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Sarvate-Beam Group Divisible Designs

The existence of Sarvate-Beam designs is explored, named after its founders D.G. Sarvate and W. Beam. In an adesign, the number of times a specified pair of points occurs together in a block is called the pair frequency. A Sarvate-Beam design is an adesign where the set of pair frequencies cover an interval of distinct nonnegative integers. The main result of this work is to completely settle the existence of uniform Sarvate-Beam group divisible designs with blocks of size three where the smallest pair frequency is zero. Higher starting frequencies are also considered and mostly settled. A case of special interest are Sarvate-Beam group divisible designs with three uniform groups, which has a nice geometric interpretation. This work is joint with Dr. Peter Dukes.