Gallagher's larger sieve

Abstract: Conventional sieve methods break down when nearly all residue classes are removed modulo p. To address this, P. X. Gallagher, in 1970, introduced a new sieve method. Gallagher's larger sieve states that if, for each prime power $t \in \mathcal{T}$, all but $u(t)$ residue classes modulo t are removed, then the number of integers remaining in any interval of length X is at most

$$\left(\sum_{t\in\mathcal{T}} \Lambda(t) - \log(2X)\right) \Big/ \left(\sum_{t\in\mathcal{T}} \frac{\Lambda(t)}{g(t)} - \log(2X)\right),$$

provided the denominator is positive, where Λ is the von Mangoldt function.

In the seminar, we will discuss the proof of Gallagher's larger sieve and its applications.