

Title: Groups represented by incidence geometries

Abstract: We develop an incidence-geometric framework that simultaneously models the inner and outer automorphisms of a group. For any group G , we attempt to associate an incidence system, called an *incidence geometric representation*, such that the type-preserving automorphism group is $\text{Inn}(G)$, while the full automorphism group is $\text{Out}(G)$. In this setup, $\text{Inn}(G)$ preserves the type structure, whereas $\text{Out}(G)$ acts nontrivially on the type set, realizing outer automorphisms as correlations. We construct such representations for dihedral and symmetric groups, the automorphism groups of the Platonic solids, various classical groups over fields including projective linear groups, and certain subgroups of free groups whose outer automorphism groups coincide with the largest finite subgroups of their automorphism groups. This is joint work with Dimitri Leemans and Philippe Tranchida.