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**Matthew B Stenzel\*** ([stenzel@math.ohio-state.edu](mailto:stenzel@math.ohio-state.edu)), Ohio State University, Newark Campus, 1179 University Drive, Newark, OH 43055. *Sharp bounds for the heat kernel on certain symmetric spaces of the non-compact type*. Preliminary report.

We give new sharper than Gaussian bounds for the heat kernel on rank one and split rank globally symmetric spaces of the non-compact type of the form  $K(t, x, y) \leq C_T t^{-n/2} e^{-d^2(x,y)/4t} \theta^{-1/2}(x, y)$ , valid uniformly for  $(t, x, y) \in (0, T] \times X \times X$ . Here  $\theta(x, y)$  is the Jacobian of  $\text{Exp}_x$  evaluated at  $\text{Exp}_x^{-1}y$ ; the factor  $\theta^{-1/2}(x, y)$  decays exponentially as  $d(x, y) \rightarrow \infty$ . The proof uses a very explicit expression for  $\Delta_y \theta^{-1/2}$  in terms of the restricted roots and a modified Minakshisundaram-Pleijel paramatrix. The motivation for this estimate is to extend Brian Hall's "phase space bounds" on Lie groups to symmetric spaces. (Joint work with Brian Hall). (Received September 28, 2000)