1042-11-198 **Abhinav Kumar*** (abhinav@math.mit.edu), Department of Mathematics, MIT, 77 Massachusetts Avenue, Cambridge, MA 02139, and **Henry Cohn** (henry.cohn@microsoft.com), Microsoft Research New England, One Memorial Drive, Cambridge, MA 02142. *Lattices, sphere packings and energy minimization.*

What are the "best" lattices in low dimensional Euclidean spaces? One way to single out particularly nice lattices is to ask for the lattices which minimize potential energy for reasonable functions. For instance, studying the potential energy of lattices for the Gaussian or inverse power law potentials amounts to studying the values of the theta functions or Epstein zeta functions. In this talk, I will describe recent work with Henry Cohn on this question in low dimensions. I will also describe the connections to the sphere packing problem and survey briefly some interesting results due to Sarnak-Strombergsson, Coulangeon and others. (Received August 19, 2008)