1057-55-455   **Vassily Gorbounov*** (`vgorb@maths.abdn.ac.uk`), university of aberdeen, aberdeen, ab25 2ts, Scotland. *Hilbert schemes of points of a surface and the black hole entropy of hyper Kahler manifolds.* Preliminary report.

Mathematically the black hole entropy of a hyper Kahler manifold M as defined by Vafa is related to a special property of the elliptic genus of M. Namely the elliptic genus of M is not just a Jacobi form it but admits a decomposition into the characters of the N=4 super conformal algebra. These are of two types, the massive and massless. The former are essentially theta functions and the later are the Mock theta functions. The collection of the multiplicities of the massless characters defines the entropy. In a series of papers T. Eguchi calculated the multiplicities of the massless characters in the Hilbert scheme of points on K3 surface. He has stated a problem of calculating these multiplicities for an arbitrary hyper Kahler manifold. In this talk we propose a way of solving this problem. We claim that the set of manifolds of the Hilbert schemes of n points on K3 surface is a set of multiplicative denerators of the cobordism ring of the symplectic manifolds, hence the Eguchi calculation defines the entropy of any hyper Kahler manifold. To prove the claim we need to show that the Milnor number of the hilbert scheme of points on K3 is not zero. (Received January 27, 2010)