)$ is the minimal out-degree of a vertex. We offer the following generalization: $dgirth(D) \leq \lceil \sum_{v \in V(D)} \frac{1}{deg^+(v)} \rceil$. We prove this conjecture up to a factor of 2: $dgirth(D) \leq 2\lceil \sum_{v \in V(D)} \frac{1}{deg^+(v)} \rceil$.

We also offer a common generalization of the above conjecture and a colorful generalization of the CH conjecture: given n sets F_i of edges in an undirected graph on n vertices, there exists a rainbow cycle of length no larger than $\left[\sum_{v \in V(G)} \frac{1}{|F_i|}\right]$. We prove this in the case that $|F_i| \leq 2$ for all $i \leq n$. (Received August 09, 2021)