SUB-GAUSSIAN HEAT KERNEL ESTIMATES AND QUASI RIESZ TRANSFORMS FOR $1 \leq p \leq 2$

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Abstract: On a complete non-compact Riemannian manifold M, we prove that a so-called quasi Riesz transform is always L^p bounded for $1 < p \leq 2$. If M satisfies the doubling volume property and the sub-Gaussian heat kernel estimate, we prove that the quasi Riesz transform is also of weak type $(1, 1)$.