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10. Partial Differential Equations

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Wave Equation for the Hermite Operator

In this lecture we talk about the Cauchy problem for the wave equation for the Hermite operator $H = -\Delta + |x|^2$ where $\Delta = \sum_{j=1}^{n} \frac{\partial^2}{\partial x_j^2}$ is the Laplacian on $\mathbb{R}^n$. We show that the solution $u(x,t)$ of the wave equation converges to the L^p initial data as $t \to 0$. This is done by expressing the solution in terms of the Weyl transform $W(\mu_t)$ of the normalised surface measure μ_t on the sphere $|z| = t$ in$\mathbb{C}^n$ and proving the L^p boundedness of the associated maximal operator $Mf(z) = sup_{t>0}|W(\mu_t)f(z)|$.