1063-11-253 **Kristin Estella Lauter*** (klauter@microsoft.com), One Microsoft Way, Redmond, WA 98052, and **Eyal Z. Goren**. *A Gross-Zagier formula for quaternion algebras over totally real fields.*

The values of the elliptic modular j-function at imaginary quadratic numbers are called singular moduli. They generate the Hilbert class field of the imaginary quadratic field and are of fundamental importance in the study of elliptic curves and in algebraic number theory, including the study of elliptic curves over finite fields. The formula of Gross and Zagier for the factorization of the norm of differences of singular moduli can be viewed as a solution to the problem of counting simultaneous embeddings of the rings of integers of two imaginary quadratic fields into a maximal order in the quaternion algebra ramified only at p and infinity. In this talk I will describe results generalizing Gross and Zagier's formula to counting simultaneous embeddings of the rings of integers of two primitive quartic CM fields into certain orders in a quaternion algebra over a totally real field. This result has applications to the problem of constructing genus 2 curves for use in cryptography. (Received August 17, 2010)