Abstract ovals of small order

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The concept of oval in a projective plane of order $n$ was generalized by Buekenhout to that of abstract oval of order $n$, that is a set $M$ of $n$ elements together with a quasi sharply 2-transitive set of $n^2$ involutorial permutations of $M$ [see F. Buekenhout, Rend. Mat. Appl., V. Ser. 25, 333-393]. An abstract oval isomorphic to an oval in a projective plane is called projective.

All abstract ovals of order $n \leq 8$ have been classified. In particular, there are two non-projective abstract ovals have order 8. Nothing is known about the existence of non-projective abstract ovals of bigger order.

In this talk we present an algorithm for an exhaustive search of abstract ovals of order 9, based on the classification of the 1-factorizations of the complete graph with 10 vertices.

The following result has been obtained: There are exactly 5 non-isomorphic abstract ovals of order 9, all of them projective.