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Applications of incomplete pairwise balanced designs

In this talk, I will describe applications of our existence results for incomplete pairwise balanced designs, $\text{IPBD}((v; w), K)$. IPBDs provide a surprisingly powerful tool for constructing designs with substructures. We describe two basic techniques for applications: using an IPBD as a 'template' in constructions and using IPBDs instead of PBDs in PBD-closure. Several examples will be given to illustrate the power of these techniques. These examples include using IPBDs to construct incomplete mutually orthogonal latin squares and resolvable designs with sub-designs. All of this work is joint work with Peter Dukes.