Steve Cohen speaks on

The Hansen-Mullen conjecture on primitive polynomials

An important, though natural, conjecture of T Hansen and G L Mullen (1992) is that, for any 4-tuple (q, n, m, a), where $0 < m < n$, and $a \in \mathbb{F}_q$, there exists a (monic) primitive polynomial $f(x) \in \mathbb{F}_q[x]$ having degree n whose m-th coefficient, i.e., the coefficient of x^{n-m}, is a. An obvious exception is any 4-tuple $(q, 2, 1, 0)$, and thereare other genuine exceptions $(4, 3, 1, 0)$, $(4, 3, 2, 0)$, $(2, 4, 2, 1)$.
At the time of its formulation it was known to be true when $m = 1$. From other studies it is now known to be true unconditionally (in particular, not just for large q) for other small fixed values of m. Further, it is known to be true for $m \leq \frac{n}{3}$ (Cohen) and, most recently, when q is *even* and n (≥ 7) is *odd* (Fan and Han).
The talk will outline a proof of the the full conjecture, including the more difficult cases when m is close to $\frac{n}{2}$.
A complete proof of the conjecture is available for $n \geq 9$: work is in hand on refinements to deal efficiently with smaller values of n.