Khintchine's Inequalities and the L^p-Boundedness of the Dyadic Martingale Square Function

Abstract: Last week we demonstrated how Khintchine's inequalities for Rademacher functions could be used to establish the upper estimate in the following Burkholder-type inequality:

$$C_{p,n}^{-1}\|f\|_{L^p(\mathbb{R}^n)} \leq \left\| \left(\sum_{k\in\mathbb{Z}} |D_k(f)|^2 \right)^{1/2} \right\|_{L^p(\mathbb{R}^n)} \leq C_{p,n}\|f\|_{L^p(\mathbb{R}^n)},$$

where $f \in L^p(\mathbb{R}^n)$, $p \in (1,\infty)$, and D_k is the dyadic martingale difference operator at scale $k \in \mathbb{Z}$. In this talk, we will continue with the proof of the Burkholder-type inequality by verifying the lower estimate. In addition, we will provide a detailed proof of Khintchine's inequalities.