Extensions of Steiner Loops

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Let S be a Steiner triple system and let $\Omega \notin S$ be a further element. The set $L_S = S \cup \{\Omega\}$, with the binary operation $\cdot$ defined by the properties:
for any distinct $x, y \in S$, $x \cdot y = z$, where z is the third point in the triple of S containing x and y;
for any $x \in L_S$, $x \cdot x = \Omega$ and $x \cdot \Omega = \Omega \cdot x = x$,
is called a Steiner loop (of projective type). In the talk we study Steiner triple systems S as extensions of Steiner normal subsystems N by the quotient Steiner systems Q, by means of the associated Steiner loops L_S (of projective type). On the one hand, we deal with non-central extensions L_S of normal subloops L_N of index 2, which form projective hyperplanes N of the Steiner triple systems S. On the other hand, we realize that the set of Veblen points of a Steiner triple system S corresponds to the center of the Steiner loop L_S and the loop L_S is a Schreier extension of its center by the quotient loop L_Q, which is determined by a factor system f.

References

[1] G. Falcone, A. Figula, M. Galici; *Extensions of Steiner Loops*, submitted for publication, (2023), pp. 23.