1096-53-668 **Matthew McGonagle*** (mcgonagle@math.jhu.edu), Department of Mathematics, Johns Hopkins University, Baltimore, MD 21218, and **John Ross**. *The Hyperplane is the Only Stable, Smooth Solution to the Isoperimetric Problem in Gaussian Space.*

We study hypersurfaces $\Sigma^n \subset \mathbb{R}^{n+1}$ that are second order stable critical points for minimizing $\int_\Sigma e^{-\frac{|x|^2}{4}}\, dA$ for compact variations that preserve gaussian weighted volume. These Σ satisfy the curvature condition $H = \langle x, N\rangle/2 + C$ where C is a constant.

Our first main result is that for non-planar Σ, bounds for the index of the associated Jacobi operator L, acting on volume preserving variations, gives us that Σ splits off a linear space. A corollary of this result is that hyperplanes are the only stable smooth complete solutions to this gaussian isoperimetric type problem, and that there are no hypersurfaces of index one. Finally, we show that for the case of $\Sigma^2 \subset \mathbb{R}^3$, there is a gradient decay estimate for fixed bound $|C| \leq M$ (where C is from the curvature condition) and Σ obeying an appropriate volume growth bound. This shows that with good volume growth bounds and uniform bounds on $|C|$, in the limit as $R \to \infty$, stable $(\Sigma, \partial\Sigma) \subset (B_{2R}(0), \partial B_{2R}(0))$ approach hyperplanes. (Received September 09, 2013)