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Schatten Properties of Commutators

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Given a quantum tori $\mathbb{T}^d_\theta$, we can define the Riesz transforms $\mathfrak{R}_j$ on the quantum tori and the commutator $x_i := [\mathfrak{R}_i, M_x]$, where M_x is the operator on $L^2(\mathbb{T}^d_\theta)$ of pointwise multiplication by $x \in L^\infty(\mathbb{T}^d_\theta)$. In this talk, we will characterize the Schatten properties of the commutator $[\mathfrak{R}_i, M_x]$ by showing that $x \in B^\alpha_{p,q}(\mathbb{T}^d_\theta)$, where $B^\alpha_{p,q}(\mathbb{T}^d_\theta)$ is the Besov space on quantum tori. Futhermore, we will extend this characterisation to the more general case where $\mathfrak{R}_j$ replaced by an arbitrary Calderon-Zygmund operator. To date, these new results treat the quantum differentiability in the strictly noncommutative setting.

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