

Sampling - Background

Cauchy Cardinal Series Sampling Theorem

$$f(t) = \sum_{|n| \leq M} c_n e^{2\pi i t n}, \quad N = 2M + 1$$

(f is M -Bandlimited). Then

$$f(t) = \sin(\pi t N) \sum_{m=0}^{N-1} \frac{1}{N} f\left(\frac{m}{N}\right) \frac{(-1)^m}{\sin \pi \left(t - \frac{m}{N}\right)}$$

(1841).

Analytic Number Theory

Interpolation

von Koch (1894)

PNT (1896)

Steffensen (1914)

Borel, Hadamard,

de la Vallée-Poussin

(1898 - 1908)

E.T. Whittaker (1915) introduced the term
cardinal function

for

$$f_c(t) = \sin(2\pi t \Omega) \sum T f(nT) \frac{(-1)^n}{\pi(t - nT)},$$

$2T\Omega = 1$. The Classical Sampling Theorem is

$\forall f \in PW_{\Omega}, f = f_c$ in L^2 and uniformly.