TS(v, λ) with cyclic 2-intersecting Gray codes: $v \equiv 0$ **or** $4 \pmod{12}$

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A TS(v, λ) is a pair $(V, \mathcal{B})$ where V contains v points and $\mathcal{B}$ contains 3-element subsets of V so that each pair in V appear in exactly λ blocks. A 2-block intersection graph (2-BIG) of a TS(v, λ) is a graph where each vertex is represented by a block from TS(v, λ) and each pair of blocks $B_i, B_j \in \mathcal{B}$ are joined by an edge if $|B_i \cap B_j| = 2$. We show that there exists a TS(v, λ) for $v \equiv 0$ or $4 \pmod{12}$ whose 2-BIG is Hamiltonian. This is equivalent to the existence of a TS(v, λ) with a cyclic 2-intersecting Gray code.

Keywords: triple system, block intersection graphs, Gray codes, Hamilton cycle