Recent Results on Difference Sets with Classical Parameters

Abstract: Singer in 1938 discovered a large class of difference sets which are related to finite projective geometry. These difference sets have parameters

$$v = \frac{q^d - 1}{q - 1}, \qquad k = \frac{q^{d-1} - 1}{q - 1}, \qquad \lambda = \frac{q^{d-2} - 1}{q - 1}, \qquad (1.1)$$

where $d \geq 3$, and they exist whenever q is a prime power.

In this talk, we discuss constructions of *inequivalent* difference sets with parameters (1.1) (classical parameters). These include the GMW construction and constructions using hyperovals. The p-ranks of these difference sets will be discussed.

Cyclic difference sets are the same objects as binary sequences with two-level autocorrelation functions. These sequences have many applications in radar, spread-spectrum communications and cryptography. Therefore this talk should be interesting to engineers also.