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Circular external difference families, graceful labellings and cyclotomy

We discuss a variety of external difference families (EDFs), including strong and circular variants. The study of these combinatorial objects is motivated by applications to robust and nonmalleable threshold schemes. However, they are also of intrinsic interest, apart from applications. In this talk, we mainly discuss mathematical aspects, especially existence and nonexistence, of circular and strong circular EDFs. Two of the interesting construction techniques involve using graceful labellings to construct circular EDFs, and using classical results on cyclotomic numbers to obtain close approximations to (nonexistent) strong circular EDFs.